



**INDUSTRY SECTORAL APPROACHES
AND CLIMATE ACTION:
FROM GLOBAL TO LOCAL LEVEL IN A
POST-2012 CLIMATE FRAMEWORK**

***A Review of Research, Debates
and Positions***

Copyright © United Nations Environment Programme, 2009

This publication may be reproduced in whole or in part and in any form for educational or non-profit purposes without special permission from the copyright holder, provided acknowledgement of the source is made. UNEP would appreciate receiving a copy of any publication that uses this publication as a source.

No use of this publication may be made for resale or for any other commercial purpose whatsoever without prior permission in writing from the United Nations Environment Programme.

Disclaimer

The designations employed and the presentation of the material in this publication do not imply the expression of any opinion whatsoever on the part of the United Nations Environment Programme concerning the legal status of any country, territory, city or area or of its authorities, or concerning delimitation of its frontiers or boundaries. Moreover, the views expressed do not necessarily represent the decision or the stated policy of the United Nations Environment Programme, nor does citing of trade names or commercial processes constitute endorsement.

About this Discussion Paper

This Discussion Paper on Industry Sector Approaches to Climate Change is intended to assist negotiators, policy-makers and other interested parties in the definition, development and implementation of sectoral approaches. In doing so, it seeks to provide a broad introduction to non-specialists on the subject of sectoral approaches.

Earlier drafts of this document were developed over 2008-2009 and circulated for comment to interested parties. This version of the Discussion Paper has been revised to provide for these comments and to reflect the outcomes of the last round of negotiations immediately prior to the 15th Conference of the Parties in Copenhagen in December 2009.

At the time of completing this document much uncertainty remains regarding the nature and extent to which sectoral approaches will form part of a post-Kyoto climate framework, with the possible timing of their development and implementation also unclear. Of necessity this is a very fluid area, the direction of which could be significantly affected over a short time period depending on the outcome of the ongoing UNFCCC negotiations.

In seeking to achieve its objectives, this Discussion Paper:

- provides an overview of some of the key issues pertaining to the development of sectoral approaches as part of a post-2012 global climate change agreement (Chapter 1);
- reviews some of the more prominent publications and workshop contributions of research bodies and think tanks on sectoral approaches that have been provided over the past two years (Chapter 2);

- outlines the positions and activities of key industry bodies on industry sectoral approaches (Chapter 3); and
- provides an analysis of the outcomes of the above reviews – identifying some of the key challenges, risks and opportunities associated with sectoral approaches and suggesting what is required, workable and politically realistic as possible solutions for a post-Kyoto regime – before reviewing the recent UNFCCC negotiations on sectoral approaches (Chapter 4).

The Discussion Paper is based on a review that considers:

- research papers by leading policy research bodies and think tanks on the subject;
- various business position papers on sectoral approaches;
- the submissions of Parties to the UNFCCC negotiations during 2008 - 2009;
- the outcome of discussions at the UNEP Business & Industry Global Dialogue 2008; and
- the views of selected individuals contributing to the UNFCCC negotiations and/or involved in the development of sectoral approaches.

This draft discussion paper has been prepared by Incite Sustainability (www.incite.co.za), led by Jonathon Hanks. It was done under guidance of the UNEP Division of Technology, Industry and Economics, and in particular Kaveh Zahedi, Climate Coordinator, and Cornis van der Lugt, Resource Efficiency Coordinator of UNEP. Andrea Bacher and Brigitte Steinberg-Hines, UNEP consultants, also contributed to the research. The information provided in this paper is the sole responsibility of the authors.

“ The structure of some industrial sectors is so highly concentrated that just a handful of companies are responsible for producing a significant share of that sector’s total greenhouse gas emissions worldwide. These sectors are thus a ‘natural’ focus of policy-makers concerned with climate change... So-called ‘sectoral approaches’ are seen as having the potential to broaden the range of contributions by all parties, including emerging economies, to greenhouse gas emissions reductions, and to help moderate competitiveness concerns in trade-exposed industries. ”

The Centre for European Policy Studies (2008)

“ For the African Group, this issue of cooperative sectoral approaches seems to be a tricky one and it cautioned about using it indistinctly for both developed and developing countries. In short, it should not create additional constraints or incremental costs for developing countries. For the G77 and China, sectoral actions should be voluntary and compatible with an open international economic system. In future discussions on this issue, it would be of the continent’s interest to consider the potential of cooperative sectoral approaches for the implementation of NAMAs in developing countries. Developed countries may contribute to their implementation through international sector-based programmes. ”

African Ministerial Conference on the Environment (2009)

Table of Contents

FOREWORD	7
EXECUTIVE SUMMARY	8
1 THE SECTORAL APPROACH TO CLIMATE CHANGE: INTRODUCTION AND OVERVIEW	12
1.1 A changing international policy context	12
1.2 Defining “sectoral approaches”	14
1.3 Benefits of sector-based approaches	16
1.4 Limitations of sectoral approaches	16
1.5 Identifying appropriate sectors for a sectoral approach	17
1.6 Agreeing the scope of the commitment	19
2 RECENT RESEARCH ON THE SECTORAL APPROACH	20
2.1 World Resources Institute (WRI)	20
2.2 International Institute for Sustainable Development (IISD)	22
2.3 The Pew Center on Global Climate Change	23
2.4 Institut du développement durable et des relations internationales (IDDRI)	25
2.5 The Climate Group and The Breaking the Climate Deadlock initiative	26
2.6 Ecofys and GtripleC	29
2.7 Centre for European Policy Studies (CEPS)	32
2.8 Centre for Clean Air Policy (CCAP)	33
2.9 International Energy Agency (IEA)	38
2.10 Organisation for Economic Cooperation and Development (OECD)	44
3 INDUSTRY ORGANISATIONS AND THE SECTORAL APPROACH	48
3.1 International Chamber of Commerce (ICC)	48
3.2 World Business Council for Sustainable Development (WBCSD)	50
3.3 The Asia Pacific Partnership (APP) on Clean Development and Climate	52
3.4 The Aluminium sector	53
3.5 The Cement sector	56
3.6 The Iron and Steel sector	61
3.7 The Transportation sector	64
3.8 The Electricity sector	69
3.9 The Chemicals sector	70
3.10 The Oil and Gas sector	70

4	SECTORAL APPROACHES IN A POST-KYOTO CLIMATE FRAMEWORK	74
4.1	Sectoral approaches and the post-Kyoto regime: A useful way forward?	74
4.2	Should sectoral approaches be part of a post-Kyoto climate framework?	74
4.3	Identifying feasible and effective options for sectoral approaches	75
4.4	What issues need to be addressed as part of a post-Kyoto framework?	78
4.5	The UNFCCC Negotiations on sectoral approaches: Preparing for Copenhagen and beyond	81
4.6	Introducing sectoral approaches in the post-Copenhagen framework	86
	ANNEX I – OVERVIEW OF PARTIES’ SUBMISSIONS ON SECTORAL APPROACHES	90
	SELECTED REFERENCES	94

Tables

Table 1	– Ecofys evaluation of three sectoral approaches (ECOFYS, 2008)	31
Table 2	– Top ten non-Annex I countries for key industrial sectors (CCAP, 2006)	38
Table 3	– Summary review of the Aluminium sector	54
Table 4	– Summary review of the Cement sector	59
Table 5	– Summary review of the Steel sector	63
Table 6	– Summary review of the Air Transportation sector	66
Table 7	– Summary review of the Automobile Manufacturing sector	67
Table 8	– Summary review of the Maritime Transport sector	68
Table 9	– Summary review of the Power Generation sector	71
Table 10	– Summary review of the Chemicals sector	72
Table 11	– Summary review of the Oil & Gas sector	73

Boxes

Box 1 – The Bali Action Plan and UNFCCC on Sectoral Approaches	13
Box 2 – WRI activities on sectoral approaches	20
Box 3 – IISD activities on sectoral approaches	22
Box 4 – Pew Center activities on sectoral approaches	23
Box 5 – IDDRI activities on sectoral approaches	25
Box 6 – The Climate Group activities on sectoral approaches	27
Box 7 – Ecofys / GtripleC activities on sectoral approaches	29
Box 8 – CEPS activities on sectoral approaches	32
Box 9 – CCAP activities on sectoral approaches	34
Box 10 – IEA / OECD activities on sectoral approaches	39
Box 11 – OECD activities on sectoral approaches	44
Box 12 – ICC activities on sectoral approaches	48
Box 13 – A carbon investor’s perspective on sectoral approaches	85
Box 14 – Providing for the core characteristics of sectoral approaches	88
Box 15 – Summary of the AWG-LCA Workshop on sectoral approaches	92

Foreword

Scientific evidence of climate change in recent years, worse than predicted earlier in middle-ground scenarios, have raised the pressure on leaders world-wide to come to a global agreement. In our work with business and industry, UNEP has in the last two years also seen an increased sense of urgency among business leaders to reach agreement on basic principles and rules to enable decisive climate action in all industries. This came with a sense of pragmatism, as the business impacts and costs of inaction become increasingly clear.

The ideal climate solution has to be a comprehensive one, mobilising collaboration from all regions. At the same time pragmatic solutions need to be found so that full advantage can be taken of initial low cost opportunities. This applies particularly to those sectors that are highly energy intensive and most implied in the climate mitigation debate. In this respect, sector approaches have received careful consideration as one practical way of speeding up the pace of action. This is particularly relevant at national level, as Governments explore ways that best meet the realities of local markets. It is also relevant as we explore sound technologies and standards that are most appropriate in the context of an industry sector globally.

Against this background, UNEP has convened a dialogue with business and industry representatives from all regions to assess the value of sectoral approaches and to consider what is achievable from the perspective of different industry sectors. What we have gathered from these discussions during 2008-2009 is that there is a general lack of understanding of what sectoral approaches would entail and in what ways they could help to speed up action whilst considering competitiveness concerns of different organisations and economies. What is clear is that the

development of implementation modalities, including definition of financial support, efficiency standards, technology transfer and reporting boundaries need to take cognizance of the realities of individual industry sectors. This does not imply moving away from more optimal solutions that can be found in integrated, systemic approaches that cover full value chains across different sectors. Rather, it means taking a multiple strategy that seeks to advance the pace of action in a pragmatic fashion.

Ongoing climate deliberations from global to local level in the months to come will determine to what extent sectoral approaches will be employed in defining the use of market mechanisms, new climate funds, national action plans, target setting and monitoring measures. This will require focused decision-making from leaders and managers both in the public and private sector. It will also require a concerted effort in capacity building, ensuring an improved understanding of industrial risks and opportunities and getting in place proper systems for data measurement, reporting and verification.

UNEP is ready to continue working with Governments, business and industry partners and other stakeholders in building capacity so that implementation of a new agreement can advance. Our growing work programme with resource intensive sectors such as buildings, transport and others follows both a sectoral and systems approach. We trust that our partners and decision-makers generally will benefit from the overview provided in this report, setting out various options and industry positions that need to be considered.

Sylvie Lemmet, Director, UNEP Division of Technology, Industry and Economics

Executive Summary

Efforts to develop a post-Kyoto agreement on climate change have been guided by the provisions contained in the Bali Action Plan, concluded at the UNFCCC's 13th Conference of the Parties in December 2007. Article 1(b)(iv) of the Bali Action Plan (see Box 1) provides for "cooperative sectoral approaches and sector-specific actions" as part of national and international action on climate change mitigation. This Discussion Paper examines the potential role for such sectoral approaches (broadly defined) as part of a post-2012 climate regime. The paper is intended to assist negotiators, policy-makers and other interested parties in the definition, development and implementation of such approaches as part of national action plans. This document also seeks to provide a broad introduction to non-specialists on this subject area.

Based on a comprehensive review of the findings and sectoral-related activities of leading research organisations and key industry bodies, and on an assessment of the UNFCCC negotiations up to December 2009, the paper considers some of the critical questions and issues that need to be considered relating to the merits and implications of including sectoral approaches within a post-Kyoto climate framework. In the belief that sectoral approaches offer some potentially significant benefits as part of global climate mitigation efforts, the paper identifies some of the challenges associated with designing sectoral approaches that seek to find an appropriate balance between environmental effectiveness, economic efficiency, social equity, and political, technical and institutional feasibility.

In doing so, the paper seeks to provide guidance to policy-makers on the following sets of questions:

- What are sectoral approaches?
- Which sectors might be most appropriate for developing sectoral approaches?
- Is there merit in seeking to develop and implement sectoral approaches?
- Should sectoral approaches be developed within the UNFCCC process?
- What decisions are needed by UNFCCC negotiators to define the policy foundation for sectoral approaches?
- In implementing sectoral approaches, what issues do national decision-makers need to consider?

This executive summary presents a brief synopsis of the key

conclusions relating to each of the above questions that result from the study undertaken in this paper.

What are sectoral approaches?

A range of different activities have been identified and described as falling under the heading of "sectoral approaches". The lack of a common understanding regarding the nature and intent of sectoral approaches has been seen to impede their initial development. A useful means for classifying these various activities is to distinguish between those that focus on a specific sector (across national boundaries), and those that focus on the domestic sectoral policies of national governments:

- **Transnational sector-based initiatives** – these include:
 - **Voluntary industry-to-industry initiatives:** transnational initiatives with commitments relating to quantitative reduction targets and/or technology transfer (e.g. the WBCSD's Cement Sustainability Initiative);
 - **Public/private partnerships:** similar to the above, but with government involvement (e.g. the Asia Pacific Partnership); and
 - **Government commitments on transnational sectors:** in which governments commit to actions (at a bilateral, regional or multilateral level) intended to reduce GHG emissions from a given sector.
- **National government sector-based initiatives** – these include:
 - **Country-specific quantitative approach:** in which developing countries earn credits for reductions achieved within a given sector below a pledged voluntary, sector-wide "no lose" GHG baseline;
 - **Sectoral approach to clean development mechanism (CDM):** in which the CDM is broadened from a project- to a sectoral-CDM, with governments involved in defining and negotiating sectoral baselines, and developing appropriate policy frameworks; and
 - **Policy-based approach:** in which developing-country governments secure recognition and support (technical and/or financial, but not tradable credits) for their sustainable development policies and measures (SD-PAM) that have GHG mitigation potential, or as part of their nationally appropriate mitigation action (NAMA) commitments.

The negotiations leading into Copenhagen have narrowed the options down primarily to various forms of national government sector-based initiatives, with explicit provision in the negotiation text being made for domestic-oriented sectoral-crediting and trading mechanisms (including sectoral CDM and “no-lose” targets) and domestic non-credited sectoral approaches, particularly as part of developing countries’ NAMA commitments. The transnational sectoral approach is not seen to be politically viable, having been rejected by most developing countries. The merits and practical implications associated with each of these various options are reviewed in this paper.

Which sectors might be most appropriate for developing sectoral approaches?

There are various criteria to be considered when identifying possible sectors conducive to such an approach. These include:

- **Environmental aspects** – key considerations include:
 - the nature of the sector’s contribution to global GHG emissions, and the anticipated growth in that sector;
 - the technical potential within the sector for achieving emissions reductions; and
 - the ability to attribute, monitor and administer GHG emissions.
- **Political feasibility** – with the aim of facilitating political agreement, the focus should be on those sectors that:
 - are highly traded internationally, thus opening options to address competitiveness concerns;
 - have a high concentration of actors across few countries;
 - are characterised by homogeneity of products and services; and
 - are more likely to be receptive to concluding and participating in such initiatives.
- **Economic and institutional factors** – key considerations include:
 - the nature of the adjustment costs associated with reducing emissions;
 - the potential for avoiding capital lock-in;
 - the nature of technical capacity within specific sectors and countries; and
 - the availability of access to appropriate data and technology.

These considerations are reviewed in more detail in Section 1.5. The implications of these issues are assessed in the context of the following priority sectors: aluminium, cement, iron and steel, transportation, electricity, chemicals, and oil & gas. An assessment of the potential priority of non-OECD countries (in certain key

sectors) for such approaches is provided in Table 2. In the recent UNFCCC negotiations specific provision is also being made for using sectoral approaches within the forestry sector.

Is there merit in seeking to develop and implement sectoral approaches?

It is recognised that a comprehensive, even-handed approach to emissions reductions is the “first best” option in terms of environmental effectiveness and economic efficiency – allowing emissions reductions to occur where they are the cheapest. Yet there are nevertheless strong arguments in favour of including a sectoral approach within the post-Kyoto architecture. If properly designed and effectively implemented, it is argued that sectoral approaches have the potential to overcome a number of political and technical issues of concern to both developed and developing countries. Such approaches:

- allow for greater participation of developing countries in global mitigation efforts;
- provide an opportunity to avoid “locking-in” long-lived carbon-intensive practices in rapidly industrialising countries;
- facilitate the setting of tangible emissions- or technology-based targets within high profile sectors;
- provide an opportunity for developing countries to accelerate the adoption of technology and facilitate access to financing;
- offer the potential, in certain forms, to increase carbon market finance for developing countries; and
- can be designed to address issues relating to competitiveness and emissions leakage between countries and within sectors.

In addition to these significant potential benefits, it is important, however, to recognise that there are some concerns and limitations relating to the use of sectoral approaches. These include the following issues:

- by focusing only on certain selected sectors, the potentially significant emissions from other sectors are ignored;
- there are technical challenges associated, for example, with defining sectoral boundaries, agreeing methodologies, and ensuring appropriate coordination with other national and international policy initiatives and market mechanisms; and
- many developing countries are concerned that sectoral approaches might impede their development opportunities by establishing new international standards on a sectoral basis or by justifying the introduction of trade barriers on particular products or technologies – a number of developing countries have, for example, expressed the concern that sectoral approaches could be used “to bring targets in through the back door.”

Whilst recognising these concerns, this paper nevertheless suggests that – if appropriately designed, and limited to specific types – sectoral approaches can play an important role in a post-Kyoto framework, particularly as regards promoting GHG emissions reduction activities in rapidly growing energy-intensive sectors in developing countries.

Should sectoral approaches be developed within the UNFCCC process?

Although certain sectoral approaches can be (and have been) pursued outside the UNFCCC process – most notably in the form of transnational sector-based initiatives – there are some important considerations in favour of integrating these approaches within the formal UNFCCC process. While some effective sectoral initiatives have been developed by global industry sectoral bodies, the international legal status of these bodies precludes them from imposing binding legal obligations on individual companies. The inherent nature of sector-wide coordinated activity also raises possible complications in terms of antitrust law. Furthermore there is the concern that without appropriate government involvement and a strong focus on domestic policies, such approaches would not deliver the required level of emission reductions. Although not without its own challenges, managing the development of sectoral approaches within the UNFCCC process allows for greater integration with the UNFCCC's financing and institutional mechanisms, and facilitates a more effectively coordinated global response to climate mitigation activities.

What decisions are needed by UNFCCC negotiators to define the policy foundation for sectoral approaches?

To allow for timely implementation of sectoral approaches as part of a post-Kyoto framework, it is important that a structured approach is adopted within the UNFCCC negotiations as part of the process of finalising agreement on the nature of the post-2012 climate framework. Based on the studies reviewed in this document (see especially Baron et al. (2008); Stephenson, (2009); and Ecofys (2008)), the paper identifies the following set of issues on which it is suggested that decisions are needed by negotiators in defining the policy foundation for sectoral approaches:

- **Coordination and coherence within the new climate framework and carbon market** – To coordinate the supply and demand for credits generated within a post-2012 carbon market, clarity will be needed on the relationship between sectoral approaches, the mitigation commitments and activities of developed and developing countries, and the nature of the

transition process relating to existing flexible mechanisms.

- **Various process issues** – Agreement should be reached on a range of suggested process elements pertaining to sectoral approaches, including on the following issues:
 - the process for determining the eligibility of countries and sectors, and for defining sector boundaries, with the aim as far as possible of ensuring the participation of relevant major developing economies and high impact sectors;
 - the methodology for establishing and approving baselines;
 - the nature of possible targets;
 - whether sectoral agreements would be voluntary, and if so whether a critical mass is necessary to bring them into force;
 - the potential data and capacity requirements for implementing a sectoral approach;
 - the nature of the measurement, reporting and verification practices;
 - the format of a registry structure for recording pledges, and the nature of timelines for submitting any such pledges;
 - the procedures relating to the generation and use of any credits generated through market-based sectoral approaches; and
 - agreeing timelines for finalising the development of sectoral approaches.
- **Institutional aspects** – To facilitate the process of developing sectoral approaches, countries should agree on the institutional mechanisms for reviewing and evaluating submissions relating to sectoral approaches; this could, for example, include the establishment of an “expert group” that could be involved in the review of submission and in contributing to the further design of such approaches.
- **Funding issues** – Finally, there will need to be agreement on the level of funding that might be available to develop a sectoral crediting mechanism and/or to fund the provision of direct technology assistance and capacity building initiatives. Ideally the mechanism for generating financial resources should be established and agreement should be reached on the process for allocating these funds to developing countries.

These are substantial issues on which agreement will be needed, adding to an already full agenda – with both political and technical complexity – that is facing climate negotiators. Pending further progress on some of the more political aspects within the UNFCCC negotiations, it is uncertain as to when agreement might be concluded on the above suggested framework issues relating to sectoral approaches. Whatever the outcome of the COP-15 meeting of the UNFCCC, there will be significant further work after the meeting, both at a global level in finalising details of the

policy framework for sectoral approaches, as well as at the level of national policy and decision-making, particularly in developing countries.

In implementing sectoral approaches, what issues do national policy-makers need to consider?

Once agreement has been reached on the broader policy framework, there are a number of specific challenges that will need to be addressed at a national level by policy and decision-makers in developing countries. These include (see also Box 14):

- **Identifying the sector to be covered within a sectoral approach, and agreeing the boundaries that define the scope of activities to be included within the agreement** – recognising that inappropriately set boundaries can undermine the potential benefits of sectoral approaches, for example by excluding valuable mitigation opportunities by setting the boundaries too strictly, rewarding ineffective actions, and/or creating misplaced incentives. It is suggested that systematic and consistent technical rules or guidelines will need to be developed, similar to those that have been used in the construction of GHG inventories from Annex I countries.
- **Setting the benchmarks** – while sectoral benchmarks may seem attractive at first sight, it has been argued (including particularly by developing country representatives) that it would be very difficult to develop a single intensity benchmark for a sector, as there are differences across technologies (even for relatively homogeneous sectors), and also between regions and countries. Benchmarks have to be set keeping in mind the principle of common but differentiated responsibilities.
- **Setting emissions baselines for industry sectors and estimating the GHG reduction potential in the potentially targeted sectors** – this will require an understanding, for example, of the availability of existing technologies, current and anticipated production capacities, regional market dynamics and the nature and impact of possible policy interventions, as well as access to plant-level data (which is often scarce and in many instances considered to be confidential).
- **Agreeing the chosen measurement unit and targets relating to any specific emissions reductions measures** – typically one of the more difficult areas to negotiate, some of the issues to consider include: which GHG gases are measured, whether targets are absolute or intensity-based, and how often they are reviewed and refined; in setting targets it is useful to recognise that the process of doing so in developing countries will be similar to setting caps in Annex I countries.
- **Implementing appropriate policy measures** – pulling all of the above elements together, while at the same time ensuring that there are appropriate incentives to prompt sufficient engagement of relevant parties, will require the development and implementation of targeted policy measures that include an appropriate mix of rewards and penalties.
- **Identifying and addressing capacity-building requirements** – the nature of capacity-building needs required to ensure effective implementation of sectoral approaches, and the possible means for addressing these needs.

Climate change presents international political and business leaders with a challenge of the highest order. Responding meaningfully to this challenge will require profound leadership, courage and action from political and business decision-makers across national and commercial boundaries. If the commitment to containing warming below a 2 °C rise on pre-industrial levels is to be realised, then, for the reasons outlined in this document, it is suggested that innovative sectoral approaches can usefully be part of a new framework for climate action in years to come.

1. The Sectoral Approach to Climate Change: Introduction and Overview

“ The structure of some industrial sectors is so highly concentrated that just a handful of companies are responsible for producing a significant share of that sector’s total greenhouse gas emissions worldwide. These sectors are thus a ‘natural’ focus of policy-makers concerned with climate change... So-called ‘sectoral approaches’ are seen as having the potential to broaden the range of contributions by all parties, including emerging economies, to greenhouse gas emissions reductions, and to help moderate competitiveness concerns in trade-exposed industries. ”

The Centre for European Policy Studies (2008)

The existing international policy framework for climate change is built on a “comprehensive” rather than “sectoral” basis. Informed largely by the United Nations Framework Convention on Climate Change (UNFCCC) and the Kyoto Protocol, the current policy framework focuses on securing economy-wide emissions targets for the six major greenhouse gases (GHG) from all sectors (the only exceptions being emissions from “bunker fuels” used in international aviation and shipping, and from land use and land use change and forestry).

In designing the Kyoto Protocol, negotiators explicitly avoided prescribing where emissions reductions should be attained, focusing instead on developing national reduction targets. From both an economic and environmental perspective this is a “first best” option as it allows emissions reductions to occur where they are cheapest, and it discourages emissions leakage from regulated to unregulated sectors (Colombier, 2008; Bodansky 2007).

Notwithstanding the evident theoretical benefits of a comprehensive approach, policy-makers are increasingly focusing on securing mitigation at a sectoral level, and are seeing “sectoral approaches” as one of the important building blocks of the post 2012 climate architecture. This is evidenced not only in the provisions of the Bali Action Plan (Box 1), but also for example in the G8 statements in Gleneagles and Heiligendamm, and in the establishment of the Asia Pacific Partnership and various industry initiatives.

This Discussion Paper reviews some of the current thinking and activities relating to sectoral approaches, as articulated by research bodies, business organisations and negotiating Parties

to the UNFCCC. This document forms part of a broader process aimed at informing the process leading up to and beyond COP-15 in Copenhagen, December 2009.

1.1. A changing international policy context

The Bali Action Plan, concluded at the 13th COP in December 2007, provides the terms of reference for the development of a new agreement on climate change. Article 1(b)(iv) of the Bali Action Plan (Box 1) provides for “cooperative sectoral approaches and sector-specific actions” as part of national and international action on climate change mitigation. The Article makes specific reference to the role of sectoral approaches in enhancing the implementation of Article 4, paragraph 1(c) of the UNFCCC, which calls on Parties to promote and cooperate in the development, application and diffusion, including transfer, of technologies, practices and processes that control, reduce or prevent GHG emissions in all sectors, with the energy, transport, industry, agriculture, forestry and waste management sectors being specifically identified.

These provisions make it clear that “cooperative sectoral approaches and sector-specific actions” (referred to collectively in this paper as “sectoral approaches”) can be pursued as part of a post-2012 climate framework. While the UNFCCC does not preclude sectoral approaches, the provision in the Bali Action Plan for such approaches has been described as a “radical departure from the existing model for international agreements,” signalling a willingness to move from the economically first-best comprehensive approach (Tyrell, 2008).

1.1.1. Motivations for a sectoral approach

There are various reasons why policy-makers and negotiators from both the developed and the developing world are considering sectoral approaches as a complement or alternative to existing approaches.

An important over-arching rationale is the recognition that the existing international policy framework is not sufficient to effect the changes necessary to keep emissions below those advised by the Intergovernmental Panel on Climate Change (IPCC), and that a broader suite of policy approaches is required. With some major emitting developing countries not yet prepared to accept binding emission reduction targets, and in light of the technical and institutional challenges that many of these countries would face in meeting country-wide targets, there is seen to be benefit in focusing efforts on specific sectors in the hope of securing commitments in areas where emissions trends are easily understood and where policies and measures can be implemented effectively (Colombier, 2008). Furthermore, recognising that some of the high-emitting sectors are dominated by a few corporations with facilities in a small number of countries, there is obvious appeal in seeking to simplify the negotiations by focusing on fewer parties who have a greater commonality of interests.

For developed countries, the principal motivators relate to the issues of competitiveness and leakage. By moving a whole sector towards a technology profile that is broadly similar in emission intensity, this will address the concern that regional carbon regimes will unfairly disadvantage regulated firms, as well as possibly prompting movement of production from relatively low emitting

facilities to higher emitting facilities in developing countries.

For developing countries, the sectoral approach provides the opportunity to accelerate the adoption of technology, while also facilitating access to financing. The major emitting developing countries generally share these interests, but will be seeking to ensure that any achieved reductions would be credited as part of any future mitigation commitments.

From an environmental effectiveness perspective, there is a particular need to engage the larger emerging economies. Not only should we be finding means to avoid “locking-in” long-lived carbon-intensive practices in these rapidly industrialising countries, but we should also be capitalising on the opportunities that greenfield economies present for innovation in new clean technologies, most of which offer valuable accompanying developmental benefits. It is evident that there is an urgent need to engage the larger developing-country emitters as part of a post-2012 deal – while recognising the context of common but differentiated responsibilities – and there is a similar urgency in achieving rapid scale-up in technology and encouraging radical innovation both within and between sectors; this needs to be done at a significantly greater scale than project-based (Clean Development Mechanism (CDM) has been able to deliver (Colombier, 2008).

It is with the belief that sectoral approaches can play a role in encouraging the participation of emerging economies, facilitate the scaling up of technology investments, and address current competitiveness and leakage concerns, that this “second-best” policy approach is being considered.

BOX 1:

The Bali Action Plan and UNFCCC on sectoral approaches

The Conference of the Parties...

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

UNFCCC Article 4 – Commitments

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

1.2. Defining “sectoral approaches”

“ The EU believes that the consideration of sectoral approaches would benefit from a further clarification of what these approaches could be. Early interventions by Parties on this issue at AWG LCA 1 and 2 showed that Parties have indeed very different interpretations of this concept. ”

EU submission to the AWG-LCA (August 2008)

A wide range of ongoing and proposed activities has been identified and described as falling under the heading of “sectoral approaches” (see for example Bodansky, 2007; Baron et al, 2007; CEPS, 2008; Colombier, 2008; Ecofys, 2008), with many commentators suggesting that there has been possible confusion and misunderstanding in recent discussions on sectoral approaches.

An IEA/OECD paper (Baron, R. et al, 2008) identifies the following criteria that may be used to distinguish between different types of sectoral approaches:

- **Their geographical scope:** be it national, regional or international, and relate to developing or developed countries;
- **Nature:** whether they are based on quantitative or qualitative goals, are complementary or stand-alone measures, and whether participation is mandatory or voluntary, depending on country groupings;
- **Nature of incentives to participate:** for example, whether or not they generate credits tradable on the global carbon market, or whether the incentives should cover all or part of emission reductions generated by sectoral actions;
- **Sectoral focus:** whether they include heavy industry with an emphasis on trade-exposed sectors, or focus more on domestic activities (such as electricity generation);
- **The role of accompanying measures:** whether they provide support for capacity building or technology acquisition;
- **Oversight:** how such mechanisms should be supervised (nationally and/or internationally); and
- **Integration:** whether (or to what extent) sectoral approaches should be formally incorporated into the UNFCCC or Kyoto Protocol processes.

In their Discussion Paper on sectoral approaches the International Chamber of Commerce (ICC) argues that although there is not yet a universally accepted template for sectoral agreements, there are

a number of elements that appear to be necessary for any such agreement, namely:

- a definition of sectoral boundaries;
- parties to the agreement;
- the nature (or subject) of the agreement, such as emissions levels, GHG intensity, technical standards, research, technological cooperation and the timeframe to achieve the outcome; and
- procedures for reporting, accountability or enforcement.

Noting these various observations, this section provides a brief review of examples of sectoral approaches. In doing so it distinguishes between those approaches that focus on the sector of activity (across national boundaries), and those that focus on national governments’ domestic sectoral policies (Colombier, 2008; see also Baron et al., 2007).

Using this distinction between transnational and national activities, it is suggested that there are six broad categories of sectoral approaches:

- **Transnational sector-based initiatives:**
 - i) Voluntary industry-to-industry initiatives
 - ii) Public-private partnerships
 - iii) Government-to-government sectoral commitments
- **National (domestic) sector-based initiatives:**
 - iv) Country-specific quantitative approach
 - v) Sectoral approach to the CDM
 - vi) Policy-based approach (SD-PAMs)

These are each briefly reviewed below.

1.2.1. Transnational sector-based industry focus

The first set of examples refers to initiatives that focus on the sector of activity itself (e.g. steel or aluminium production), where the scope for action is not dictated by national boundaries. Such transnational initiatives typically apply to multinational, energy-intensive industries, and their primary aim is to coordinate transnational activities between a significant number of firms in that sector. There are three broad sub-categories of such approaches.

i) Voluntary industry-to-industry initiatives

These refer to transnational industry-to-industry initiatives that seek to engage a sector on a broad international basis. They include activities such as the Cement Sustainability Initiative (CSI) and the climate programmes of the World Steel Association (formerly the International Iron and Steel Institute) and the International Aluminium Institute (IAI) (Chapter 3).

These initiatives could include commitments to:

- a quantitative reduction goal – described by the IEA/OECD as *transnational quantitative sectoral approaches* (Baron et al, 2007); or to
- coordinating R&D and/or diffusing technology – described by the IEA/OECD as *technology-oriented approaches* (Baron et al, 2007).

Typically the existing industry-led initiatives include activities relating to gathering performance data, developing metrics, setting and reporting on voluntary standards and targets, exchanging experience and good practices, and co-operating on technology, with a particular focus on engaging major companies in emerging economies where the greater emissions growth and reduction potential lies (CEPS, 2008).

Although these are frequently of a self-regulatory nature, there is a strong argument to be made that some level of government intervention is necessary to ensure sufficient incentive to go beyond the performance levels typically driven through voluntary initiatives alone.

While these initiatives may be valuable in stimulating best practice, ensuring comparability of effort between developed and developing countries, and creating a level playing field for trade, they are not without controversy. Some developed countries have expressed the concern that international sector agreements could be used as a substitute for, or to weaken, national caps. On the other hand many developing countries are fearful that such agreements would in practice put much of their economies under a binding cap before they deem it fair to do so.

ii) Public-private partnerships

These are similar to the industry-to-industry initiatives referred to above, other than the fact that national governments are expressly included within the initiative. The most visible example of this is the Asia-Pacific Partnership on Clean Development and Climate (Chapter 3). As with industry-to-industry initiatives, they may include commitments to quantitative reduction goals and/or technology R&D and diffusion.

iii) Government-to-government sectoral commitments

This refers to situations in which countries enter into intergovernmental sectoral agreements (at a bilateral, regional or multilateral level) in which governments commit to actions intended to moderate or reduce GHG emissions from a given sector. These agreements could:

- establish sectoral emission targets (an outcomes-based

approach); or

- commit states to adopting harmonised policies and measures for a particular sector – such as technology-based standards, taxes, or best-practice standards (a process-based approach).

These government-to-government agreements could:

- be between Annex I Parties, in the form of quantified or qualitative goals that are agreed for a specific sector in addition to the national emissions target; or
- include non-Annex I Parties with the aim of building the necessary enabling frameworks through financing, technological cooperation and transfer, capacity-building and institutional strengthening.

Bottom-up sectoral analysis/commitments: Building on the approaches outlined above, some commentators have suggested that a sectoral approach be used to provide the analytical foundation for future commitments. It has been suggested that quantitative nation-wide emission reduction targets be determined by analysing the reduction goals for each sector in detail with the results being totalled using a bottom-up process. An example of this is a Japanese proposal for sectoral approaches that was presented at the Bangkok UNFCCC meeting held in April 2008.

1.2.2. National / domestic sector-based focus

The second set of examples refers to initiatives that relate to a national government's domestic sectoral policies; the primary aim of these initiatives is to encourage investment in more efficient capital and operating practices on a public policy basis. These domestic sectoral activities provide a useful possible means for encouraging the participation of developing countries in mitigation activities, while respecting the principle of common but differentiated responsibilities. The scope of activities is potentially wider than in transnational agreements, and can cover for instance the power sector, the building sector, and infrastructure for transport. This is of particular interest as many Governments invest in these sectors at a time of global economic recovery.

iv) Country-specific quantitative approach – with scope for sectoral-crediting (“no-lose targets”)

A number of organisations have suggested a sectoral approach in terms of which non-Annex I Parties would earn credits for any reductions achieved within a given sector below a pledged voluntary, sector-wide “no lose” GHG baseline: if sectoral emissions exceeded the baseline, there would be no legal consequences, but if emissions are below the baseline, then the state would

receive tradable emission reduction credits. The incentives for the country lie with the provision of a technological and financial package to support their domestic policy, plus the possibility to sell to industrialised countries any emissions reductions achieved beyond the “voluntary pledge”. (CCAP, 2006; The Climate Group, 2008; The Pew Center, 2008)

v) Sectoral approach to CDM

This would consist of an “up-scaling” of the CDM through a sectoral approach to setting baselines that reduces transaction costs, addresses competitiveness and increases the project volume (Ecofys, 2008). This would require a greater involvement of government than is the case with the current CDM, for example in defining and negotiating sectoral baselines, and developing appropriate policy frameworks that ensure incentive to take on mitigation action (Climate Group, 2008).

vi) Policy-based approach (SD-PAMs)

In terms of this pledge-based approach, developing-country governments would seek to secure recognition and support (technical and/or financial) for their individualised sustainable development policies and measures (SD-PAMs) that have GHG mitigation potential (Winkler et al (2002)). Proposed definitions of SD-PAMs in this area suggest that they should be domestically driven, could cover diverse approaches in many different sectors, and have a strong development focus (The Climate Group, 2008). Actions or commitments could vary in form, and could include efficiency standards, renewable energy targets, or reforestation policies.

1.3. Benefits of sector-based approaches

Sector-based approaches are seen to offer a number of possible benefits over alternative policy options. The following listed challenges are those cited primarily by the Centre for Clean Air Policy (CCAP) (Schmidt et al, 2006) and the Pew Center for Climate Change (Bodansky, 2007):

- **Potential for increased participation** – Sectoral approaches offer an alternative, potentially less onerous, approach for those countries not yet prepared to assume binding national targets. For developing countries without reliable economy-wide emissions monitoring, it is more practical to assume a commitment for a sector where emission trends are well understood. Focusing on specific sectors can highlight synergies between GHG reduction and other priorities such as energy security or air quality, thereby increasing incentive to participate.

- **International competitiveness** – An often-cited benefit of sectoral approaches is that an international sector agreement may alleviate competitiveness concerns by agreeing levels of effort across a sector globally; this could also assist in minimising cross-border leakages. This applies primarily in globally traded energy-intensive industries such as steel, aluminium and cement.
- **Targeting key sectors** – Sectoral approaches enable authorities to focus efforts on sectors where action is the greatest priority (for example to avoid long-term lock in emissions), where international cooperation is most valuable (for example, because a particular country cannot access key technologies alone), or where progress can be facilitated (for example, because the sector involves relatively few important actors or is easy to monitor).
- **Greater equity** – Some internationally-competitive sectors in developing countries are equally or more GHG-efficient than those in Annex I countries, so a sector-based approach may be a “fairer” way to reduce global GHG emissions than approaches that differentiate countries by income.
- **Increased technology transfer** – This approach creates a focused environment for global technology transfer and deployment.
- **Negotiations alleviation** – Sectors that are highly concentrated in terms of companies and countries might be easier to negotiate agreements: the relevant actors would be easier to identify, and negotiations among a smaller number of parties, with greater commonality of interests, would be more likely to succeed.
- **Flexibility** – Sectoral approaches could give governments the possibility to choose sector-differentiated commitments, for example efficiency standards for one sector, emission reductions for another.

1.4. Limitations of sectoral approaches

Notwithstanding these benefits, there are a number of potential limitations and challenges associated with a sector-based approach. (Schmidt et al, 2006), Bodansky, 2007) and Baron et al., 2007). These include:

- **Limited coverage** – Focusing on a few selected sectors will ignore emissions from sectors that may present a significant contribution to national emissions, while omitting specific energy intensive or high-growth sectors may hinder attainment of global GHG reduction targets.
- **Definition of sectors** – Defining boundaries of sectors and reaching a universally accepted agreement of the methodology could be challenging.

- **Cost-effectiveness** – Focusing on certain sectors restricts options and thus raises costs; one study by the OECD, found, for example, that an automotive transport sector agreement would be “significantly more costly” in reducing emissions than an economy-wide emissions trading system. (cited in Bodansky, 2007).
- **Leakage** – Emissions can potentially “leak” into uncovered sectors or countries, depending on how the sectors are defined and the extent to which related products or activities are also simultaneously covered.
- **Legal issues** – Depending on the type of sectoral approach initiated, there might be various challenges in terms of international law.
- **Lobbyism** – Strong industry players may commonly block ambitious targets as it concerns them very directly.
- **Intrusiveness** – Sectoral approaches may be more intrusive than some alternative approaches that deal with multiple sectors simultaneously. A characteristic of the Kyoto Protocol that assisted in achieving consensus was that it did not unduly interfere with sensitive domestic policy decisions.
- **Aligning sectoral and other actions/commitments** – It may be challenging to align a sectoral commitment or action with a country’s other policies; for example a country with a cap-and-trade system must decide how to treat a sector covered by a sectoral agreement: whether it is covered under the cap-and-trade system and, if so, how these obligations are reconciled.
- **Possible increased complexity** – With very few sector-specific discussions having taken place in the global climate policy arena, UNFCCC negotiators may fear that sectoral complexities would strain their capacity.
- **Information asymmetry** – Governments often have insufficient knowledge of the technical details of industrial activities, as was demonstrated for example in the allocation process under the EU ETS.

Some challenges associated with designing and negotiating specific sectoral approaches are provided in Chapter 4.

1.5. Identifying appropriate sectors for a sectoral approach

An important question to address in developing a sectoral approach is to consider which sectors are the most conducive to such an approach. This section briefly identifies some criteria to consider when identifying sectors, before commenting on some specific sector examples.

1.5.1. Criteria for identifying sectors

The following criteria have been suggested as the basis for assessing the suitability of sectors for a sectoral approach (WRI, 2007; The Climate Group, 2008; Pew Center, 2008):

Environmental consideration

In an effort to drive effective changes in global emissions, a sectoral approach could focus first on those sectors that offer the greatest potential for environmental benefits, as determined, for example, by its share of global GHG emissions, its rate of emissions increase, or its potential for emissions reduction.

Economic factors

Important economic factors to consider in assessing the appropriateness of a sector include: the possible capital lock-in of carbon intensive technologies, and the adjustment costs associated with reducing emissions.

International competitiveness issues

Sectoral approaches may also be desirable for sectors producing internationally traded goods such as aluminium, aircraft, steel, chemicals, and forestry, which may be particularly vulnerable to competitive imbalances and to the risk of emissions leakage. A sectoral approach could address this competitiveness problem by establishing commitments across a given sector, thereby helping to ensure a more level playing field.

Concentration of actors

One of the benefits of sectoral agreements is their potential to ease negotiations; this suggests that particular attention should be paid to the concentration of actors (either countries or firms, depending on the nature of the sectoral approach) in a given sector.

Homogeneity of products and processes

The homogeneity of products and processes should also be considered to test the feasibility of an international benchmark. Sectors with greater uniformity of products and/or processes (such as the cement or aluminium sectors) are typically better suited to a sectoral approach.

Receptivity of business

The negotiability of sectoral agreements will depend on the receptivity not only of governments, but also of business actors. It is anticipated that this will depend, in part, on the economic factors discussed above, including adjustment costs and effects on competitiveness, but it may be informed by more “intangible”

issues such as the business culture within a particular sector, historical patterns of regulation within the sector, and the personal views of business leaders.

GHG attribution, monitoring and administration

An additional consideration relates to the ease of attributing emissions to a given sector, as well as the nature of practicalities relating to monitoring, administration and access to data.

All these factors should be considered when assessing a sector's suitability for a sectoral approach. These criteria will apply differently to different sectors (and in different economic conditions within particular sectors), thus suggesting a tailored approach between and within sectors.

Within a given sector, it has been suggested that a two-tier approach might be useful, with one tier for the larger players (aimed at including them in global carbon crediting, then in global carbon trading), and another tier for the smaller ones (aimed mostly at supporting large developing countries in closing or requalifying its small plants). It is suggested that this two-tiered approach would be particularly useful for some large developing countries, considering for example their cement or steel sectors.

1.5.2. Which sectors are most suitable for sectoral approaches?

Most of the policy research organisations involved in sectoral approaches have considered this question. Some have argued (e.g. Bodansky, 2007) that few if any sectors stand out as ideal candidates for a sectoral agreement – as being large, homogenous, highly concentrated and highly competitive. Different sectors are seen to be likelier candidates on different grounds.

Following is a brief review of what have been identified as the most appropriate sectors (see e.g. Bodansky, 2007). Further discussion on sectors is provided in Chapter 3.

Aluminium

From the perspective of competitiveness, a highly concentrated and homogenous energy-intensive sector such as aluminium is seen to be a good candidate. The suitability is further enhanced when one considers the nature of the existing voluntary initiatives to reduce GHG emissions in this sector.

Steel

This sector shares many of the characteristics of the aluminium sector and is similarly a suitable candidate for a sectoral approach. Some voluntary GHG initiatives have been undertaken by the World Steel Association and would provide a useful foundation for further work.

Cement

The cement industry, although also relatively homogenous and highly concentrated among countries, includes many smaller producers and is less subject to competitiveness issues than aluminium and steel. However it is one of the most progressive large sectors, considering its responsiveness to the climate change challenges.

Transportation

- **International aviation and shipping** – sectoral climate agreements seem most likely in these two sectors that are currently exempt from the Kyoto requirements.
- **The automotive sector** – this could be a good candidate for a sectoral approach: road transport accounts for about 10 % of global GHG emissions and is among the fastest growing sources in many countries; the sector is relatively homogenous and is highly concentrated in terms of both countries and manufacturers.

Electricity

On the one hand, the electrical power sector may seem an unlikely candidate for a sectoral agreement given its heterogeneous and decentralised nature, and that competitiveness is not a direct concern. On the other hand, its emissions, the largest of any sector, are well quantified and are growing rapidly; with long-term capital decisions in the near future potentially locking in emission increases for decades, the sector is a high priority for mitigation activities. Achieving a significant reduction in electricity-related emissions will require solutions such as carbon capture-and-storage whose wide-scale deployment may be possible only through international cooperation. The necessary technology and financing terms may be most readily achieved as part of an agreement specific to the electricity sector. (Bodansky, 2007)

Land use and agriculture

Land use, the sector with the second largest share of global emissions, also presents a mixed picture. Emissions are concentrated in a few countries, and could potentially be reduced at a low cost, suggesting that it may be conducive to a sectoral agreement. But its emissions are not well quantified, and the factors responsible for these emissions vary widely between countries, posing challenges for either a target-based or a policy-based approach.

1.6. Agreeing the scope of the commitment

A sectoral approach could include a large array of substantive provisions, which could be adopted on a uniform basis or differentiated in order to reflect relevant differences between different states or groups of states. Some examples of possible commitments within a sectoral approach are presented below.

Emissions-based approaches

These could include sectoral emission targets, on either an absolute or an indexed basis.

- **Long-term targets** – A sectoral agreement could set out a long-term emissions target for the affected sector, or it could set a date for the phase-out or phase-in of a specific technology.
- **Emission targets and trading** – Emission targets could be defined for a given sector, with emissions allowances being allocated to individual emitters within that sector, and with trading allowed between countries participating in the agreement and/or with countries with economy-wide or other sectoral targets.
- **Performance standards** – Performance standards for a particular sector could, for example, require individual companies to reduce their emissions by a certain percentage per year; or emission or energy efficiency standards could be defined for individual products such as automobiles.

Policy-based approaches

These require states (or particular groups of states, if commitments are differentiated) to adopt uniform or harmonised policies and measures for a sector, such as technology-based standards, taxes, or best-practice standards. Specific examples might include:

- **Taxes** – A sectoral agreement could provide for harmonised taxes within that sector.
- **Technology/specification standards** – Specification standards might identify particular means for reducing emissions, for example requiring states to ensure that a specified percentage of new vehicles use hybrid, biofuel, or other low-GHG technology.

Cooperation on technology, research and development

- **Technology research, development and diffusion** – A sectoral approach could also seek to promote the development and diffusion of new technologies, as either a supplement or an alternative to technology/specification standards. For example, countries could commit funding for joint research and development of advanced technologies, or an agreement could facilitate technology transfer by addressing intellectual property rights and strengthening enforcement of local patents regimes.

- **Finance** – With the aim of encouraging broader participation and addressing equity concerns, a sectoral agreement could establish a financial mechanism to support technology deployment, capacity building, or policy development in developing countries.

2. Recent Research on the Sectoral Approach

This chapter provides a brief review of the recent activities of a range of leading policy research and advocacy bodies that have been engaged in examining the potential role of “cooperative sectoral approaches and sector-specific actions” as part of a post-2012 climate framework. For each of the research bodies (or research partnerships): a brief outline is provided of the research organisation/s; their main publications and/or workshop activities on sectoral approaches are listed; and a synopsis is given of some of their principal publications and thinking on sectoral approaches.

The chapter starts by reviewing some of the earlier work in this field, and some of the more generic research statements on sectoral approaches, before focusing on some of the more recent applied research that is specifically seeking to inform the ongoing UNFCCC negotiations.

2.1. World Resources Institute (WRI)

“Sectoral approaches will always remain a second-best solution to a comprehensive climate policy. But with so much at stake no options should be left off the table. Sectoral approaches could be used to complement, but not to supplant, a global climate arrangement.”

WRI

The World Resources Institute (WRI) is an environmental think tank whose stated mission is to move human society to live in ways that protect Earth’s environment and its capacity to provide for the needs and aspirations of current and future generations. Climate protection is one of four key focus areas for the WRI.

2.1.1. The WRI Report

The WRI’s 2007 discussion paper examines the potential for integrating the sectoral approach into a broader climate framework and assesses the different forms that sectoral approaches might take. The paper concludes with the following recommendations on the potential for international sectoral approaches as part of a new climate framework:

BOX 2: WRI activities on sectoral approaches

Work by the WRI on sectoral approaches includes:

- **Slicing the Pie: Sector-based Approaches to International Climate Agreements** – A WRI Report published in December 2007 that examines the form that sectoral commitments might take, analyses which sectors are best suited to sectoral approaches to climate mitigation, and evaluates several different models for how sectoral agreements might be integrated into the broader climate regime.

- In the belief that there remains some inconsistency in understanding of the term “sectoral approach”, the paper calls for greater specificity in the concept and proposes using the following terms for specific types of action: sectoral crediting, mandatory sector emission caps, technology standards.
- Recognising that there is good reason to prefer more comprehensive approaches over sectoral approaches, the paper expresses some caution with the use of sectoral approaches, suggesting that for a given level of ambition, they tend to increase cost, reduce transparency, and increase the negotiating burden for governments. The paper highlights the following three concerns:

- **Information asymmetry** – The existing information asymmetry between governments and sector representatives can make negotiating appropriate targets difficult. Whereas a comprehensive approach allows for targets to be set with reference to an environmental goal, sectoral agreements leave governments to make difficult decisions as to the appropriate level of effort from each sector, rather than using markets which are generally a better means of identifying true costs and abatement opportunities.
 - **Reduced competition** – An efficient response to the climate challenge would result in the inherently emission-intensive products and processes being replaced by less emission-intensive alternatives. There is concern that by weakening this competition between products, a sectoral approach would raise the cost of emission abatement, and relieve the pressure on a particular emission-intensive product relative to competing products.
 - **Environmental effectiveness** – It is argued that the climate process should be driven primarily by the environmental goal of keeping climate change at acceptable levels. Relying heavily on carving out specific sectors for separate agreements would make it very difficult to maintain this focus.
- While the paper recognises the argument that crediting mechanisms applied at the sector level (such as a “no regrets” cap) might abate competitiveness concerns – by drawing all competitors from a sector into a single system – it argues that it is unclear that this addresses the underlying concern of competitiveness: that the cost profiles of producers under a genuine emissions cap are different from those under “no regrets”. It suggests further that it is unclear whether developed countries would have the political appetite for enabling significant net financial transfers through a carbon trading mechanism to international competitors in globally traded sectors. On this basis it suggests that sectoral crediting mechanisms and no-lose targets seem to be most appropriate for domestically-oriented sectors such as electricity.
 - The WRI argues that technology approaches have considerable potential, and that these may be negotiated without direct sector involvement. Vehicle efficiency standards, renewable energy mandates, appliance standards, collaborative research and development (R&D), and similar initiatives are all seen to fall within the potential scope of “sectoral agreements”. These initiatives offer considerable opportunity in terms of climate protection efforts, and international coordination could be

beneficial for example by spreading the cost of R&D efforts, or in gaining economies of scale for emerging technologies such as wind turbines or hybrid vehicles.

- It is argued that both the UNFCCC and external processes have a potential role as fora for sectoral approaches, but there is concern that the greater negotiating burden may prove challenging. Recognising that specific arrangements have been made for sectoral approaches under the UNFCCC and Kyoto Protocol, there is concern that certain Parties are resisting such approaches as unduly compromising the rights of sovereign Parties to choose the emissions reduction options. While it is seen to be plausible that the UNFCCC may introduce recognition for sectoral approaches agreed in other fora, this raises questions of equity and inclusiveness for UNFCCC Parties excluded from these alternative fora (such as the G8).

Additional research

The paper concludes by arguing that additional work is needed on international sectoral cooperation, identifying the need for work for example on the following issues:

- What additional sectors should be explored (e.g., oil & gas)? What other ways might sectors be defined?
- What is the optimal form of international cooperation in a given sector from an environmental, economic, and political point of view? What are the views of key stakeholders? Additional sector-specific analysis is needed along the lines already begun by IEA and OECD.
- Within specific sectors and policy choices, what is the appropriate level of stringency?
- How can sectoral agreements overcome the various disadvantages of sectoral cooperation such as concerns over cost-effectiveness and environmental effectiveness?
- Which countries should participate in which kinds of agreements? One of the rationales offered in support of sectoral approaches is to increase participation; namely to engage the United States and developing countries. What kind of comprehensive agreement and what combination of sectoral agreements would yield the highest levels of participation and emission reductions?

As the following research summaries indicate, there has since been much progress in working to address many of these questions.

2.2. International Institute for Sustainable Development (IISD)

“ Sector-specific approaches in the post-2012 regime provide an opportunity to get movement before binding targets can be negotiated. Given the flexibility in terms of enabling approaches, it may in fact be prudent to start early in key sectors to get movement internationally. The experience of a number of multilateral technology agreements could prove instructive – such as the Cement Sustainability Initiative under the World Business Council for Sustainable Development, and the task force approach of the Asia Pacific Partnership on Clean Development and Climate – although efforts will need to go far beyond those to date. ”

IISD – A Way Forward: Canadian Perspectives on Post-2012 Climate Policy

Established in 1990, IISD is a Canadian-based not-for-profit organisation with a diverse team of staff located in more than 30 countries. It is a policy research institute that engages decision-makers in government, business, NGOs and others in developing and implementing policies that are simultaneously beneficial to the

global economy, the global environment and to social well-being. Climate change and energy is one of their focus areas.

2.2.1. A Way Forward – IISD perspectives

Published in May 2008, *A Way Forward: Canadian Perspectives on Post-2012 Climate Policy* assesses the four pillars of a post-2012 climate regime – mitigation, adaptation, technology, and financing and investment – with the goal of informing discussions on how these key areas may be incorporated in a post-2012 agreement, in light of Canadian interests and perspectives. In doing so, the report considers the issues of sectoral approaches, with the aim of better understanding the risks and opportunities so that positions and actions can be undertaken. The report raises the following points on sectoral approaches:

- Sectoral approaches provide an important opportunity for industry to directly engage their counterparts in other parts of the world to assess whether common approaches can be developed that satisfy concerns over disproportionate cost increases.
- An important incentive for major emitting developed and developing countries to participate in such voluntary sector-specific action would be access to technology and financing.
- While Canada has been pushing internationally for binding targets for major emitting developing countries – such as China and India – they believe that sector-specific approaches in the post-2012 regime would provide an opportunity to get movement in these countries before binding targets can be negotiated.
- It is argued that it may be prudent to start early in key sectors to get movement internationally; the experience of a number of multilateral technology agreements – such as the Cement Sustainability Initiative under the World Business Council for Sustainable Development, and the task force approach of the Asia Pacific Partnership on Clean Development and Climate – are seen to be instructive, “although efforts will need to go far beyond those to date.”
- Sectoral efforts to promote climate change goals for developing countries will need to consider:
 - subsidies for private infrastructure investors, altering incentives such that low-carbon technologies are attractive;
 - subsidising developing country acquisition of intellectual property in the area of clean technologies;
 - capacity building for regulatory infrastructure to promote low-carbon technologies; and
 - financial support for developing country adoption and implementation of climate-friendly technologies.
- The paper argues that Canada should consider increased

BOX 3: IISD activities on sectoral approaches

Work by the IISD on sectoral approaches includes:

- **A Way Forward: Canadian Perspectives on Post-2012 Climate Policy** – this report seeks to inform discussions on the nature of a post-2012 agreement, in light of Canadian interests and perspectives.
- **Furthering EU Objectives on Climate Change and Clean Energy: Building Partnerships with Major Developing Economies** – this paper provides an analysis of how the EU can further its stated objectives on climate change and clean energy by means of cooperation and engagement with developing countries through partnerships with major developing economies such as Brazil, China, India, Mexico and South Africa.

support for sectoral approaches beyond overseas development assistance, and should engage industry in discussions on a path forward. It recommends that Canada identify strategic sectors for engagement, considering: where the country can show leadership, where Canada would improve its competitive position, and what sectors offer increased access to lower-cost emission reductions.

- The paper suggests that the sectors of agriculture and forestry that are referenced in the Bali Action Plan are also important for Canada. The IPCC notes that there is massive mitigation potential in agriculture – estimated at 5,500 to 6,000 MtCO₂-eq per year by 2030 – and that there are a variety of options for reducing emissions in this sector. Agricultural mitigation measures often have synergies with sustainable development policies; and there are interactions between migration and adaptation in this sector. Agriculture will need to be addressed in the eventual post-2012 agreement, and is an area where Canada could potentially provide leadership.

2.3. The Pew Center on Global Climate Change

“ International sectoral agreements could contribute to a post-2012 effort as one element of a broader framework that includes other commitment types. In this context, they appear best suited to advancing agreement and action by: helping to defuse competitiveness concerns that, if not resolved, could preclude agreement across the full range of post-2012 issues; treating critical technology and finance issues within a discrete sector where they are most urgent, such as electricity, rather than on broader terms where agreement may be more difficult; and taking advantage of potential tipping effects, for instance in the automotive sector, to leverage agreement among a few parties into a broader, perhaps global, technological transformation. ”

Pew Center on Global Climate Change

BOX 4:

Pew Center activities on sectoral approaches

Work by the Pew Center on sectoral approaches includes:

- **International Sectoral Agreements in a Post-2012 Climate Framework** – A Working Paper (published in May 2007) that examines the broader policy and structural questions relating to the development of sectoral approaches at the international level – in particular, sectoral approaches taking the form of inter-governmental agreements. The paper is part of a Pew Center series expanding on key recommendations of the Center’s Climate Dialogue at Pocantico.
- **Sectoral Options in Electric Power** – Analysing, with McKinsey & Company, a range of options for structuring agreements in the electric power sector including: differentiated targets (absolute and intensity); low-carbon standards (portfolio standard; technology standard); end-use efficiency standards; R&D agreements; and finance mechanisms.
- **Post-2012 Global Policy Scenarios** – Modelling, with Battelle Memorial Institute, a set of alternative scenarios reflecting different policy architectures. Some scenarios include sectoral agreements in transportation, electricity or land use, alone, and in combination with other policy types (absolute targets, policy-based commitments).
- **Towards an Integrated Multi-track Climate Framework** – Published in December 2007, the paper outlines what it calls an ‘integrated multi-track approach’ that seeks to combine the flexibility of the “bottom-up” approach (in which the international effort is derived from nationally defined programmes) with the cohesion of the “top-down” approach in which governments negotiate binding international commitments that drive national policy.

The Pew Center on Global Climate Change was established in 1998 by The Pew Charitable Trusts to bring together business leaders, policy makers, scientists, and other experts with the aim of developing a new cooperative approach and bringing critical scientific, economic, and technological expertise to the global climate change debate.

The Center seeks to inform this debate through analyses in four areas: policy (domestic and international), economics, environment, and solutions. In 2003, the Pew Center engaged more than 100 experts, policymakers, and stakeholders from more than 30 countries in a new initiative to advance the international agenda on climate change. This initiative continues with the Climate Dialogue at Pocantico, a series of off-line discussions among a select group

of senior policymakers and stakeholders exploring options for next steps in the climate effort.

2.3.1. Pew Center Working Paper: Conclusions

The Pew Centre's 2007 working paper on sectoral approaches focuses on one particular type of sectoral agreement in which governments commit to actions intended to moderate or reduce GHG emissions from a given sector.

They argue that such agreements could contribute to the post-2012 climate effort in different ways:

- One possibility would be to negotiate one or more sectoral agreements that stand independent of one another.
- Alternatively, a series of sectoral agreements could be negotiated simultaneously or sequentially and linked in an overarching framework, with overlapping but not necessarily identical groupings of countries participating in each.
- A third option would be to incorporate sectoral agreements in a comprehensive framework alongside other types of commitments. For instance, some countries with economy-wide emission targets and others with policy-based commitments could jointly enter into a side agreement setting out commitments within a given sector. For a country with an overall emissions target, a sectoral commitment could be one of several means of achieving that target, or the covered sector could be excluded from the overall cap. For countries without overall targets, sectoral commitments may be in addition to any other commitments they have undertaken.

Following their review of international sectoral agreements, the paper provides the following conclusions:

- While from both an environmental and an economic perspective a global cap-and-trade system might be the preferred approach, this does not appear a viable option in the post-2012 timeframe because developing countries are highly unlikely to assume binding economy-wide emission caps.
- From a theoretical perspective, a series of parallel sectoral agreements could provide comprehensive coverage of major emission sources and, if linked in an overarching framework, could also achieve the cost efficiency of a fully comprehensive approach. However, this, too, appears improbable. While developing countries may be more willing to enter sectoral agreements than to accept economy-wide targets, they are unlikely to take commitments across all their major-emitting sectors. For countries willing to accept economy-wide targets, on the other hand, they would probably be more practical and efficient than a sector-by-sector approach.

- The paper concludes that more realistically, international sectoral agreements could contribute to a post-2012 effort as one element of a broader framework that includes other commitment types. It suggests that in this context, such agreements appear best suited to advancing agreement and action by:

- helping to defuse competitiveness concerns that, if not resolved, could preclude agreement across the full range of post-2012 issues;
- treating critical technology and finance issues within a discrete sector where they are most urgent, such as electricity, rather than on broader terms where agreement may be more difficult; and
- taking advantage of potential tipping effects, for instance in the automotive sector, to leverage agreement among a few parties into a broader, perhaps global, technological transformation.

- While the Pew paper presents a range of possibilities for structuring sectoral agreements, precisely how they could best fit into a multi-commitment framework would depend on the other commitments taken and ultimately, therefore, can be determined only through negotiation. The paper suggests that among issues that would need to be addressed are how best to compare relative effort across different commitment types and whether sectoral commitments fall within or are in addition to other commitments.
- It is argued that, ultimately, the likelihood of sectoral agreements within a post-2012 framework depends on their political attractiveness. The Pew Center suggests that in sectors such as cement and aluminium, where industry is well organised at the international level, companies facing competitive imbalances may have an incentive to initiate a sectoral approach that could be the foundation for an inter-governmental agreement. However, in other sectors without this motivating force, but where there may be other rationales for a sectoral approach, it may fall to governments to take the initiative if sectoral agreements are to emerge.

2.3.2. The Pew Center Paper on an Integrated Multi-Track Climate Framework

The Pew Center's report outlines what it calls an "integrated multi-track approach" that seeks to combine the flexibility of the "bottom-up" approach (in which the international effort is derived from nationally defined programmes) with the cohesion of the "top-down" approach (in which governments negotiate binding international commitments that drive national policy).

The report explains the rationale for an integrated multi-track

approach, draws lessons from other multilateral regimes, and identifies some of the key variables in designing a multi-track climate framework. It reviews and assesses three alternative approaches:

- **Individualised commitments** – Countries would propose their own commitment and then negotiate with others to reach a mutually acceptable package. (With each country having its own “track” this is similar to the approach adopted in the GATT tariff negotiations).
- **Parallel agreements** – This approach would involve the negotiation of a set of parallel agreements establishing different types of commitments (e.g. reduction targets or policy undertakings), and/or address different sectors. The agreements would be components of an integrated framework with a common reporting and review system, but countries could choose from the available agreements. While less flexible than individualised commitments this would introduce a stronger degree of structure and greater consistency in the focus of commitments.
- **Integrated commitments** – Under the third approach countries would agree at the outset on a limited number of tracks – and on which countries could negotiate within which tracks – with the aim of developing a single agreement in which all commitments are agreed as an integrated package.

The authors conclude that of the three models, the “integrated commitments” approach is mostly likely to produce a collective level of effort sufficient to meet the challenge of climate change. While allowing the flexibility of different commitment types, it is seen to provide stronger reciprocity and effort, firstly by establishing agreement at the outset on commitment types, and the countries to which they apply, and secondly by requiring that all tracks be agreed as a single package.

2.4. Institut du développement durable et des relations internationales (IDDRI)

“ Sectoral approaches can provide an alternative pathway to climate commitments: their practical and political advantages can counterbalance their economic shortcomings. Indeed, the current political deadlock between developed and developing countries may be resolved through a sectoral agreement that recognizes the possible need for

international support on capacity and technology. To be most credible, however, any sectoral agreement should achieve broad participation of emerging countries, and should be aimed clearly at avoiding lock-in of carbon intensive investments. ”

Colombier M and Guerin E (IDDRI)

The Institut du Développement Durable et des Relations Internationales (IDDRI) is a French institute that examines sustainable development issues that require international coordination, such as climate change or the depletion of natural resources. Its research focuses on global governance, North-South relations and international negotiations. The organisation has three main objectives: informing policy decisions, identifying emerging issues, and creating a platform for dialogue between stakeholders.

BOX 5: IDDRI activities on sectoral approaches

Work by the IDDRI on sectoral approaches includes:

- **Breaking the Climate Deadlock initiative** – an IDDRI researcher served as lead author on a Briefing Paper on sectoral approaches for the Breaking the Climate Deadlock initiative (reviewed in section 2.5 below).
- **Workshops on sectoral approaches** – the IDDRI has hosted and contributed to various workshops on sectoral approaches; most of the workshop papers are available online.

2.4.1. IDDRI Paris workshop (April 2008)

In April 2008, the IDDRI organised a workshop on sectoral approaches in partnership with the French Ministry of Ecology, Energy, Sustainable Development and Territorial Development, and the Ministry of Foreign and European Affairs. The aim of the workshop was to bring together high-level international experts, NGOs and representatives from those countries that would participate at the 3rd Major Economies Meeting on Energy Security and Climate Change, initiated by the United States parallel to and informing the UNFCCC process.

The workshop included:

- a review of lessons learned from the power generation, cement and steel sectors;

- a clarification of underlying concepts and an analysis of transnational agreements;
- a review of domestic sectoral policies and incentivising agreements; and
- an assessment of the possible role of sectoral approaches in a post-Kyoto framework.

In his report of the workshop, the IDDRI director made the following observations and conclusions:

- There has been a shift in the nature of the discussion on sectoral approaches, as evidenced, for example, by the references to sectoral approaches in the Bali Action Plan and recent G8 statements, as well as through the establishment of the Asia Pacific Partnership (APP) on Clean Development and Climate.
- Despite the growing recognition of sectoral approaches across stakeholder groups and amongst countries, there are diverse motivations, with resulting differences in the views of parties on the intended objectives and outcomes.
- The workshop is seen to have provided a valuable opportunity for making progress in developing a common understanding of sectoral approaches and opportunities, with some consensus evident that “thinking sectoral” is useful in developing well-informed and appropriate policies for low emitting technology deployment and transfer.
- While it was agreed that sectoral approaches should be kept in mind when designing the Copenhagen agreement as a possible tool for implementing future commitments, it was recognised that sectoral approaches alone cannot meet the mitigation challenge and should not be seen as a substitute for an international climate agreement.
- There is seen to be a critical role for national policy frameworks in recognising and enforcing actions through the sectoral approach.
- The challenge in taking sectoral approaches is seen to be significant: the design of sectoral approaches will take time, they will require complex governing procedures, and there are technical and political challenges associated with ensuring access to data and with the implementation and enforcement of measures that are measurable, reportable and verifiable.

Copies of the workshop presentations are available from www.iddri.org/Activites/Ateliers/Workshop-on-sectoral-approaches/

As noted above, the IDDRI has been a contributor to the *Breaking the Climate Deadlock* initiative, which is reviewed in more detail below.

2.5. The Climate Group and The Breaking the Climate Deadlock initiative

“ It is crucial that Contracting Parties to the UNFCCC determine the nature and the degree of their engagement through sectoral agreements. The sectoral approach is aimed at breaking the negotiation deadlock on a more technical, and hence less politically sensitive, ground. But sectoral approaches also introduce a significant risk of an insuperable negotiating burden. At a stage where time to conclude the negotiation by Copenhagen is already short, detailed and technical sector-level discussions are out of the question – for one thing, most UNFCCC delegations do not have the staffing required to enter into such discussions. ”

The Climate Group – Sectoral Agreements (Discussion Paper)

Launched in Japan in March 2008, *The Breaking the Climate Deadlock* is an initiative of former UK Prime Minister Tony Blair and the not-for-profit organisation The Climate Group. Its objective is to build political support for a post-2012 international climate change agreement in the lead up to the 2009 Copenhagen Conference. Its focus is on the political and business leaders from the world's largest economies, particularly the G8 and the major developing countries.

2.5.1. Global Deal for our Low Carbon Future

The *Global Deal* Report was launched on 27 June 2008 by Tony Blair and The Climate Group as an input to the G8 Hokkaido Toyako Summit. The report sets out 10 key building blocks for a post-2012 international climate change agreement, one of which is the use of sectoral actions.

The report suggests that developed countries may use sector targets as a part of their national policies, and that one-sided sector-based incentive schemes may help developing countries accelerate their efforts. Where similar opportunities exist in many countries, the report contends that sectoral approaches may benefit from international cooperation and enhance the delivery of national targets. The report highlights the potential for “no-lose”

BOX 6: The Climate Group activities on sectoral approaches

Work on sectoral approaches within the Breaking the Climate Deadlock initiative include:

- **Global Deal for our Low Carbon Future** – this report identifies 10 building blocks for a post-2012 agreement, one of which is sectoral actions.
- **Sectoral Agreements (Briefing Paper)** – this paper explores the potential for international sectoral agreements (that define and organise the implementation of sectoral initiatives) as a means of mitigating GHG emissions.
- **The Architecture of a Global Climate Change Agreement (Briefing Paper)** – this paper explores the architectural mix of elements needed to reach a global agreement to address climate change, with specific provision for sectoral approaches.

sector incentives for developing countries to scale up investment flows and abatement beyond what can be achieved with project-based CDM. Recognising the potential controversy associated with transnational sectoral agreements, the report nevertheless suggests that there may be benefits if countries pursuing sector schemes have some degree of international coordination for example by sharing data on sector performance, cooperating on industry best practice or sharing enabling technologies.

It suggests that further work be undertaken to address the following questions:

- How can sectoral schemes be most effectively used by developed nations to deliver cap commitments?
- How might a scheme for one-sided sector incentives work for developing countries? What would be the criteria for eligibility? What would the incentives be? How would such a scheme be administered? How would we address potential impacts on the carbon price?
- In which cases might international cooperation on sectors help countries deliver more ambitious targets?
- Are sector-specific schemes needed for sectors currently outside of national caps, e.g., international aviation and shipping (so-called “bunker fuels”)?

2.5.2. Briefing Paper on Sectoral Approaches

The June 2008 briefing paper explores the potential for sectoral agreements to mitigate GHG emissions. The paper reviews the rationale and types of sectoral agreements, assesses possibility

for further action in two sectors (aluminium and power), and considers how sectoral agreements could fit into the overall climate architecture.

Observations

- Although a comprehensive approach to all gases and sources, with economy-wide targets, is the first best option from both an economic and environmental perspective, sectoral approaches are nevertheless seen to offer a useful means for engaging developing countries in contributing to reducing global emissions.
- While industry-to-industry voluntary initiatives are seen to be useful (for example in collecting data and sharing best practices) it is argued that without government involvement and a strong focus on domestic policies they will not deliver the required level of emission reductions.
- In terms of getting the right “menu” of options to engage developing countries, it is argued that the main objective should be to support urgent mitigation actions in those sectors where there is a high risk of carbon lock-in, including in particular the power sector (as the top priority), buildings, infrastructures for transport, and key energy intensive industries.
- It is suggested that the right menu of market- and policy-based instruments must be tailored to the needs of developing countries and to the characteristics of priority sectors. While for some sectors in some countries, this may be an output-based sectoral agreement (with an absolute or intensity target), there is also a strong rationale for policy-based support to sectoral policies in developing countries.
- Four potential models of governance for a comprehensive agreement and sectoral agreements are identified:
 - **Additional model** – where a comprehensive agreement covering all sectors for the industrialised countries would be supplemented by sectoral agreements that engage additional (emerging) countries.
 - **Complementary model** – differs from the above in that certain sectors might be covered by two distinct agreements, and hence industrialised countries would be committed in both agreements.
 - **Carve-out model** – a single comprehensive agreement that would exclude particular sectors; the separate sectors would then be subject to special agreements with the purpose of broadening participation.
 - **Integration model** – special provisions for some sectors could be integrated into policies and measures to implement economy-wide caps laid down by the comprehensive agreement.

Recommendations

The paper concludes with the following recommendations:

- There is no “one size fits all” approach to sectoral agreements, but rather a variable geometry across sectors.
- Any attempt to introduce sectoral agreements from an international competitiveness angle will create significant pushback from developing countries. It argues that a focus on sustainable development and energy security will facilitate international discussion on sectoral agreements.
- In the context of the urgency to negotiate a post-2012 climate framework, negotiators could focus on two “pure” sectors: aluminium and power. Each of them would represent a good test of the two broad categories of sectoral agreements: industry-to-industry transnational agreements; and agreements based on international support for domestic public policies.
- The aluminium sector is a good test case for an industry-to-industry transnational agreement, building on the voluntary initiative undertaken by the International Aluminium Institute.
- The power sector is seen to be a good candidate for an agreement based on international support for domestic public policies for various reasons:
 - it has the highest share of global emissions (24%), and is the most rapidly growing sector for emissions;
 - it is a good test case for implementation of an agreement that must be multi-dimensional, requiring action on both the supply (generation) and demand side;
 - there remains valuable potential for diffusion at scale of the wide range of available and potential breakthrough technologies; and
 - the sector has limited international exposure, and remains a heavily regulated sector in many countries, thus providing national policy intervention with “significant strategic clout”.
- An overarching, comprehensive agreement is needed – rather than a myriad of sectoral agreements – since the goals that are set for sectors must support the broader environmental goals.

The paper argues that in negotiating sectoral approaches, Parties should consider the following four priorities:

- On transnational sectoral agreements:
 - clarify how they can engage in transnational sectoral agreements; and
 - start considering the appropriate level of ambition for an industry initiative;
- On domestic public policies for sectoral agreements:
 - start considering how to make SD-PAMs measurable, reportable and verifiable; and

- consider what could be a good package of support for public policies in emerging countries for those sectors where sound domestic policies are key to success.

2.5.3. Architecture of a Global Climate Change Agreement

This briefing paper reviews the architectural mix of elements needed to reach a global agreement to address climate change, with specific provision for sectoral approaches. The paper argues that the architecture of the new global climate change agreement requires two broad elements:

- **Quantitative elements** – These comprise commitments to reduce emissions in a predictable manner, and should include a quantitative cap on emissions in developed countries, as well as some form of commitment at a sectoral level in some developing countries. It is argued that this will provide certainty of emission outcomes over the near to medium term, as well as the basis for an international carbon market, which would help to mobilise private capital for investments in low carbon technology.
- **“Bigger picture” elements** – Recognising that the above quantitative elements may, politically, be seen as threatening (particularly to the development ambitions of emerging economies) – and that in themselves they are not sufficient to ensure an adequate mitigation response – the paper calls for a “bigger picture” side of the agreement that provides for innovation, leadership and diplomacy. These would provide for fuller management of emissions, assist in addressing some political issues associated with the quantitative elements, and address adaptation needs.

The paper suggests that while the quantitative elements would be part of an agreement through the UNFCCC process, some of the “bigger picture” elements might occur outside the UNFCCC package, for example in agreements between key countries, among smaller groups of countries, among key industries operating in some countries, or as elements agreed in other multilateral fora.

It argues that the following should be sought in Copenhagen:

- agreement of the basic elements of this architecture, with detailed specifics on the industrialised countries’ quantitative commitments, plus sufficient detail on commitments by key developing countries and “bigger picture” elements, to provide the basis for the agreement package to come together; and
- agreement to complete the detail on the commitments by key developing countries and the “bigger picture” elements within one year so that the ratification of the agreement by key countries is achievable by the end of 2011.

2.6. Ecofys and GtripleC

“Sector No-Lose Targets are not a scaling up ‘silver bullet’. But they have some characteristics that suggest that for some sectors in some key developing countries they may be the best new carbon finance mechanisms identified thus far. Moreover, in conjunction with SD-PAMs, they may be what is needed to strike the appropriate political balance (regarding mitigation) between industrialised and developing countries in the post-2012 agreement. However, to realise this potential a very large effort is needed in a very short time. This will require proactive leadership by world leaders – in industrialised and developing countries, and in governments and business.”

Ecofys and GtripleC RA – The Role of Sector No-Lose Targets (2008)

Ecofys is a Netherlands-based consultancy that specialises in energy saving and renewable energy solutions, offering research and consultancy services on sustainable energy and climate policy. GtripleC (Global Climate Change Consultancy) is a New Zealand-based consultancy that assists public and private sector groups to understand international climate change policy and develop programmes to identify opportunities and risks.

2.6.1. Workshop paper for Netherlands EEA

This September 2008 report was developed by Ecofys for the Netherlands Environmental Agency as an input paper to a policy workshop on development-related mitigation options for a global climate change agreement. The report provides a background overview of sectoral approaches, reviews three prominent sectors (electricity, cement and iron, and steel) in six important emerging economies (China, India, Brazil, Mexico, South Africa and Korea), and identifies and briefly evaluates the following eight types of sectoral approaches in terms of their environmental effectiveness, cost effectiveness, distributional impacts, and technical and institutional feasibility:

- bottom-up sectoral analysis to inform the discussion on mitigation potentials of Annex I Parties;

- cooperative sectoral approaches supported and enabled by finance and technology;
- sectoral crediting in non-Annex I Parties;
- complementary sector-specific goals for Annex I Parties;
- policy-based approach;
- technology standards;
- transnational sectoral approaches; and
- sectoral approaches to CDM.

On the basis of this review, the paper chooses to describe and evaluate in more detail the following three “promising” sectoral approaches for developing countries, and outlines the implications of each of these in terms of preparations for the Copenhagen meeting:

- **Bottom-up negotiated binding sectoral targets** – this involves a commitment to keeping a sector’s emissions below a defined level (set in absolute or emissions-intensity terms);
- **A Best Available Technology (BAT) approach** – in which a developing country (with support from developed countries) would achieve predefined technology standards in selected sectors; these commitments would relate to sectors separately and independently, without extending to commitments for the whole economy; and
- **Sectoral sustainable development policies and measures (SD-PAMs)** – in which a developing country commits to implementing specific policies and measures in a certain sector, in return for financial or other support from developed countries.

BOX 7:

Ecofys / GtripleC activities on sectoral approaches

Both individually and in partnership Ecofys and GtripleC have published and contributed various policy papers and workshops on sectoral approaches, including:

- **Sectoral approach and development** – a September 2008 paper for the Netherlands Environmental Assessment Agency.
- **Sectoral Proposal Templates** – these templates are being developed for selected sectors with the aim of performing a reality check by “road testing” them in some developing countries.
- **The role of sector no-lose targets in scaling up finance for climate change mitigation activities in developing countries** – a May 2008 paper prepared for the UK Government’s Department for Environment, Food and Rural Affairs.

Each of these options is evaluated in terms of their environmental effectiveness, cost effectiveness, distributional impacts, and technical and institutional feasibility. A summary of this analysis is given in Table 1. Their analysis suggests that:

- negotiated binding sectoral approaches do well in terms of environmental and cost effectiveness, but present significant challenges in terms of political feasibility;
- sectoral SD-PAMs would potentially be easier to implement, but might not target all possible mitigation options; and
- sectoral approaches based on BAT and best practice commitments present the challenge of defining the agreed BAT level, and can be less effective if they do not prompt movement from one technology to another.

2.6.2. Sectoral Proposal Templates

The project on sectoral proposal templates seeks to support developing countries in proposing sectoral emission baselines under a post-Kyoto climate regime. GtripleC and Ecofys are the coordinating partners of the project, which is funded by the UK (DEFRA), the Carbon Finance Unit of the World Bank, the Government of the Netherlands, and GTZ (Germany). Mexico and Argentina are the “road test” partners for the initiative.

The sectoral approach underlying this work is seen as a means to scale-up investments in clean technology and systems in developing countries. GtripleC and Ecofys are currently developing “Sectoral Proposal Templates” for selected sectors with the goal to perform a reality check by “road testing” them in some developing countries. (See further www.sectoral.org/).

The concept of sector “no-lose” targets

- The templates are being developed with sector “no-lose” targets in mind, in terms of which developing countries would pledge to achieve voluntary sector “no lose” targets for certain sectors expressed as an intensity target.
- Tradable emission reduction units would be issued for emission reductions beyond the agreed sector baseline, but no penalty would apply in case the country failed to meet the intensity target. The crediting baseline would be set at a relatively low level, and would include national contributions or external support beyond a reference scenario.
- The prospective revenue from the emission credits would assist in mobilising the necessary financing for the countries, and their entities, for investments in technologies, systems, programmes and policies to overachieve the sector crediting baselines.

The Templates

- In developing no-lose targets, a key issue becomes how developing countries will prepare their proposals for sectoral crediting baselines such that they
 - can be understood by other countries in the process;
 - will be seen as a credible starting point; and
 - provide a means to negotiate them through analysis of specific underlying elements and drivers.
- These “Sectoral Proposal Templates” developed as part of this study aim to facilitate this process. The concept behind the templates is that they systematically step through all the elements that would go into understanding what a reasonable crediting baseline might be for the sector in question. These elements obviously are of a technical, social and economic nature and are very sector- and country-specific.
- Given that a crediting baseline is essentially a projection for a future multi-year period, it will be important to understand the current trends in emissions and associated dynamic “metrics” for the sector and drivers for these trends.
- By combining qualitative and quantitative information on the sector and the relevant circumstances in the country in a structured way, the template provides the maximum level of transparency necessary for the negotiation of a sectoral crediting baseline at the international level.
- Although mainly directed towards the negotiation of sector targets, the templates can also be used as an input to the discussion on sectoral CDM.

Road-testing

- Draft “Sectoral Proposal Templates” have been developed for the cement, electricity and transport sectors, and are currently being road-tested in Mexico with the aim of improving understanding of the concept of sectoral crediting baselines and to learn about data availability and collection needs.

2.6.3. Sector no-lose targets

In May 2008 the UK Department for Environment, Food and Rural Affairs (DEFRA) published a paper (under the lead authorship of GtripleC) that seeks to provide “a comprehensive and robust analysis” of the so-called “sector no-lose targets” (SNLTs) approach, in terms of which developing countries adopt non-binding quantitative sectoral goals, with excess emission reductions being eligible as credits to be sold to industrialised countries.

On the basis of their review, the paper proposes the following insights and conclusions aimed at informing the process of

Table 1
Ecofys evaluation of three sectoral approaches (ECOFYS, 2008)

	Sectoral sustainable development policies and measures	Best available technology and best practice commitments	Negotiated binding sectoral targets
Environmental	Impact on emissions depends on stringency of policies, hard to predict Possibly not covering all emission reduction options, since some may not have a sustainable development benefit	Impact potentially high but depends on stringency Special consideration needs to be taken to reduce demand for products and to achieve movement to low carbon technologies (e.g. renewables)	Impact potentially high but depends on stringency If intensity based, special consideration needs to be taken to reduce demand for products
Economic	Sources and distribution of financing need to be defined Emission trading cannot be applied, but long-term perspective is taken	Sources and distribution of financing need to be defined Emission trading cannot be applied	Carbon market is a major funding source Globally cost effective through emission trading if broad participation
Distribution and equity	Builds on host country development objectives and characteristics	Builds on the concept of technology upgrading, energy security, etc. Accommodation of national circumstances by adjustments for availability of natural resources and differentiated timelines for implementation	Bottom up development and negotiation leads to adequate consideration of national circumstances May be seen as a limiting economic growth
Technical and institutional	Only the implementation of the policies has to be monitored, not their effect Difficult to determine the stringency of the effort and level of financial support needed	Agreement on the approach possible in December 2009 Technical specification of the BAT and BP levels is very difficult, taking place after 2009 Determination of the national contribution and the financing needs difficult	Exact amount of emission reductions from sectoral targets will not be available in December 2009, but will only emerge after subsequent detailed negotiations High government capacity needed to implement national measures to reach the target

Yellow indicates a medium evaluation

Green indicates a positive evaluation

including sectoral approaches in a post-Kyoto climate regime:

- Recognising the urgent need for significant investments in zero and low-carbon technologies and practices, and in the belief that developing countries having a particularly important role to play, the paper argues that sector no-lose targets – in moving beyond the additionality-based constraints of CDM-type policy instruments – are a “good prospect for scaling up carbon finance instrument in some sectors in some developing countries”.
- While the paper recognises that this sounds somewhat equivocal, it argues that “some sectors and some countries” can nevertheless account for a very significant portion of projected global emissions growth, and typically represent sectors where significant volumes of new investment are long-lived (and often carbon-intensive) capital plant.
- The most likely candidate *sectors* (and associated baseline metrics) for SNLT are seen to be:
 - electricity generation (tonnes of CO₂ per MWh generated);
 - cement, aluminium or steel production (tonnes of CO₂ per tonne produced); and
 - upstream emissions of oil and gas production (tonnes CO_{2e} per barrel of oil delivered).
- In terms of *countries*, the paper argues that the process of preparing and negotiating SNLTs – coupled with its associated measuring, reporting and verification requirements – suggests

that only a subset of developing countries (the larger rapidly industrialising countries) are likely to be interested, at least over the short term.

- The paper identifies several significant challenges in implementing the SNLT approach, including:
 - ensuring sufficient environmental integrity through real emissions reductions;
 - managing uncertainty around the correct matching of the demand and supply of carbon credits; this underlines the importance of bold targets being agreed to by developed countries and the need for close attention to the setting of baselines;
 - and addressing significant capacity-building associated with the timely negotiation and implementation of this technically complex new form of compliance carbon mechanism.
- To address these challenges the paper suggests that there should be some form of pilot activity to test SNLTs, with the new World Bank *Carbon Partnership Facility* cited as a possible player in this regard. The paper also reviews some possible solutions to these challenges including:
 - establishing an independent expert body to support negotiations;
 - supporting developing countries in the development of domestic policies and measures that incentivise project-level

- activities within affected SNLT sectors;
- developing a “nesting approach” whereby an international institutional process (similar to the current CDM) credits individual on-the-ground activities; the total of any credits issued under this process would be deducted from the amount the country was later issued for the overall sector performance; and
 - considering a scheme whereby the reward for countries beating sectoral baselines would not be carbon credits but instead some predetermined level of funding.
- The paper concludes by highlighting “the substantial amount of effort needed on multiple work fronts” if SNLTS are to be part of the Copenhagen agreement on the post-2012 multilateral climate regime.

2.7. Centre for European Policy Studies (CEPS)

“ Global sectoral industry approaches have potential. This has been demonstrated (in this report). On the other hand, they are no panacea. Whether global sectoral industry approaches will ultimately emerge as a central pillar of a post-2012 framework remains uncertain and depends on whether the concept of global sectoral approaches will be able to meet the four challenges we have specified: data definition, collection and use; avoiding anti-competitive behaviour; engaging emerging economies; and governance. And even if they do, it is unclear at this moment whether they will ever become a substitute for legally binding commitments at the Party-level. Still, global sectoral industry approaches can become an important complement to existing national, regional or international policies and activities. ”

CEPS Task Force Report

Founded in Brussels in 1983, the Centre for European Policy Studies (CEPS) seeks to serve as a leading forum for debate on EU affairs, based on its in-house research capacity and complemented by an

BOX 8: CEPS activities on sectoral approaches

Work by CEPS on sectoral approaches includes:

- **CEPS Task Force on sectoral industry approaches** – to spread understanding of sectoral approaches, test the concept among EU and international stakeholders, assess issues in terms of environmental outcome, efficiency, political acceptability and feasibility, and develop concrete recommendations.
- **Economic and Social Research Institute project** – CEPS is a core partner of this project funded by the Japanese Government; a key focus of the research is the design of EU climate policies to ensure progressive engagement of the EU’s main international partners.
- **Technical Workshop on sectoral approaches** – In September 2008 CEPS hosted a workshop on sectoral approaches, the presentations of which are publicly available.

extensive network of partner institutes throughout the world.

In the context of its research programmes and networks, CEPS organises various activities involving its members and other stakeholders in the European policy debate including national and EU-level policy-makers, academics, corporate executives, NGOs and the media. CEPS hosts the focal point of the RINGOs network, the official constituency of Research and Independent Organisations to the UNFCCC, and is co-organiser of the European Climate Platform, which brings together climate negotiators, policy-makers and researchers.

2.7.1. CEPS Task Force Report

The CEPS Task Force Report – *Global Sectoral Industry Approaches to Climate Change: The Way Forward* – is based on multi-stakeholder discussions, supported by the Cement Sustainability Initiative of the World Business Council for Sustainable Development. Task Force members include stakeholders from a broad range of industry, industry associations and NGOs. During their meetings, the Task Force also consulted with officials from the EU institutions, international organisations and non-EU governments.

The report provides an overview of existing sectoral approaches and their core features, outlines some preconditions for successful implementation of such approaches, and describes how sectoral approaches could be integrated with existing climate change policies, before proposing a possible way forward.

The CEPS report focuses explicitly on *global sectoral industry approaches* – transnational industry-focused initiatives that aim to engage a sector on a broad international basis, and include industry-led initiatives (such as the Cement Sustainability Initiative), as well as public-private partnerships (such as the Asia-Pacific Partnership on Clean Development and Climate).

Focusing on how and by whom global sectoral approaches might be advanced so as to play a meaningful role in a post-2012 framework, the report identifies four major challenges that need to be addressed, and suggests that progress has been made on the first two, while pointing a way forward on the last two:

- technical issues relating to data definition and collection;
- managing the risk of anti-competitive behaviour;
- identifying effective incentives for emerging economy companies and governments to engage in sectoral approaches; and
- establishing a suitable governance structure.

The report recommends the following activities aimed at accelerating the development and use of global sectoral approaches (cited verbatim from the report):

- “Governments should partner with industry to test the different concepts in practice, by undertaking pilot projects in key countries and sectors to see whether the identified four challenges can be solved pragmatically.
- Developed country governments, in partnership with industry and international bodies, should increase the capacity of companies or developing country governments, especially of emerging economies, to measure and report emissions on a sector-by-sector basis.
- Governments should support the development of global sectoral industry approaches by engaging with industry sectors and reviewing their activities, possibly in the context of the IEA benchmarking exercise.
- Industry should reinforce its efforts to develop practical performance benchmarks that are acceptable in sectors across a range of developed and developing economies.
- Industry sectors should attempt to develop a “common framework for global sectoral industry approaches” that establishes basic monitoring, reporting and verification requirements and principles, as well as processes to develop benchmarks and provide regular information to governments and international organisations. The WBCSD working group on sectoral approaches is an example.
- Industry sectors should collect the results of successful efforts at monitoring and verification, most notably the WBCSD/WRI Greenhouse Gas Protocol and the Global Reporting Initiative sectoral guidelines, which have led to the development of

an ISO 14064 standard, and work on indicators and data collection carried out under the auspices of the IEA, national and international industrial associations, the APP and EU ETS allocation methodologies.

- Industry and governments should harmonise the data formats of different databases, such as those of the Asia-Pacific Partnership on Clean Development and Climate, the IEA and industry-led approaches.
- Those advocating sectoral approaches should identify what COP-15 in Copenhagen will need to decide in order to maintain or even accelerate the momentum of sectoral approaches.
- Industry must provide guidance on what it wants to see in a global agreement, e.g. recognition of sectoral approaches and which model(s), absolute or intensity targets, the role of sectoral crediting, or the beginning of sectoral-level negotiations.”

In addition to producing this Task Force report, CEPS has contributed to the work of the EU-funded consortium convened by the Centre for Clean Air Policy (CCAP) (see section 2.4 above). As part of this initiative they hosted a Technical Workshop on sectoral approaches in September 2008. The presentations and background papers are available on the CEPS website. Elements of the outcomes of this workshop are reviewed elsewhere in this paper.

2.8. Centre for Clean Air Policy (CCAP)

“ Sectoral approaches have emerged as one of the most promising tools to motivate countries and industry around the world to deliver the necessary emission reductions. In developing countries, sectoral approaches can help enhance efficiency and industry performance, support new technology deployment and promote sustainable economic development. They can also promote further cooperation between Annex I and developing countries on climate change and can help address competitiveness concerns among Annex I country industries and governments. ”

Centre for Clean Air Policy

Headquartered in Washington DC, the Centre for Clean Air Policy

(CCAP) is a non-profit think tank that focuses on developing pragmatic and cost-effective climate and air quality policy through analysis, dialogue, and education.

In July 2008, the European Commission awarded a \$3 million grant to CCAP-Europe for a two-year study to research ways in which the EU can assist developing countries to reduce GHG emissions in key high-emitting internationally competitive industries. The work, which focuses on sectoral approaches to reducing emissions, is being undertaken in partnership with:

- **The Institut du développement durable et des relations internationales (IDDRI)** – conducting outreach to European industry and institutions (Section 2.4);
- **The Centre for European Policy Studies (CEPS)** – a Brussels-based think tank leading the work on transnational industry-led sectoral approaches and working with IDDRI to conduct outreach (Section 2.9);
- **Climate Change Capital (CCC)** – a specialist investment

banking group conducting comparative analysis of finance and investment requirements between the different approaches in each sector and country; and

- **The Centre for European Economic Research (ZEW)** – a German non-profit economic research institute leading the international policy and trade modelling.

The project team presented interim results at the 2008 conference in Poznan, Poland and final results at COP-15 in Copenhagen. A final report will be delivered to the European Commission in early 2010.

2.8.1. CCAP Future Actions Dialogue Paper

Published in August 2006, this paper – *A sector-based approach to the post-2012 climate change policy architecture* – presents a specific proposal for a sector-based approach. The proposal has been developed based on off-the-record, informal discussions among senior climate change negotiators from over 30 industrialised and developing countries as part of the Future Actions Dialogue.

Following is a summary of their proposal and associated implications:

- The paper proposes a country-based “*voluntary no-lose sectoral approach*”, in terms of which key developing countries pledge to achieve a voluntary no-lose GHG emissions intensity target in major energy sectors (e.g. electricity, cement, steel, oil refining, pulp/paper, and metals). Under this approach:
 - failure to meet the voluntary pledge would not incur any penalties or require the purchase of credits from other countries (so-called “no lose”);
 - emissions reductions that meet a country’s pledge would be permanently “retired for the atmosphere”; and
 - reductions achieved beyond the voluntary pledge would be eligible for sale to industrialised countries as emissions reductions credits that are fully fungible with existing international emissions trading mechanisms.
- In terms of the proposal, industrialised countries and international financial institutions would encourage developing countries to pledge to meet more aggressive sectoral intensity targets by providing assistance to them through a Technology Finance and Assistance Package. This programme would support such activities as deployment of advanced technologies, development of small and medium-sized enterprises to assist in technology implementation, capacity-building, and pilot and demonstration projects, and could be financed through the allowance values or auction revenues in developed country emissions reduction

BOX 9: CCAP activities on sectoral approaches

Work by the CCAP on sectoral approaches includes:

- **Sector-based Approach to the Post-2012 Climate Change Policy Architecture** – Published in August 2006, the paper presents a specific proposal for a sector-based approach to GHG emissions mitigation in the post-2012 framework based upon discussions in the Center for Clean Air Policy’s Dialogue on Future International Actions to Address Climate Change.
- **EU-funded sectoral approaches study** – the CCA is the lead partner in a broader project involving: IDDRI; Centre for European Policy Studies; Climate Change Capital; and the Zentrum für Europäische Wirtschaftsforschung GmbH.
- **Sectoral Approaches: A Pathway to Nationally Appropriate Mitigation Actions** – Published in December 2008, this is the interim report of the outcomes of the collaborative study in which different sectoral approaches were road-tested in China, Mexico and Brazil, to explore which features of these various sectoral approaches might work in practice.
- **Various workshops presentations and associated briefing papers** – The CCAP has produced numerous other papers and workshop presentations that are available on their website. Two of these (a short policy brief on the impact of sectoral credits on the carbon market, and an updating presentation to the final negotiation session prior to Copenhagen) are briefly reviewed below.

programmes.

- The paper suggests that emphasis be placed on including the top ten largest GHG emitting countries in each sector, which would generally ensure coverage of 80-90% of developing country GHG emissions in each sector (see Table 2).
- It is proposed that the final sectoral GHG intensity pledges made by each participating developing country would result from negotiations between industrialised countries and each specific developing country. It is anticipated that a developing country would adopt a single carbon-intensity target in each sector, or possibly two targets, one for new facilities and the other for existing facilities. The proposed process involves:
 - internationally selected experts or institutes defining benchmark energy intensity levels for major processes within each selected industrial sector;
 - non-Annex I countries pledging a carbon intensity level that they can meet without assistance;
 - Annex-I countries negotiating with developing countries on specific financial and other support (from the Technology Finance and Assistance Package) to encourage non-Annex I parties to commit to stricter “no-lose” emissions intensity levels.
- While it is recognised that the voluntary nature of the programme does not guarantee that emissions reductions would be achieved, it is argued that success would be facilitated by two key features:
 - by basing their targets on accurate, bottom-up assessments, it is argued that developing countries will feel more confident they can achieve the targets and are thus more likely to achieve the desired levels; and
 - the mix of incentives – such as the Technology Finance and Assistance Package and the receipt of emissions reductions credits – should provide positive motivation for emissions reductions.
- The paper recommends that a benchmarking effort, similar to that for developing countries, would be undertaken for developed countries to determine a consistent level of effort that their industrial sectors should make towards meeting the national GHG emissions reduction target. The final targets for developed countries would be hard, aggregate, economy-wide targets built upon the initial sectoral analyses, while the targets for developing countries would be carbon-intensity targets that place no limits on growth in a given sector as long as carbon-intensity is improved. Other sectors in developing countries (e.g., transportation, residential, and commercial) would remain eligible to participate in the project-based, policy-

based, programmatic, or sectoral CDM, for which the full level of emissions reductions are eligible for sale.

2.8.2. The EU-funded sectoral approaches study

This EU-sponsored project is researching ways in which the EU can assist developing countries to reduce GHG emissions in high-emitting internationally competitive industries. The project is focusing on four energy-intensive sectors – iron and steel, cement, aluminium, and electric power – in three countries (China, Brazil and Mexico). As part of this process, developing country workshops are being held in China, Mexico, Brazil and India, with developed country stakeholder workshops in the EU, US and Japan.

The study entails quantitative analysis, including:

- identifying and analysing potential mitigation options;
- developing lower-emission scenarios under each sectoral approach;
- undertaking trade and competitiveness analysis;
- estimating funding levels required and potential financing options; and
- developing potential government and private sector policies to implement mitigation options and sectoral programmes.

This study is informed by the belief that sectoral approaches may play a more definitive role in a post-2012 framework, as well as the understanding that different approaches may be required for different countries and sectors.

At the July 2008 China Workshop:

- Preference was expressed for a bottom-up nationally-binding approach, with specific future technology penetration commitments linked to financing, rather than carbon intensity targets.
- The discussions on cement focused on waste heat reduction technology; a broader set of policy options including cement blending to be considered in the future analysis as well as social costs of policies.
- On iron and steel, it was suggested that a single standard for the entire sector might not work and that standards for different processes need to be considered.

At the September Mexico Workshop:

- Participants were supportive of sectoral approaches.
- Work is being undertaken on a possible sectoral target for oil refining and emission reduction options; this is being coupled with financing options to overcome potential governmental policy barriers.

- The Mexican Climate plan envisions a cap-and-trade system as a path to meeting a sectoral target; the first priority is to build monitoring and reporting capacity.
- The cement sector expressed willingness to consider a sectoral approach, but is less optimistic that there is much room for emissions reductions.

2.8.3. CCAP Sectoral Interim Report

This interim report of the consortium's "proof-of-concept" study of different sectoral approaches in China, Mexico and Brazil – published in December 2008 – presents the preliminary results of the first phase of their study: an evaluation of sectoral approach issues and opportunities in the cement sector.

This analysis consisted of four steps: collecting plant-level data; developing baseline production, energy use and emissions projections to 2025; calculating average marginal abatement cost curves for a variety of potential mitigation options in each country; and modelling the impacts of scenarios in which packages of mitigation measures were implemented.

At the outset of their study, three different designs for sectoral approaches were proposed for analysis – a transnational sectoral approach, a sectoral carbon finance approach (also known as Sectoral CDM), and a bottom-up sectoral approach.

The study was originally intended to provide a proof of concept for each of these three sectoral approach designs. However, during the course of this study the visions of the three approaches have evolved, and it is increasingly evident that the transnational sectoral approach is no longer politically viable having been rejected by most developing countries. Furthermore, the sectoral carbon finance approach and the sectoral bottom-up approach have evolved to become more similar than originally envisioned and now essentially represent different methods for setting a sectoral crediting baseline. The key remaining difference between the two is the bottom-up approach's provision of up-front technology or financial assistance to a developing country to encourage the country to undertake a stronger commitment.

The research team's analysis suggests that if current growth rates of cement production in China, Brazil and Mexico continue through 2020, then strong mitigation efforts could potentially capture two-thirds to four-fifths of the potential emissions reductions identified in two recent comparison studies of the emissions reduction potential of implementing current best available technologies in the cement sector.

The study further suggests that implementation of stringent no-lose targets in the cement sectors in these three countries would produce emissions reductions of more than 15% from

business-as-usual (BAU) in 2020, within the range that the IPCC and others have suggested is needed from developing countries in 2020 to keep GHG emissions on a path that can limit global warming to 2°C.

Preliminary lessons and conclusions

Based on their preliminary findings, the research team identified the following key lessons learned:

- The plant level data needed to perform a bottom-up analysis of a sector is scarce and is often considered to be confidential when it does exist. This is particularly true of cost data and indicates a need for extensive capacity building in developing countries to obtain the necessary data in a manner which industry finds acceptable.
- Due to this lack of data, sectoral approaches that adopt technology deployment targets, or couple intensity targets and technology deployment goals, may be more viable than intensity-based targets alone, in the near term.
- Flexibility in the design of a sectoral approach will be critical to its ability to access the full suite of mitigation opportunities available to participating countries.
- Although some have argued that bottom-up sectoral targets are too complicated to be included in an international treaty, this proof-of-concept study suggests that designing sectoral targets for developing countries is simply a process of: understanding emission reduction opportunities and costs within a domestic policy and political context; setting a sector-wide target; and defining the domestic policies and international incentives necessary to achieve compliance with that target (in essence the same process that developed countries must follow in regulating these same energy-intensive sectors).
- Overall, the results of the current study and other related efforts undertaken by CCAP-Europe and its partners suggest that sectoral approaches must have clearly defined objectives, build on ongoing unilateral mitigation actions and support national sustainable development strategies. To achieve this, they must produce material participation and material emission reductions across sectors and countries, be flexible, take national and local circumstances into account and produce technological innovation and transfer.
- Sectoral efforts should focus on the most inefficient sectors in the key developing countries. Ultimately, however, the primary determinants of the success of emission reduction efforts in the post-2012 commitment period will be the degree of leadership exhibited by both developed and developing countries and the level of targeted support provided by developed countries

to assist developing countries in the implementation of their nationally appropriate mitigation actions (NAMAs), which may include sectoral approaches, as required by the Bali Action Plan.

2.8.4. Policy Brief: How Will Sectoral Credits Affect the CDM Offset Market

In this short Policy Brief, the CCAP examines the likely interaction between sectoral crediting and the existing CDM offset market. Noting that some fear that the CDM offset market will be flooded, while others are concerned that offset supply will be insufficient to meet demand, the paper suggests that “reality is somewhere in the middle.”

The CCAP suggests that a substantial fraction of developing countries’ cost-effective mitigation opportunities will be used to meet their sectoral targets and may not be sold as offsets. It argues that only reductions in excess of sectoral targets will be eligible for sectoral crediting and they anticipate that these reductions are expected to cost somewhat more than traditional CDM offsets, which take advantage of lowest available cost mitigation opportunities.

The CCAP foresees that initially there could be a decline in offset investments in countries subject to sectoral actions, coupled with an increase in investments in CDM offsets from sectors and developing countries still eligible for participation in the CDM programme. They argue that demand for offsets – both CDM and sectoral – will grow significantly from 2012 or 2013 as more developed countries (including the United States, Australia, Japan and New Zealand) implement cap-and-trade programmes that allow for use of international offsets.

They suggest that even as sectoral crediting begins to ramp up – which may take time due to the associated institutional requirements – the traditional CDM market will remain competitive in securing private sector participation, aided in part by the anticipated streamlined CDM procedures. They conclude that even with sectoral credits and traditional CDM projects at full operation, it may be difficult to supply the total amount of offsets in demand by developed countries.

2.8.5. UNFCCC Side Event Presentation: Update on Sectoral Study

At a side event to the UNFCCC Barcelona negotiations, on 3 November 2009, the CCAP provided an update on the lessons learnt from their sectoral study and shared some observations on sectoral options in the NAMA context. A summary of some of the issues raised follows.

The CCAP’s “proof of concept” study of sectoral programmes in China, Mexico and Brazil (with parallel efforts in India and Indonesia), has been examining the following questions:

- What data is available on technologies, costs, emissions, and fuel use?
- What impact can sectoral programmes have on global emissions?
- How can these programmes fit into a Copenhagen agreement?

On access to data, the study found that significant data gaps exist, with the facility-level cost data being nearly impossible to acquire due to confidentiality and competitiveness concerns. The study highlights the value of in-depth bottom-up analysis and underlines the need for capacity building in developing countries to begin immediately. Notwithstanding these constraints it suggests that even when data is limited, reasonable sectoral goals can potentially be determined, arguing that the process of setting such goals with incomplete and aggregate data can stimulate greater interaction, cooperation and feedback from the affected industries, as they want to ensure that sectoral goals are equitable and feasible.

On the issue of setting goals, their study suggests that sectoral goals should not be rigidly limited to emissions-intensity goals, arguing that technology-based goals can be more effective in some settings, are generally easier to implement and measure, report and verify (MRV), and can serve as transitional goals while data capacity is built. It is recognised, however, that determining the level of emissions credits to be earned from beating a technology-deployment goal is more uncertain than for emissions-intensity goals. The study confirms that the process of setting sectoral goals in developing countries will be similar to setting caps in Annex I countries being both a policy and political negotiation process.

At a general level, the study concludes that:

- sectoral approaches can be feasibly designed and implemented in developing countries;
- sectoral approaches can lead to significant emissions reductions in developing countries, many of which can be achieved cost-effectively;
- effectively designed policies and measures – that address identified the barriers and treat affected entities equitably – is key to the success of sectoral programmes; and
- the design and implementation of sectoral approach “does not have to be perfect, as we are not trying to devise an architecture for the very long term” – instead they can be viewed as an interim step on a longer-term quest.

Table 2

Top ten non-Annex I countries for key industrial sectors (CCAP, 2006)

Electricity	Steel*	Chemical & Petrochemical	Aluminium	Cement & Limestone	Paper, Pulp & Printing
China	China	China	China	China	China
India	Japan	India	Brazil	India	Brazil
South Africa	Unites States	U.A.E.	India	South Korea	India
South Korea	Russia	South Africa	Venezuela	Brazil	India
Mexico	India	South Korea	Chile	Indonesia	Indonesia
Iran	South Korea	Brazil	Argentina	Mexico	Mexico
Saudi Arabia	Germany	Mexico	Bahrain	Thailand	Columbia
Kazakhstan	Ukraine	Iran	Kazakhstan	Pakistan	Thailand
Indonesia	Brazil	Indonesia	South Korea	Egypt	Argentina
Thailand	Italy	Venezuela	Macedonia	Iran	Chile

* Steel data is from worldsteel *World Steel in Figures 2009*

2.9. International Energy Agency (IEA)

“ 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. ”

IEA/OECD

The International Energy Agency (IEA) acts as energy policy advisor to 28 member countries in their effort to ensure reliable, affordable and clean energy for their citizens. With the changes in the energy markets since the IEA's establishment during the oil crisis of 1973-74, its mandate has broadened to focus on energy security, economic development and environmental protection. Current work focuses on climate change policies, market reform, energy technology collaboration and outreach to the rest of the world, especially major consumers and producers of energy like China, India, Russia and the OPEC countries.

2.9.1. November 2007 IEA Paper: Sectoral approaches for GHG Mitigation

The IEA's November 2007 paper explores the potential for using sectoral approaches as a means of enhancing GHG reduction policies and engaging emerging economies on a lower emission path. The paper surveys existing literature and recent climate policy developments; provides an overview of sectoral approaches in three GHG-intensive sectors (aluminium, iron and steel, and cement); and draws on interviews in Australia, China, Europe, Japan, and the United States, as well as on various workshops on technology and energy efficiency policies in industry.

The paper identifies and reviews four broad categories of possible sectoral approaches, and argues that such approaches could be a useful vehicle for enhancing the effectiveness and broadening the scope of GHG mitigation efforts. Highlighting the need for a thorough understanding of the sector-specific context, the report reviews a set of case studies in its three focus sectors.

In their assessment of possible instruments for a quantitative sectoral approach, the paper provides a useful assessment of the potential role and drawbacks associated with using industry benchmarks, before highlighting some of the possible methodological and political hurdles that must be overcome in setting common baselines at international level.

The report identifies three broad sets of challenges facing sectoral approaches:

- **Technical** – sectors need a fair record of their starting points, from an energy emissions and technology standpoint; although efforts are currently underway in the three sectors studied in the report, it is suggested that this may be more difficult for

BOX 10: IEA / OECD activities on sectoral approaches

Recent and ongoing work by the IEA and the OECD includes:

- **Sectoral Approaches to Greenhouse Gas Mitigation: Exploring Issues for Heavy Industry** – Published in November 2007, this paper explores sectoral approaches as a new set of options to enhance the effectiveness of GHG reduction policies and to engage emerging economies on a lower emission path.
- **Options for Integrating Sectoral Approaches into the UNFCCC** – Published in November 2008, this paper seeks to inform efforts for integrating sectoral approaches into the UNFCCC regime.
- **Sectoral Approaches and the Carbon Market** – Published in 2009, this paper considers the carbon market aspects of sectoral approaches to reduce GHG emissions in developing countries
- **Sectoral Approaches in Electricity: Building Bridges to a Safe Climate** – Published in 2009, this book shows how sectoral approaches could be used in the international climate policy framework to support a transition towards low-CO₂ electricity systems in developing countries.
- **Sectoral Market Mechanisms: Issues for Negotiation and Domestic Implementation** – Published in October 2009, this paper reviews recent proposals for the design of sectoral market mechanisms, identifies the possible principles and technical requirements that Parties may wish to consider in elaborating these mechanisms, and examines the nature of domestic implementation of sectoral market mechanisms, noting how the transition between current and future market mechanisms could be managed.
- In addition, the IEA has produced **numerous research papers** on sector-related subjects – including on energy technology options, emissions trading and industrial energy efficiency – as well as **organising and contributing to workshops and UNFCCC processes**.

emerging economies, especially China with its large number of installations.

- **Institutional** – new international instruments may need to be developed, some of which may raise significant issues for the climate regime; recognising that some developing countries may have limited ability to implement and enforce broad-based energy and environmental policies, the need for enhancing capacity is highlighted.

- **Political** – the report suggests that international climate negotiations have been characterised by “a rather antagonistic North-South debate” and the paper suggests that it remains to be seen whether emerging economies will consider some form of sector-based commitment at international level to unlock these win-win potentials.

In terms of taking the sectoral approach forward within the UNFCCC policy processes, the IEA makes some closing observations and recommendations – summarised below – relating primarily to the work the IEA could take in contributing to the possible uptake of these approaches.

Identifying and prioritising sectoral approaches

The first suggested activity is to estimate the GHG reduction potential of the various sectoral approaches, on the basis of existing technologies, production capacities, regional market dynamics and possible policy incentives. It is argued that this would help to identify the most productive avenue for sector-based efforts, whether they are embedded in existing policy instruments, or lead to new ones.

Sectoral crediting approaches

The report suggests that the option of “no-lose sectoral pledges” offers a “valid point of entry” for those developing countries that may seek to enter GHG mitigation commitments through a sector-based, rather than a country-wide, approach, and suggests that further work be taken on the international policy aspects of such options, including assessing the feasibility of sector-wide crediting for trade-exposed, GHG-intensive industries, and considering the nature, duration and scope of GHG crediting, in light of required levels of global reductions.

Sustainable development policies and measures (PAMs)

This approach is seen to be another area that is worth exploring as a means for engaging developing countries in international policy cooperation, including particularly in the aluminium, iron and steel, and cement sectors. The report suggests that although SD-PAMs are not yet officially recognised by the UNFCCC, they are increasingly present in developing country submissions. The IEA puts great emphasis on energy efficiency as a means for lowering GHG emissions, and stresses the sustainability advantages of energy-efficiency best policy practice (BPP). Noting its in-depth analysis on this issue, the report argues that reaching out to so-called +5 countries could deliver significant gains in terms of more sustainable energy practice and lower GHG emissions,

and that such expertise could be used to design SD-PAMs as an instrument that aligns the domestic policy objectives of developing countries with the need to reduce GHG emissions.

Industry performance indicators and benchmarks

Recognising the value of industry benchmarking activities, the report argues that the use of information generated by benchmarking, once collected, opens up some policy questions for possible further research by the IEA, most notably on assessing how to use benchmarks as a means to identify a least-cost outcome for GHG mitigation activities.

Additional sectors

The report suggests that further work be undertaken in evaluating the potential for sectoral approaches in the power generation and transport sectors; these are the fastest growing sources of GHG emissions in the developing world, but do not raise similar competitiveness concerns as those illustrated in the IEA's review of the aluminium, iron and steel, and cement sectors.

A pilot phase for sectoral approaches

Recalling that in the run up to the Kyoto Protocol, a pilot phase for activities implemented jointly provided important insights for the Protocol's project-based mechanisms, the IEA report suggests that a pilot phase could be envisioned to move beyond the current theoretical discussion of sectoral approaches with the aim of addressing some of the key implementation issues. Possible elements to be tested in such a pilot project could include:

- the feasibility and usefulness of a common benchmark, or a common methodology to establish meaningful country-specific sectoral objectives that reflect national circumstances and a country's willingness to undertake meaningful reductions;
- the nature of countries' institutional needs for implementing sectoral approaches, and the impact on these institutional needs if GHG crediting is involved; and
- identifying the preferred approach for international cooperation aimed at encouraging best practice in policy and technology; recognising that best policy practice may not be simply "transplanted" from a developed to a developing country, the report suggests that the feasibility of such policy ought to be tested, possibly with plant-level pilot projects in the country.

2.9.2. IEA / OECD Paper: Options for Integrating Sectoral Approaches into the UNFCCC

The IEA/OECD's November 2008 paper seeks to build on the

various research and policy initiatives underway – including its earlier work outlined above – with the aim of prompting Parties to move forward on sectoral approaches by focusing specifically on possible options for integrating sectoral approaches into the post 2012 UNFCCC regime.

The paper considers three main models for sectoral approaches – domestic sectoral activities in developing countries, sector-based technology cooperation and transnational sectoral agreements – and briefly introduces options in each of these categories, focusing on issues that could be brought forward in an agreement by COP-15 in Copenhagen. It outlines some cross-cutting issues and discusses how these might interact with other possible aspects of a post-2012 mitigation framework. Reviewing existing language in the Convention and Protocol, the paper suggests various specific possibilities for decisions by Parties in this area.

Domestic sectoral approaches

The paper considers the following options for domestic sector-based activities in developing countries, and identifies possibilities for integrating these in the UNFCCC regime:

- Non-credited efforts, such as policies and measures (SD-PAMs) or other "nationally appropriate mitigation actions" (NAMA) – these would provide access to a funding mechanism, rather than to tradable credits, that would assist with the development and implementation of appropriate sector-wide policies;
- A sectoral crediting mechanism either through extension of the 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); or
- Binding sector-wide emissions targets (absolute or intensity-based) that allow the possibility to trade for example under Article 17 of the Kyoto Protocol, or an equivalent in another instrument.

The paper suggests that Parties would need to consider the following issues if domestic sector-based activities are to be included in the post-2012 framework:

- **Eligibility** – On what basis should sectors be selected or prioritised? Should it focus on certain global priority sectors, or should developing countries be able to self-select sectors and activities? (Suggested criteria include cost-effectiveness of mitigation, the lock-in characteristics of sectors, the ability to measure and verify emissions, and overall mitigation potential).
- **Crediting** – Can sectoral actions and approaches in developing countries generate carbon credits, and if so, to what extent? How would one ensure that there is sufficient balance between the supply of new credits and global demand for such credits?

- **Institutional arrangements** – What form of international coordinating body will be needed? What would be its composition and mandate?
- **Link to nationally appropriate mitigation actions** – Can developing country Parties take, among their nationally appropriate mitigation actions, 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 prior to the Copenhagen meeting 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.

Sectoral agreements on technology cooperation

Recognising the importance of technology issues in the UNFCCC negotiations, the paper suggests that there would be value in adopting a streamlined approach to technology through some form of sectoral structure. A sectoral approach to technology would allow for a clear focus on those sectors where enhanced international cooperation – for example through technology transfer, financing R&D or technology deployment, capacity building, or supporting audits and data collection – could result in significant mitigation.

The paper suggests that Parties would need to consider the following issues if a sector-based approach to technology is to be included in the post-2012 framework:

- **Integration** – How would such an approach be integrated with existing technology-related activities?
- **Choice of sectors** – Should priorities be set on the basis of relative cost of mitigation, the size of the potential reduction, existing gaps (in countries and sectors) in mitigation, and/or the need to achieve technological breakthroughs?
- **Methodologies** – How would mitigation potentials and costs be quantified and what role for the experiences of industry associations on best available technologies?
- **Financing** – Would funding for sector-specific cooperation be distinct from existing financial mechanisms?

Transnational sectoral approaches

Transnational sectoral approaches apply to a sector across a range of countries. These could include:

- 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;
- a transnational technology goal, setting a share of global output or production capacity to be supplied by a given technology over a specific timeframe; or
- a cooperative approach to research and development, to provide for equipment allowing radical emission reductions in the longer run.

The paper recognises that Parties could choose to develop such approaches within the framework of the UNFCCC, or that (some) Parties could choose to do so outside the UNFCCC. Either way, Parties have the choice of building on existing transnational activities such as the Asia Pacific Partnership or the various private-sector initiatives reviewed in more detail in Chapter 3.

While these existing initiatives provide a useful basis for developing sectoral agreements, there is currently no formal mechanism for “importing” these private-sector efforts into the UNFCCC process, other than through project descriptions and methodologies developed for the CDM. Furthermore, unlike for domestic sector-based activities, there are not at present any specific proposals from Parties for transnational sectoral agreements to be included within the UNFCCC process, and most developing country Parties have voiced objections to such an approach.

The paper suggests that should Parties wish to include such agreements within the UNFCCC regime, this would probably need to be negotiated under the auspices of the Convention, not the Kyoto Protocol, and that it could take the form of an amendment to the Convention or the development of a new protocol, in each case possibly with annexes for the sectors and Parties covered.

The paper argues that if transnational sectoral approaches are to be included within the post-2012 UNFCCC framework, then Parties would need to consider the following issues:

- **Coherence** – ensuring coherence between any transnational sectoral goals with existing nation-wide commitments by developed countries and other mitigation actions by developing countries;
- **Sectoral expertise** – organising the technical expertise (possibly using the technology and economic assessment panels of the Montreal Protocol serve as a model);
- **Negotiation areas** – clarifying the core elements of the

negotiation, which could include technology cooperation, common methodology for GHG baselines, target types, and various trade aspects;

- **Choice of sectors** – identifying the choice of sectors; and
- **Capacity building** – addressing data gaps in these sectors.

Concluding comments

In its concluding comments the paper highlights that it does not advocate any of the three broad approaches as being preferable in the shorter or longer-term, but rather that its focus is on identifying specific possibilities for integrating sectoral approaches in the UNFCCC regime. It suggests that while several issues may need to be decided by Copenhagen, others would not, and thus advises that a two-stage process be followed, allowing Parties to adopt a framework agreement on sectoral approaches at COP-15 without seeking to address of existing uncertainties on these options. Some of these issues and associated recommendations are explored further in Chapter 5.

2.9.3. Sectoral Approaches and the Carbon Market

This paper, published by the OECD and IEA Secretariats in mid-2009, considers the carbon market aspects of sectoral approaches to reducing GHG emissions in developing countries.

Recognising that the market is core to the effectiveness of crediting mechanisms – and thus that proposals for such mechanisms must provide for potential supply and demand projections – the paper:

- considers the volume of credits that such mechanisms could generate, given sectoral emission trends and mitigation potentials;
- explores how the carbon market would interface with three types of sector-wide objectives in countries as the basis for crediting or trading, namely: intensity goals – based on GHG emissions per unit of output; fixed emission goals – using an absolute total quantity of GHG emissions as the basis for sectoral crediting (with an ex post issuance of credits), or sectoral trading (with an ex ante allocation of allowances); and technology-based sectoral objectives; and
- examines how sectoral crediting systems could be designed to enhance global GHG mitigation, going beyond the current role of CDM CERs as one-for-one offsets for emissions in developed countries.

Acknowledging that projections of supply and demand for sector-based credits are plagued with uncertainty, the paper does not attempt to address all underlying questions, but rather seeks

to estimate the order of magnitude of the supply that sectoral crediting mechanisms could generate, and of demand based on current policy announcements, focusing on the 2013-2020 period. In doing so, the importance of a few regions, and of a few sectors (electricity, energy-intensive industry and forestry) becomes clear.

Notwithstanding the considerable uncertainties associated with the projections, the study's preliminary estimates suggest that potential supply could be significantly larger than demand, particularly if sectoral crediting is adopted for large emission activities (most notably the power, cement and forestry sectors) and/or if baselines are too close to business-as usual. The paper suggests that this potential for oversupply needs to be carefully considered in assessing sectoral mechanisms, recognising that a low resulting carbon price could deter needed innovation and contribute to carbon lock-in. The paper calls for a thorough assessment of sectoral options for crediting to avoid raising unrealistic expectations on possible finance from the carbon market, and suggests that parties will need to decide carefully on those sectors amenable to sectoral market mechanisms, with important choices needed on which entities to include (based, for example, on size of operations, age of plant and so on).

The paper also explores the domestic policy implications of moving from a single project approach (CDM), to a multi-plant, sector-wide carbon market mechanism implied by sectoral crediting and trading. The study cautions that “sector-based market mechanisms – regardless of the chosen design option – will require significant upfront effort both nationally and internationally to set appropriate baselines, ensure adequate measurement, reporting and verification, and generate economically valuable and environmentally-credible credits.”

2.9.4. Sectoral Approaches in Electricity: Building Bridges to a Safe Climate

This book, published in mid-2009, reviews the feasibility of sectoral approaches as a means of addressing the particularly significant challenge of electricity-related CO₂ emissions from developing countries. The sectoral approach is seen to offer advantages in allowing developing countries that may not be in a position to adopt a comprehensive, legally binding emission objective to commit certain sectors to ambitious GHG emission mitigation measures.

The paper recommends a two-tiered international approach: on the demand side it calls for urgent policy support on energy efficiency, while on the supply side, it urges the use of strong economic signals to encourage low-CO₂ generation technologies, from high efficiency plants to renewables, nuclear and CCS.

While acknowledging that the current international framework

has achieved some success in reducing electricity emissions – for example with the CDM encouraging the deployment of some clean generation technologies – the paper suggests that it has been less effective in the area of end-use and plant energy efficiency, and thus urges the international community to “shift to a higher gear” with the adoption of sectoral market mechanisms as a “radical departure” from CDM.

The paper reviews the scope for sectoral market mechanisms, in terms of which credits for emission reductions would be issued once a country reports performance that exceeds an agreed sectoral emission objective, the so-called baseline. These baselines would differ across countries, reflecting the fact that generation fuel mixes, resources and access to technology still differ greatly from region to region. The paper suggests that to be politically plausible, crediting on a sectoral basis will require setting ambitious emission baselines to deliver meaningful global CO₂ abatement, and to ensure that the supply of credits does not overwhelm demand. Developing countries would need first to reduce emissions to meet the baseline – their contribution to global mitigation – and only be credited for reductions that surpass this baseline. The study proposes design options for electricity baselines that would meet the above concerns and requirements.

To ensure appropriate incentives for investors in power generation, sectoral crediting will need an effective policy framework in which sectoral crediting would lead to credits being issued for performance aggregated at country level. Within the sectoral approach, the paper also considers technology deployment goals as commitments for which developing countries could seek international assistance, and which could also contribute to meeting a sector baseline.

The IEA paper considers four countries – China, India, South Africa and Mexico (an OECD member country) – and reviews their wide-ranging policy experience in the electricity sector, both on end-use and generation.

The case studies highlight various issues that would need to be addressed if countries were to make sector-level pledges. These gaps include: developing appropriate regulatory frameworks and incentives to maximise and maintain plant efficiency; ensuring the availability of national level data on electricity production and CO₂ levels; and enhancing the role of local governments in relaying national policies.

2.9.5. Sectoral Market Mechanisms: Issues for Negotiation and Domestic Implementation

Published in October 2009, this paper reviews recent proposals

for the design of sectoral market mechanisms, identifies the possible principles and technical requirements that Parties may wish to consider in elaborating these mechanisms, and examines the nature of domestic implementation of sectoral market mechanisms, noting how the transition between current and future market mechanisms could be managed.

In its review of recent proposals, the paper examines the options relating to the supply side of the carbon market – in the form of the “range of sometimes conflicting definitions of sectoral crediting, sectoral trading and NAMA-crediting” – before summarising recent legislative and policy developments in developed countries that could impact the demand side. It briefly considers the various institutions that are being proposed to govern these new mechanisms, before identifying the following design elements that require further clarification in determining how these mechanisms would work in practice:

- the criteria for eligible countries and sectors;
- the nature of targets (absolute or intensity based);
- the process for establishing/approving baselines;
- the nature of guidelines for managing issued credits; and
- the relationship of these mechanisms with the CDM.

Noting the need to adjust domestic legislation in developed countries to provide for the use of units from these new mechanisms, the paper reviews existing and emerging legislative developments in Australia, Canada, the European Union, New Zealand and the US. Identifying certain policy issues that are pertinent to both domestic and international discussions, the question is raised that decisions on some of these issues may best be taken at a domestic level, thus reducing technical discussions from UNFCCC negotiations.

In reviewing some of the elements needed to establish sectoral market mechanisms, the paper identifies a number of elements of a more political nature (so-called “principles”) that would need to be clarified, including:

- agreeing definitions of crediting and trading;
- defining the participation of developing country Parties in the different mechanisms;
- setting the environmental ambition of baselines;
- agreeing the sectors to be engaged;
- clarifying the relation between market support for mitigation and other forms of financial support;
- setting possible limits on the use of credits; and
- introducing a possible sunset clause, limiting the eligibility of scaled-up crediting to a defined time period.

The paper also identifies various elements of a more technical nature that need to be addressed before these new market mechanisms can operate. These include:

- setting criteria for eligibility for participation by developed countries, as buyers;
- defining the process for setting baselines and for assessing performance ex ante and measuring it ex post;
- agreeing the length of the crediting period and the frequency for issuing credits;
- creating a new trading unit (similar to the CDM's CER) and establishing appropriate registries; and
- appointing a national entity to administer the new mechanisms, and to measure, report and verify performance of the sector.

The paper concludes by considering in some detail how the transition from the current flexibility mechanisms to a broader, more ambitious policy framework could be managed, with the aim of encouraging further private sector investment and ensuring a functioning carbon market. Various scenarios relating to the accounting of existing CDM projects in a sector that is subject to a sectoral mechanism are considered; these range from integrating all existing CDM projects into the sectoral mechanism, to maintaining full independence of existing projects from the new mechanism.

2.10. Organisation for Economic Cooperation and Development (OECD)

“ Sectoral agreements could be a useful part of any post-Kyoto arrangement on climate change, but are unlikely to deliver on their promise without any significant practical effort, political will and supplementary measures outside such agreements... Beyond the political acceptability of any implied burden-sharing, the workability of any sectoral agreement will depend upon the detail. This may prove to be the single biggest advantage of sectoral approaches: the opportunity they provide to focus the minds of governments and industries on the practicality of emissions reductions in some of the most emissions-intensive sectors. ”

OECD – Post-Kyoto Sectoral Agreements: A Constructive or Complicating Way Forward?

Established in 1961, the OECD with its 30 member countries provides a forum and the analytical capacity to assist governments to exchange policy experiences, and to identify and promote good practices through policy decisions and recommendations.

2.10.1. Post-Kyoto Sectoral Agreements – A Constructive or Complicating Way Forward?

Published in March 2009, this paper by the Roundtable on Sustainable Development, within the OECD, examines the following two sectoral approaches, and considers the implementation issues and costs and benefits of each of these, using specific “real-world” examples:

- Sectoral Crediting Agreements (SCA) – in essence the same as the sectoral no-lose approach referred to earlier, an SCA is similar in concept to the CDM but with a focus on an entire industrial sector rather than on individual projects; and
- Sectoral Emissions Agreements (SEA) – at its simplest, this would be in the form of an agreement that caps global emissions throughout an entire sector, with sectoral emissions allocation permits being negotiated between different countries.

BOX 11: OECD activities on sectoral approaches

The OECD has been working on sectoral approaches since at least 2005; in many instances it has been doing so jointly with the IEA (see Section 2.9). Their work includes:

- **Sectoral Approaches to Greenhouse Gas Mitigation: Exploring Issues for Heavy Industry** – undertaken with the IEA; reviewed in Section 2.9.
- **Options for Integrating Sectoral Approaches into the UNFCCC** – undertaken with the IEA; reviewed in Section 2.9.
- **Sectoral Approaches and the Carbon Market** – undertaken with the IEA; reviewed in Section 2.9.
- **Post-Kyoto Sectoral Agreements: A Constructive or Complicating Way Forward?** – undertaken by the Roundtable on Sustainable Development, within the OECD; this is reviewed below.
- **The Economics of Climate Change Mitigation: How to Build the Necessary Global Action in a Cost-effective Manner (2009)** – reviewed below.
- **The Economics of Climate Change Mitigation: Policies and Options for the Future (2008)** – reviewed below.

Sectoral Crediting Agreements

The OECD paper uses the case study of introducing an SCA in the electricity generation sector in China to assess the feasibility of SCAs more broadly.

- For the purposes of the case study, the SCA would involve setting country-level emissions targets for sectors and rewarding those participating countries whose sectors outperform their targets with tradable emissions reduction credits.
- Targets would be built up from: a reference case incorporating current policies and measures (PAMs); new pledged or planned PAMs; and an extra margin to help ensure crediting occurs for additional emission reductions. The agreement would be a “no-lose” one: failure to meet targets would not result in penalties or requirements to purchase credits from other countries. These targets could differ for each participating country, as well as for new or established plants.
- It is envisaged that there would be a three-stage process associated with negotiating and defining the “no-lose” targets:
 - assessing and defining energy intensity best practice benchmarks in each sector;
 - Non-Annex I countries pledging a carbon intensity level they can meet without assistance;
 - Annex I countries negotiating with developing countries the specific financial and other support to be provided to encourage the non-Annex I countries to commit to stricter “no-lose” emissions targets (any funding here would be limited to reaching rather than exceeding the no-lose target, as reductions beyond the no-lose target would receive credits).

The results of the modelling exercise of using an SCA in the Chinese electricity sector suggests that such an instrument “could make a substantial contribution to the investment costs of a low carbon growth pathway in China”, with an emissions-intensity target of 8% below the reference intensity being sufficient to raise the necessary capital to facilitate this transition.

However, the case study highlights some important potential risks and obstacles:

- In defining the reference case for future emissions and emissions intensity, how does one provide for the impact of current and planned policies, distinguishing, for example, between those that are concrete and those that are aspirational, or accounting for those that have uncertain but potentially significant impacts on emissions (such as carbon capture and storage)?
- Who would be in the market to purchase the potentially significant number of offset credits (one scenario for China suggests the creation of possibly 2.5 billion credits in 2030), and what impact

would this have on the global price of carbon and, in turn, on the climate stabilisation objectives?

- What domestic policies and measures would be needed to provide the necessary impetus to exceed a no-lose target, and how politically feasible are these?
- How would one overcome significant existing concerns relating to the poor quality of emissions monitoring and data collection?

Underpinning these potential risks and obstacles is the need to find an appropriate balance between setting sufficiently stringent Annex I commitments – so as to prompt developed-country funding – with ensuring suitably ambitious no-lose targets, thereby providing “just the right amount of funding and offsets.”

In their preliminary conclusions on the potential for SCAs, the OECD paper suggests that while an SCA in the power sector could certainly scale up financial flows and link emission reductions in developing countries to specific abatement opportunities by focusing attention on sector-specific opportunities, the impact is highly uncertain, and there is potential that offset credit would be generated in such quantities as to undermine global activities.

Sectoral Emissions Agreements

To assess the potential for sectoral emissions agreements, the OECD paper uses the example of an SEA in the cement sector using results from a model of international cement production developed by a group of multinational companies.

- For the purposes of the case study, it is envisaged that the SEA would set an emissions intensity target (CO₂ per tonne of cement produced) that is calculated using a percentage improvement in emissions intensity relative to a base period. Countries would negotiate the level and respective shares of this target and would be allocated fungible emissions permits accordingly. In doing so, the SEA would seek to broaden the geographical scope of emissions reduction activities, while respecting the principle of common but differentiated responsibilities.
- The agreement would include explicit penalties for not meeting the target, as well as benefits if the target were surpassed: countries that better the target would be allocated emissions permits on the basis of their production multiplied by the distance between their emissions intensity and the target, while countries that fail to meet the target would have to purchase permits to cover the shortfall.
- The nature of credits created would differ depending on whether or not a country has economy-wide emissions caps: countries with existing caps would be required to “retire” their permits at the level of national accounts; countries without economy-wide

caps would be eligible to sell them on, but, to avoid doubling-counting of reductions, would not be eligible to register these as CDM projects.

- It is proposed that the SEA be devised as a protocol to the UNFCCC, and that the agreement would only enter into force with the ratification of countries responsible for 75% of emissions in the sector according to emissions data held by the UNFCCC for a base year date of 2005. (In terms of the cement sector, around 75% of existing cement sector emissions could be covered within the agreement if only nine parties countries were included in any sectoral agreement, e.g.: China, India, Brazil, Mexico, South Africa, Korea, the United States, Japan, and Russia).

On the basis of a modelling of the impacts of a cement sector agreement, the OECD paper suggests that a sectoral agreement based on intensity targets extended to all countries would result in almost a fourfold increase in emissions reductions compared to a scenario in which only Annex I emissions are capped – increasing from an approximate 5% reduction in 2030 to over 20% reduction with intensity targets. (While absolute caps across all countries would lead to a greater reduction, this would be in conflict with the core UNFCCC principle of common but differentiated responsibilities).

However, the case study highlights some important potential challenges:

- A significant immediate challenge would be to increase the availability of reliable GHG emissions data, and to ensure verification of emissions reductions. Despite the existence of the WBCSD's Cement Sustainability Initiative and its "Getting the Numbers Right" programme, there remain substantial gaps in measurement throughout the sector, notably in China, the largest source of CO₂ emissions in the sector.
- Participating governments would need to implement effective policies and measures – in some instances including local baseline and credit schemes – to provide sufficient incentive for industry participation. This is dependent upon sufficient political will, appropriate institutions and adequate resources.
- There would need to be sufficient incentive for the participation in the SEA of both Annex-I and non Annex Parties. While Annex-I countries would benefit from reduced concerns amongst domestic industry regarding lost competitiveness and emissions leakage, the potential benefits for developing countries – such as the revenue from sales of emissions permits, and increased levels of institutional capacity – are likely to be less visible, particularly in the context of concerns that developing countries

might outgrow their emissions caps due to increased economic development. Given the role that cement plays in infrastructure development, this last issue is of particular relevance.

In their conclusion regarding prospects for a cement industry SEA, the OECD study concludes that ensuring adequate incentives for developing countries would be the determining factor, and they question whether there is currently sufficient incentive to attract enough high-emitting developing countries.

Prospects for sectoral agreements generally

In its closing comments on prospects for sectoral agreements, the OECD paper suggest that while these could be a useful part of any post-Kyoto arrangement, sectoral agreements are "unlikely to deliver on their promise without significant practical effort, political will and supplementary measures outside such agreements."

2.10.2. The Economics of Climate Change Mitigation: How to Build the Necessary Global Action in a Cost-effective Manner

Published in June 2009, this OECD paper examines the cost of various national, regional and global mitigation policies and assesses the corresponding incentives for countries to participate in ambitious international mitigation actions. The paper illustrates the scope for available instruments to strengthen these incentives and discusses ways to overcome barriers to the development of an international carbon price. The paper discusses regulatory issues raised by the expansion of emission trading and crediting schemes, considers the potential impact on world emissions and mitigation policy costs of removing existing fossil fuel energy subsidies, and emphasises the importance of incorporating the forestry sector into a future international climate policy framework.

A section of this paper is devoted to reviewing the potential and limitations of sectoral approaches. These are seen to offer scope for broadening participation to developing countries, lowering overall mitigation costs and facilitating international technology transfers, while requiring less institutional capacity than nation-wide targets.

In its analysis of sectoral approaches the paper reaches the following conclusions:

- It suggests that two types of sectoral approaches could play a useful role, including specifically in energy intensive sectors, the power sector and the international shipping and air transport sectors:
 - sectoral crediting mechanisms, which would reward emission cuts relative to pre-defined baselines; and
 - binding sectoral targets, under which some developing

countries could cap the emissions or the emission intensity of key GHG-emitting sectors.

- Highlighting the need for these approaches to be ambitious to be environmentally effective, the paper argues that in the context of projected BAU emission growth in most developing countries, meeting ambitious world targets through sectoral crediting alone would require negative emission rights for developed countries by 2030-2040, along with lax or no constraints on offset credit use so that these targets can effectively be met. Insofar as such an arrangement is implausible, sectoral crediting, if adopted, will have to evolve gradually into more binding arrangements such as sectoral caps, at least for key developing country emitters. The paper suggests that in the transitory period during which sectoral crediting operates, baselines could progressively be tightened (set further below BAU emission levels) from one commitment period to the next.
- Sectoral caps and sectoral crediting mechanisms are both seen to have the potential to lower the cost of achieving a given global emissions target, by exploiting low-cost abatement opportunities in developing countries. If appropriately designed, it is suggested that they have the potential to curb leakage and to address the competitiveness and output losses of energy-intensive industries in developed countries. The papers suggest that other sectoral initiatives, such as voluntary, technology-oriented approaches can help diffuse cleaner technologies, but are unlikely to provide sufficient emission reduction incentives to individual firms as they put no explicit opportunity cost on carbon.
- The paper argues that the overall cost of sectoral caps could be reduced through international permit trading between developing countries that adopt them, and suggests that linking a sectoral scheme covering non-Annex I countries to an Annex I economy-wide trading scheme would also bring an economic gain to participating countries as a whole.
- It concludes that as compared with binding caps, sectoral crediting would entail lower GDP costs – and in fact typically a gain – to developing countries and may thus be easier to adopt. It recognises, however, that while sectoral crediting would reduce transaction costs and bottlenecks, it may not necessarily address concerns with the current CDM regarding additionality, perverse incentives to raise emissions, and, to some extent, leakage. The paper advises that if credits are granted to governments, ways would need to be found to ensure that the price signal is effectively transferred to firms. This could be achieved for instance by setting up a domestic carbon tax, or a firm-level crediting mechanism under which local firms in

the sector considered would be assigned baselines (consistent with the overall sectoral baseline), and would receive credits for emission cuts relative to those baselines.

2.10.3. The Economics of Climate Change Mitigation: Policies and Options for the Future

Published in December 2008, this OECD paper sets out to explore feasible means for developing a least-cost set of policy instruments that is applied as widely as possible across all emission sources (countries, sectors and greenhouse gases). Using a range of modelling frameworks, the paper analyses cost-effective policy mixes to reduce emissions, the implications of incomplete coverage of policies for the costs of mitigation action and carbon leakage, the role of technology-support policies in lowering future emissions and policy costs, as well as the incentives – and possible options to enhance them – for emitting countries to take action against climate change.

The paper argues that a mix of policy instruments will be required to reduce emissions at least cost, including price-based instruments, R&D policies, regulations and standards, information-based instruments, and possibly sector-wide agreements. It argues that pricing carbon – through emission trading schemes (ETS) or taxes – is a cost-effective approach to emission control, and should thus feature prominently in the mix. Acknowledging, however, the challenge associated with putting a global price on carbon, the paper assesses the costs, environmental consequences and competitiveness issues of various alternative policy arrangements, including sectoral approaches.

The paper suggests that international sector-wide agreements in energy-intensive industries offer a promising approach, encouraging broader participation and allowing larger emissions cuts to be achieved at a lower overall cost than would be incurred by a small country coalition. It recognises, however, that they can have large consequences for the cross-country distribution of costs, depending on the features of sectoral and economy-wide trading schemes and whether these schemes are integrated. It suggests that apart from large energy-intensive sectors such as aluminium, cement or steel, international shipping and air transport are two industries where a sectoral approach may be useful.

3. Industry Organisations and the Sectoral Approach

This chapter provides a brief review of the activities of a range of industry sectoral bodies from key sectors in which sectoral approaches are either being implemented or for which sectoral approaches been proposed. Detailed summary tables are included for each sector. These tables provide a brief overview of the climate-related characteristics of that sector, identify some of the principal international and regional sectoral organisations in that sector, and briefly outline their policy positions on climate change issues.

3.1. International Chamber of Commerce (ICC)

“ Voluntary sectoral approaches by business have led to greater energy efficiency and better methodologies to measure and report GHG emissions. They have also contributed to the research, deployment and development of technologies. However, many questions remain on how these voluntary initiatives may limit the application of international approaches in a post-2012 framework, regarding enforcement of these measures and their impact on other sectors. ”

Brian Flannery, Vice-Chair of ICC's Environment and Energy Commission

The International Chamber of Commerce (ICC) is the voice of world business “championing the global economy as a force for economic growth, job creation and prosperity.” Representing over 7,500 businesses and associations of all sizes and sectors in 130 countries around the world, its activities cover a broad spectrum, from arbitration and dispute resolution to making the case for open trade and the market economy system, business self-regulation, fighting corruption or combating commercial crime.

The ICC's activities on climate change are undertaken through its Commission on Environment and Energy, which is tasked with developing business positions on major environmental and

BOX 12: ICC activities on sectoral approaches

ICC publications and submissions include:

- **Sectoral Approaches: An International Chamber of Commerce Issue Discussion Paper** – released in December 2007 this outlines some core considerations of the ICC on sectoral approaches.
- The ICC has also made formal written and verbal submissions that relate to sectoral approaches at the meetings and workshops of the UNFCCC and the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA), as well as hosting a side events on the issue. The issue of sectoral approaches was discussed at the ICC/WBCSD Business Day held at the COP-14 meeting in Poznan.

energy issues, and to maintain ICC as the primary representative of business producers and consumers in key intergovernmental negotiations in these areas. On climate change, its focus area is to elaborate business policy positions for the intergovernmental negotiations under the UNFCCC preparing towards the post-2012 framework.

3.1.1. ICC Position Paper and UNFCCC submissions

Following is a summary of key issues raised in the various ICC submissions on sectoral approaches at recent meetings and workshops of the UNFCCC and the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA).

General points:

- The ICC recognises and supports the promotion of voluntary approaches by business, and sees them as important tools to encourage cost-effective steps to minimise GHG emissions and other activities to address climate change risks. Noting the experience of voluntary initiatives in the aluminium, iron and steel and cement industries (reviewed elsewhere in this paper) they see clear opportunities for sectoral approaches to deliver results.
- It is clear from discussions that stakeholders conceive very differently what such approaches constitute and the ways in which they might function.
- Sectoral approaches are one significant element in a portfolio of actions to address climate change, but should not be considered in isolation. To avoid inefficiency and unintended effects, sectoral approaches should be understood in an integrated policy context that considers implications for closely related areas such as energy and development as well as implications for competition within and between sectors.

Fundamental issues

The ICC has identified a number of core issues that it believes should be provided for in developing any global sectoral agreements.

- They highlight the importance of defining boundaries, noting that:
 - sectors have been defined differently by different organisations;
 - governments define sectoral boundaries and policies in line with their own national circumstances; and
 - the current technological and market base of sectors in different countries can vary dramatically and this may encourage or discourage effective sectoral agreements.
- On the role of sectoral approaches as a means of minimising economic distortions, while it is recognised that no-lose crediting agreements could encourage industries in non-Annex I countries to develop rigorous monitoring and reporting procedures and to reduce emissions to levels equivalent to those in the developed countries, there is concern that this would not, however, provide a level playing field, as industries within non-Annex-I countries would receive credits for reductions that had already been achieved voluntarily in developed countries. They suggest that consequently, other measures would have to be applied, in capped countries, to mitigate competitiveness impacts for industries with limited, or no, ability to pass through the direct and indirect CO₂ costs.

- For this reason the ICC argues that sectoral approaches should be evaluated in the context of economy-wide interactions: changes in the pace of investment in any sector may create short-term or long-term imbalances affecting supply and value-chains relations across the entire economy.

Benefits of sectoral approaches

The ICC has identified the following rationales for sectoral approaches:

- seeking to avoid competitiveness issues inherent in differentiated national targets;
- providing a means for addressing technological issues directly, leading to sharing of best practice, raising performance standards, enhancing environmental performance, and encouraging technology transfer; and
- promoting broader participation and a more efficient (revised) CDM.

Potential for sectoral approaches

On the potential for sectoral approaches as part of the UNFCCC, the ICC has raised the following points:

- There is currently no common understanding of how such an international sectoral approach would be formulated or implemented.
- While business and industry typically organise through associations to consult – and in some cases reach agreement – with national governments, few, if any, sectors have capacity to negotiate or legally commit at international level on their members' behalf. Only a few sectors (such as the aluminium, iron and steel and cement sectors) have international associations with widespread global membership, and the majority of international associations do not yet have established governance procedures that would allow them to interact in a formal way in deliberations with national or intergovernmental authorities.
- National and international business associations are in a position to share views, and welcome the opportunity to participate in discussions of sectoral approaches.

Considerations and characteristics

The ICC highlights the following considerations and characteristics of sectoral approaches:

- Characteristics that may promote sectoral approaches:
 - energy intense sectors;
 - exposure to international trade;
 - producing commodity products; and
 - using similar production technologies.

- Characteristics that may inhibit sectoral approaches:
 - specialised products based on proprietary technology;
 - products based on unique or strategic national circumstances;
 - products where market position is based on brand;
 - proposals interfering with trade agreements; and
 - products and processes where GHG emissions trends are growing to meet other societal objectives.
- Considerations on which further clarity is needed:
 - how environmental integrity will be ensured, noting issues relating to qualification, crediting baselines and MRV requirements;
 - the likely levels of supply and demand for credits generated within the post 2012 carbon market by potential new mechanisms such as sectoral crediting;
 - coherence within the overall framework of mechanisms and their engagement with the private sector; and
 - the interaction between sections within the economy and between nations.

Recommendations

The ICC has argued that policy approaches should:

- encourage voluntary sector-based approaches where environmental and/or economic benefits can be demonstrated;
- allow markets to develop and select technologies;
- evaluate and give priority to options based on cost-effectiveness in order to achieve the largest impact on emissions with the lowest socio-economic impact;
- maintain a balanced effort among sectors and countries that minimises competitive distortions;
- minimise economic damage to existing, economically viable capital stock and focus on new investment, encouraging efficiency improvements in existing capital stock and early retirement of inefficient equipment; and
- assess economy-wide and trade implications, taking account of supply and value chain linkages.

In their comments on an earlier draft of this UNEP document, the ICC reiterated their concern that there is still too little common understanding of how these approaches would function. They underlined their belief that the post-2012 framework should continue to explore the possibility of using sectoral approaches as complementary tools to governmental actions in mitigation, adaptation, technology and financing, and that it should accommodate and recognise voluntary commitments of specific sectors at regional and global levels. They stress that they do not

support the creation of global sectoral emissions caps or targets.

3.2 World Business Council for Sustainable Development (WBCSD)

“ While discussions are under way to reach a global climate agreement, complementary sectoral approaches should be put into place under which key industry players could work together to accelerate CO₂ reductions. There are a number of benefits with sectoral approaches. They offer a way of mobilizing emerging economies in CO₂ mitigation. This is important when we consider (for example) that 80% of emissions in the cement sector come from developing regions. Sectoral approaches also enable a small number of key industry players, or indeed countries, to become engaged quickly. ”

Bjorn Stigson, President of the WBCSD

The World Business Council for Sustainable Development (WBCSD) is a CEO-led, global association of some 200 companies dealing exclusively with business and sustainable development. The WBCSD provides a platform for companies to share knowledge, experiences and best practices on sustainable development, and to advocate business positions on these issues in a variety of forums, working with governments, non-governmental and intergovernmental organisations.

Members are drawn from more than 35 countries and 20 major industrial sectors. The Council also benefits from a global network of around 55 national and regional business councils and regional partners.

Energy and Climate Focus Area

One of its core key focus areas is Energy and Climate. The programme includes the following activities:

Policy issues and frameworks – which seeks to create or enhance opportunities for multilateral dialogue.

Tools and practices – this includes initiatives such as the WBCSD/WRI GHG reporting protocol that seeks to harmonize GHG

accounting and reporting standards.

Facts and trends publications – a series of publications aimed at creating a basis for dialogue and action.

Capacity building initiatives – which seeks to build capacity in partnership with the WBCSD regional network.

Through this focus area, the WBCSD interacts with international bodies such as the IPCC and the UNFCCC. It participates at the various UNFCCC Conferences of the Parties, and generally organises various industry-related side events at these meetings, usually in partnership with organisations such as the ICC.

The WBCSD also runs a series of sector-based voluntary initiatives that are managed and funded by the participating members and other parties. The WBCSD supports them with project management, experience sharing and quality control, advocacy and administration. The following sectoral projects have been initiated:

- Cement Sustainability Initiative
- Electricity Utilities
- Sustainable Forest Products Industry
- Mining, Minerals and Sustainable Development
- Sustainable Mobility
- Tyre Industry

In terms of developing sectoral approaches to climate change, the strongest endorsement and action on this issue has come through the Cement Sustainability Initiative (CSI), which is outlined further in Section 3.5 below. A review of the WBCSD's Electricity Utilities Sector Project and its position on sectoral approaches within the electricity sector is provided in Section 3.8.

“Towards a low carbon economy”: A WBCSD response to the Bali Action Plan

In their March 2009 publication, *Towards a low carbon economy*, the WBCSD provides a business perspective on the key issues under negotiation at the UNFCCC. The paper focuses on issues relating to technology development and deployment, finance and carbon markets, cooperative sectoral approaches and adaptation. It includes policy recommendations, suggests improvements to existing mechanisms, and proposes ideas for new mechanisms under the international climate change framework.

In the paper the WBCSD proposes the introduction of a cooperative sectoral approach framework as a flexible tool that can be “docked in” to the UNFCCC process to enhance financial flows, promote cooperation between developed and developing countries, and deliver large-scale mitigation and adaptation

activities. They suggest that within this framework individual agreements be developed through the voluntary participation of countries – developed and developing – and business working together to achieve emissions reductions or increase sequestration in specific sectors through specific activities.

Each agreement would lead to nationally appropriate actions enabled by technology and financing and supported by robust “measurable, reportable and verifiable” processes. Typically, an agreement would relate to a sector and deliver technology capacity building to that sector through a series of activities. These would be developed by business in response to the incentives set in place within the agreement.

The WBCSD identifies the following parameters for such approaches:

- The agreement would be between a limited number of countries that decide to engage. Affected business sectors would indicate a willingness to participate:
 - developing countries would engage in activities that support domestic mitigation actions;
 - developed countries would also engage in relevant mitigation actions and support the developing countries on agreed elements; and
 - the private sector would choose to implement the nominated activities.
- Agreements would focus on both current and future emissions reduction activities benefiting from the incentive mechanisms provided.
- The objectives, deliverables and timelines for all elements included in the scope would be defined and quantified.
- The scope of an agreement would vary according to the specific needs of participating countries and sectors, and could include:
 - supporting the deployment of existing low-carbon technologies;
 - collaborating on clean technology development between governments and business;
 - crediting performance that exceeds an agreed baseline/standard within a sector, to drive the efficiency of technology performance; or
 - supporting capacity building programs to provide the technical capacity needed to deploy low-carbon technologies.
- The agreements would not result in the “carving out” of sector emissions from a participating developed country's overall target.
- The agreements would be formally recognised under the UNFCCC:

- A board would be established to oversee governance and compliance;
- The agreements would be negotiated by the interested parties and then presented to this board for approval;
- Through a robust “measurable reportable and verifiable” process, activities within the agreement would be registered; and
- The agreements would then be reported and recognised by the COP.

To illustrate how this approach might work in practice, the paper provides an overview of how it could be designed for large-scale technology demonstration (such as carbon capture and storage) and industry cooperation (such as cement).

Note: the WBCSD’s Cement Sustainability Initiative (CSI) is outlined in Section 3.5 below; a review of the WBCSD’s Electricity Utilities Sector Project is provided in Section 3.8.

3.3 The Asia Pacific Partnership (APP) on Clean Development and Climate

“ As it stands, APP provides a means to diffuse best practice, and could help gather data that has been lacking on energy and environment performance in key industrial activities, mainly in China and India. Whether APP will succeed in bringing significant improvements in energy efficiency and environment depends on a range of factors, starting with China and India’s domestic policy objectives and prevailing energy prices, and potential assistance provided by Partner countries. ”

International Energy Agency Information Paper (November 2007)

The Asia-Pacific Partnership on Clean Development and Climate (APP) is an international non-treaty agreement between Australia, Canada, India, Japan, the People’s Republic of China, South Korea, and the United States. It also has strong industry participation, with active involvement of the private sector from the seven Partner countries. It was announced in July 2005 at a Regional Forum meeting of the Association of South East Asian Nations (ASEAN),

and was launched in January 2006 at the Partnership’s inaugural Ministerial meeting in Sydney.

The seven partner countries have agreed to work together and with private sector partners to meet goals for energy security, national air pollution reduction, and climate change in a manner that promotes sustainable economic growth and poverty reduction. The countries collectively account for more than half of the world’s economy, population and energy use, and produce about 65% of the world’s coal, 62% of the world’s cement, 52% of the world’s aluminium, and more than 60% of the world’s steel.

Objectives

The objectives of the Partnership are to:

- create a voluntary, non-legally binding framework for international cooperation to facilitate the development, diffusion, deployment, and transfer of existing, emerging and longer term cost-effective, cleaner, more efficient technologies and practices among the Partners through cooperation so as to achieve practical results.
- promote and create enabling environments to assist in such efforts.
- facilitate attainment of national pollution reduction, energy security and climate change objectives; and
- provide a forum for exploring the Partners’ respective policy approaches relevant to addressing interlinked development, energy, environment, and climate change issues within the context of clean development goals, and for sharing experiences in developing and implementing respective national development and energy strategies.

Task Forces

The Partnership has identified eight public-private Task Forces to develop and implement Action Plans aimed at expanding investment and trade in cleaner energy technologies, goods and services in key market sectors.

The Task Forces address five energy-intensive sectors – aluminium, buildings and appliances, cement, coal mining, and steel – as well as three energy supply sectors – cleaner fossil energy, renewable energy and distributed generation, and power generation and transmission.

Each Task Force has developed an Action Plan to serve as a blueprint for cooperation among the Partners within that thematic or sectoral area. The Action Plans emphasise immediate and medium-term actions, and include:

- a set of goals for the Partners active in that sector;
- general contextual information about the sector; and
- a set of specific projects and activities to further their respective goals.

The initial portfolio of nearly 100 partnership projects has an emphasis on activities such as sectoral assessments, capacity building, and identifying best practices and technology research and demonstration.

Energy Technology Cooperation Centre

With the aim of facilitating technology transfer – a key goal of many proposed sectoral approaches – the APP envisages the establishment of an Energy Technology Cooperation Centre (ETCC) that would:

- coordinate and facilitate the diffusion of knowledge and best practices on energy efficiency and energy efficiency-based technology, through the collection and dissemination of energy-efficiency information and expertise, including best practices, assessment techniques, benchmarking and skills exchanges; much of this effort is expected to be undertaken through websites, seminars, databases, and workshops;
- coordinate train-the-trainer workshops for Partners' relevant government and industry experts in the energy technology and efficiency fields, for example through sessions to train plant personnel, consultants and other engineering resources in energy saving assessment techniques, software decision tools and implementation of energy efficient technology practices; and
- conduct voluntary energy audits, which could potentially identify cost effective, energy saving measures and opportunities to conserve energy and increase efficiency.

Some of the sector-specific activities of the APP are reviewed in the following brief outline of key sectors.

3.4 The Aluminium Sector

“ The aluminium industry has ten years' experience in the development and implementation of a successful global sectoral approach. This global sectoral approach was and is facilitated by the fact that the primary aluminium industry is a relatively homogenous sector, with only two standard technologies and over 200 plants (mines, refineries and smelters) worldwide (of which over a third are in China). ”

International Aluminium Institute (September 2008)

In many respects the aluminium sector appears to be one of the most conducive sectors to international cooperation: it has a strong concentration of actors, attractive mitigation options, and the presence of proactive industry associations. Responsible for approximately 0.8% of global GHG emissions, these emissions are concentrated in a few countries and companies: 12 countries represent 82% of global aluminium production, with China, Russia, the EU, Canada and the US accounting for 61% of total production. Ten leading companies (mostly multinationals) produce 55% of world's aluminium, with three companies (Alcan, Alcoa and Rusal) constituting a third. The fact that there is little variation in production processes and technology is also conducive to a sectoral approach.

This sector is one of the first to develop a global approach to cutting emissions, agreeing voluntary emission-reduction and energy-efficiency targets. It has pledged to cut emissions of perfluorocarbons (PFCs) per tonne of aluminium produced by 80% by 2010 and to cut smelting energy by 10% by 2010 compared with 1990 levels. It also has a strong data reporting system in place, with data reporting coverage being in the order of 65% of global production.

This brief review focuses on the activities of the International Aluminium Institute. A broader summary of sectoral activity is provided in Table 3.

3.4.1 The International Aluminium Institute (IAI)

This review of the aluminium sector is based primarily on presentations and literature by the IAI, and includes IAI (2008), Chase (2008), CEPS (2008) and the IAI website. This summary review represents the authors' understanding of the literature, and should not be seen as constituting a formal sectoral position.

The International Aluminium Institute (IAI) is the Global Forum of the world's Aluminium Producers. The Institute has 26 member companies representing more than 80% of world primary aluminium production. The IAI's *Aluminium for Future Generations* sustainability initiative is a programme of continuous improvement that comprises thirteen voluntary objectives and 22 performance indicators, covering all key phases of aluminium's life cycle.

All IAI member companies have agreed on a voluntary sectoral approach to climate change as part of the *Aluminium for Future Generations* initiative. The global initiative covers the full aluminium life cycle, including direct emissions reduction, the promotion of greater energy efficiency, metal recovery and recycling involving government and local community support as well as product responsibility with respect to transport lightweighting and energy saving potential in construction and packaging. As part of the

initiative, all members submit data to the IAI; several non-member companies also submit annual GHG-related data.

The development of this global sectoral approach was (and is) facilitated by the fact that the primary aluminium industry is a relatively homogenous sector, with only two standard technologies and over 200 plants – mines, refineries and smelters – worldwide, of which over a third are in China. The key elements of this sectoral approach are outlined below.

Objectives of an aluminium sectoral approach

The IAI has identified the following common global voluntary objectives:

- an 80% reduction in perfluorocarbons (PFCs) per tonne of production by 2010 as compared to 1990 (PFCs are potent GHG, emitted during brief upset periods in the aluminium smelting process);
- a 10% reduction in smelting energy per tonne by 2010 compared to 1990;
- a 10% reduction in alumina refining energy per tonne by 2020;
- the promotion of recycling of used products; and
- the promotion of aluminium applications such as for the lightweighting of vehicles.

Main elements

The main elements of this sectoral approach include:

- common measurement and GHG emissions calculation methodologies for all primary aluminium production processes, standardised with IPCC national GHG inventory guidelines, ISO GHG management and lifecycle standards and the WBCSD/WRI GHG protocol;
- quantification of all GHG emissions from aluminium production processes and assessment of full life cycle emissions and emissions savings from the production, use and recycling of aluminium products;
- comprehensive annual data collection on anode effect performance (PFC emissions), alumina refining and aluminium smelting energy consumption, anode consumption, lime production and soda use;
- driving continuous improvement by benchmarking facility energy, emissions and safety performance;
- encouraging greater energy efficiency throughout the production phase, as well as further increase in the collection of post-consumer scrap for recycling; and
- employment of a specialised climate change expert consultant to spread best practice, train employees and carry out emission

Table 3
Summary review of the Aluminium sector

ALUMINIUM SECTOR	
Sector overview (WRI, 2007)	
Share in GHG emissions	• 0.8% of global emissions and 4% of manufacturing industries' emissions.
Concentration of actors	• 12 countries represent 82% global production; China, Russia, the EU, Canada and the US account for 61% of total production; ten leading companies (mostly multinationals) produce 55% of world's aluminium (Alcan, Alcoa and Rusal constitute a third).
GHG measurement / attribution	• Accurate measuring of aluminium production; heavy trade volume makes attributing emissions to countries and companies challenging (electricity consumption embodied in exported products).
Trade and investment flows	<ul style="list-style-type: none"> • Very industrialised in both trade and investment; 45% of global production is exported as unwrought aluminium. • Concentration of actors and mitigation options make the sector conducive to international cooperation; voluntary climate change targets adopted by the sector, promoted by industry associations.
Uniformity of products	• Little variation in production processes and technology.
Government role	• Not heavily regulated or considered especially strategic sector.
Implications for Sectoral Approaches	<ul style="list-style-type: none"> • In theory is seen to be conducive to international cooperation: strong concentration of actors; attractive mitigation options; and presence of proactive industry associations. • One of the first sectors to develop a global approach to cutting emissions, agreeing voluntary emission-reduction and energy-efficiency targets. It has pledged to cut emissions of perfluorocarbons (PFCs) per tonne of aluminium produced by 80% by 2010 and to cut smelting energy by 10% by 2010 compared with 1990 levels. • The industry met its PFC reduction targets four years early and by 2007 had managed to cut smelting energy by 6%. It is now considering tougher PFC reduction targets and is focusing on the 20% of smelters responsible for 50% of emissions. Between 2000 and 2005 the industry managed to cut absolute emissions by 14% while increasing production by 20%. • Positioned to play leadership role in climate protection: cost-saving technologies significantly reduce PFC and CO₂ emissions; aluminium is conducive to recycling which accounts for 40% of global demand and produces 95% less emissions.

Table 3 Summary review of the Aluminium sector (continued)

Sector Association	Policy Position
GLOBAL International Aluminium Institute (IAI) <ul style="list-style-type: none"> 2007: 26 members companies from every region of the world, including Russia and China 2006: membership companies = ~ 80% of world primary production and significant proportion of world's secondary production 	<ul style="list-style-type: none"> Voluntary agreement in place since the late 1990s. Collects data on energy use and GHG emissions from 110 of the world's 198 aluminium smelters, representing 61% of production, which is useful for inter-company benchmarking. Supports the Aluminium for Future Generations Initiative: 13 voluntary objectives and 22 performance indicators related to emissions reduction. Created initially as a pan-European initiative.
GLOBAL Asia Pacific Partnership on Clean Development and Climate – APP Task Force on Aluminium <ul style="list-style-type: none"> Member-countries: Australia, Canada, China, India, Japan, USA Asia-Pacific Partners account for 37% of the world's aluminium production 	<ul style="list-style-type: none"> The industry can make further improvements in environmental performance, while reducing costs, through best practice use of existing equipment (in particular perfluorocarbons (PFC) emissions management, increased uptake of best available and affordable technology (including improved instrumentation), the continued development and deployment of new technologies, and by increasing levels of recycling. Leaders of the aluminium associations of the six Partner countries agreed to a MOU to reduce PFC emissions from aluminium production in May 2006. Further details on the APP provided in Section 3.4.1.
EUROPE European Aluminium Association (EAA) <ul style="list-style-type: none"> Industries: automotive, building, mass transportation, and packaging 22 member companies from all industries plus 15 national association members 	<ul style="list-style-type: none"> Has supported IAI's <i>Aluminium For Future Generations</i> programme since 1998. Supports EU's proposal for emission standards for vehicles with limits. It believes that the formula used for calculations penalized light-weight materials. Supports complete Life Cycle Assessment methods, to develop fair and robust environmental indicators. Believes that the inclusion of aluminium in the ETS and the impact of CO₂ costs being passing through costs in electricity prices, for indirect emissions, would seriously endanger the competitiveness of the industry.
CHINA China Nonferrous Metals Industry Association <ul style="list-style-type: none"> Co-hosting the 2008 China Aluminium Technology & Energy Saving and Emission Reduction Forum 25-27 July 2008, Inner Mongolia 	<ul style="list-style-type: none"> No position statement could be found for the China Nonferrous Metals Industry Association. In terms of the environment, the focus is on hazardous waste disposal and recycling rather than emissions directly (impact on monitoring and reporting). China is a member of the APP and participates in the aluminium task force with group and individual actions. China has set a goal of reducing the emissions of major pollutants by 10% during 2006-2010. The Chinese government thus proposed the concept of a "green GDP" and ordered local governments to develop their regional economies accordingly.
CANADA Aluminium Association of Canada (AAC) <ul style="list-style-type: none"> 90% of the production of primary aluminium is concentrated in Quebec. 11 smelters: 10 primary aluminium smelters in Quebec and one in British Columbia There are three producers in Canada, all members of AAC: Alcan Inc., Alcoa Canada Primary Metals and Aluminerie Alouette Inc. 	<ul style="list-style-type: none"> In January 2008 signed the <i>Framework Agreement on GHG Reductions in the Primary Aluminium Sector</i> with the government of Quebec. Endorses a policy that promotes the development of hydroelectricity as an aid to reduce GHG emissions. Alcoa 2020 Strategic Framework for Sustainability: target to reduce emissions based on 2000 – 30% reduction nitrogen oxides by 2007, 60% reduction SO_x by 2010. From base year 1990: 25% reduction in GHG emissions by 2010 (assuming success with the inert anode technology: 50% reduction by 2010).
USA The Aluminum Association <ul style="list-style-type: none"> Approx 50 full members and about 30 associate members, in the US and abroad 	<ul style="list-style-type: none"> Supports the Asia Pacific Partnership on Clean Development and Climate Change.

measurements with IAI-sponsored equipment, and analyse GHG data and develop methodologies.

Current Results

The following results achieved by IAI's initiatives are seen to demonstrate the potentially positive role that can be played by sectoral approaches:

- PFC emissions have been reduced by 83% per tonne of product between 1990 and 2006, equating to a reduction of over 65% in total global annual PFC emissions to the atmosphere;
- the energy efficiency of the electrolytic process has improved by 5% between 1990 and 2005, with indirect emissions from electricity production being reduced by 8% per tonne of aluminium produced between 2000 and 2005;
- latest life cycle inventory data from 2005 show that there has been a 14% reduction in total direct GHG emissions from the production processes of primary aluminium between 2000 and 2005, despite a 20% increase in primary aluminium production over the same period;

- reductions of direct and indirect GHG emissions have resulted in a decrease of two tonnes of CO₂ equivalents for every tonne of aluminium produced since 2000;
- aluminium substitution for heavier materials in cars and light trucks produced in 2006 will lead to potential savings over the full life cycle of around 140 million tonnes of CO₂ equivalents; and
- the production of aluminium from recycled products worldwide rose from 13 to 15 million tonnes per year between 2000 and 2005.

Major future challenges

Despite these benefits, it is clear that there are some significant challenges associated with sectoral approaches. The IAI has identified the following challenges:

- Maintaining accurate calculations of PFC emissions from the global industry, and ensuring a high response rate, is a significant ongoing focus of activity.
- As production of primary aluminium by non-reporting facilities

grows (mainly in China), the accuracy of calculations of PFC emissions from the global industry decreases. One of the major challenges for the industry is to increase the number of reporters to its annual survey. Participation in the anode effect survey fell from a high of over 70% to just 63% in 2005.

- Following the success of reducing PFC specific emissions by 80% since 1990, the industry is looking at other opportunities to reduce its direct emissions – further PFC performance improvement, anode consumption efficiency, alumina refining fuel efficiency.
- Meeting the 10% smelting energy efficiency improvement objective by 2010 will be a challenge, given the limits of technology and the demand on facilities to increase the electric current in the electrolytic process in order to produce more metal from existing capacity and meet the demand for lightweight, safe and recyclable aluminium products.

The way forward

The IAI has expressed its support for the development of voluntary industry-based sectoral approaches, and considers that the success of the IAI voluntary global sectoral approach is due to its voluntary nature. It suggests that sectoral approaches or arrangements should only be a transitional step towards comprehensive global solutions.

While advocating voluntary global sectoral approaches, the IAI does not regard aluminium as a suitable industry sector for introducing some form of obligatory intergovernmental transnational sectoral agreement. It considers such an agreement to be impractical, due to the many jurisdictions involved and the need to cover all the various industries producing competing materials under the same regime, and is opposed to such an agreement that they believe could cause inter- and intra-sectoral competitive distortions in the global market. It argues that sectoral emission caps and production constraints at the national level are anti-competitive, and notes that these have not received support from key developing countries/producers.

The IAI maintains that sectoral baseline crediting – which is being promoted in place of caps/constraints as a transitional measure to engage developing countries – is a concept worth exploring, but emphasises that it is important that any baselines/benchmarks be set at levels to reward real performance improvements and that these should not constitute subsidies.

The IAI has been collaborating with the Asia Pacific Partnership on Clean Development and Climate, a voluntary sectoral approach that they believe provides a useful model for future initiatives.

3.5 The Cement sector

“ The CSI believes a sectoral approach can be a useful tool to improve the speed and effectiveness of industry’s greenhouse gas mitigation efforts. If properly designed it could offer strong participation incentives to developing economies, businesses and governments. The CSI would like to see the sectoral approach incorporated into international climate language as a policy option, with explicit details to be further defined after the Copenhagen COP meeting in December 2009. If the Sectoral Approach option is retained at Copenhagen, further work by the CSI in consultation with governments and national trade associations would be needed to put this approach into effect. ”

Cement Sustainability Initiative

The global cement industry represents approximately 5% of global anthropogenic CO₂ emissions (process emissions and energy use). Without abatement measures, current emissions are expected to grow by 3% per annum through 2030, with most of the increase being in developing countries. The latest McKinsey GHG abatement cost curve suggests that identified abatement levers would cut emissions by 25% relative to a BAU scenario, with most of the abatement potential being achievable using conventional technologies (McKinsey & Co, 2009).

There is a relatively low concentration of actors in this sector, with the 16 largest companies accounting for 25% of global output. The G8+5 countries encompass 80% of the world’s cement production.

With fixed emission targets not seen to be attractive to either industry or governments, it has been argued that cement lends itself best to a policy approach that uses emission intensities or CO₂ performance standards. An alternative option would be country-specific reduction requirements, or to focus technology and financial assistance toward China and several countries.

This brief review focuses on the activities of the World Business Council for Sustainable Development’s (WBCSD) Cement Sustainability Initiative. A broader summary of sectoral activity is provided in Table 4.

3.5.1. The Cement Sustainability Initiative (CSI)

This review of the CSI initiative is based primarily on presentations and literature by the CSI, including Vernaghan (2008), CEPS (2008), Mages (2008) and the WBCSD/CSI website.

This summary review represents the author's understanding of the literature, and should not be seen as constituting a formal sectoral position.

A member-initiated, voluntary project under the WBCSD, the Cement Sustainability Initiative (CSI) was created in 1999 to explore what sustainable development means for the cement industry, and to identify and undertake joint and individual actions to improve the sustainability of the cement industry. The CSI currently operates with 18 participants that have operations in more than 100 countries worldwide. CSI's members are from developed and developing countries and account for over 740 MT of global cement production, representing the majority of production in the EU, North America, Latin America and India. The CSI is developing a cement industry sectoral approach, and has committed to advocating sectoral approaches consistently in the UNFCCC and the G8+5 and APP groups.

The CSI Climate Protection Task Force

The CSI has a CO₂ and Climate Protection Task Force, which includes clear performance commitments and regular reporting of results. Key initiatives developed by this task force include:

- developing a common CO₂ measurement and reporting protocol that is now used by 80% of the world's cement industry;
- developing a database of CO₂ emissions through their "Getting the Numbers Right (GNR)" initiative – this now has data from over 700 cement kilns;
- promoting independent assurance of CO₂ emissions data;
- encouraging its members to set and report on specific CO₂ reduction targets;
- undertaking capacity building on its tools, especially in China and India;
- developing a new Sectoral Benchmarking CDM methodology; and
- developing an economic model of the global cement business over the period 2005-2030 that incorporates the goals and costs associated with different carbon management approaches.

While its efforts have seen CO₂ savings in 2007 of over 70 million tonnes compared to 1990, the CSI recognises that "there is an urgent need to engage cement companies in emerging economies in the CSI's climate protection efforts, as developing nations are where the vast bulk of future growth in global cement production will take place."

CSI's Sectoral Approach Initiative

In 2006 the CSI started the development of a global cement sectoral approach aimed at addressing its direct emissions. A principal underlying goal of this initiative is to monitor, report, verify and mitigate CO₂ emissions from the global cement sector in a consistent and fair manner, which can contribute to global efforts in UNFCCC to respond to the challenge of climate change (CEPS, 2008).

An important related objective is to build capacity in emerging economies, as these economies are expected to account for nearly 80% of the cement sector's emissions in the near future.

The CSI has argued that sectoral approaches:

- offer new opportunities to mobilise emerging economies in CO₂ mitigation actions, recognising that 80% of cement industry CO₂ emissions come from these regions;
- make it possible to accelerate CO₂ reduction by identifying the most efficient mitigation approaches and therefore allowing the whole sector to reach a performance target more quickly, and requiring engagement with a smaller number of key industry players and countries, compared to a global climate agreement; and
- provide a model that is transferable to other industries.

Principles

The CSI argues that its sectoral approach should be based on the following principles:

- it must be set within the UNFCCC, and be compatible with existing and future mechanisms (such as the CDM and JI);
- it must include major developed and developing economies;
- it must be based on clear, simple metrics and methodologies and maintain a verified emissions data base;
- it must be a flexible and inclusive approach that allows for integration into national and regional regimes;
- its focus should be on improving process efficiency, based on ambitious emissions mitigation;
- it should be open to market approaches with inefficiencies minimised by fully fungible credits;
- it should promote a level playing field for the global cement sector; and
- government involvement is needed to define sectoral targets, implementation mechanisms and avoid free riders.

Key elements

The sectoral approach is being developed with the following proposed elements:

- production-based efficiency benchmarks for authorities to set targets and incentives;

- developing a simple metric (tonnes of CO₂ per ton cement) for proposing consistent but differentiated targets;
- using market credits to reward improved efficiency and promote waste fuel/blended cement; and
- supporting R&D to develop technology, and build capacity through public-private partnerships.

Modelling exercise

Recently the CSI undertook an economic and policy modelling exercise to assess the potential benefits and pitfalls of a sectoral approach. The model featured eight world regions and six different policy scenarios with a wide spread of carbon limits, ranging from “no commitments” to a full global cap on absolute CO₂ emissions from the sector.

The model projections indicate that:

- Cement production, driven by growing demand, is expected to more than double by 2030.
- A sectoral approach could reduce cement sector emissions significantly compared to the base case.
- While regional differences exist, a sectoral approach could significantly increase access to the major greenhouse gas mitigation levers available to the sector by proper design of national policies.
- Potential trade distortions caused by differentiated carbon policies can be managed by one or a combination of tools including allowance allocation policies, border carbon adjustments, import/export tariffs and rebates.
- Exploiting the full potential of the sectoral approach requires supporting government policies in the participating countries, covering cement standards, building codes, and waste management practices among other areas.

Challenges

The CSI has identified the following challenges in finalising its sectoral approach:

- ensuring the participation of the major developing economies in the initiative;
- assigning responsibility for setting/updating benchmarks and stretch/motivating targets;
- moving from reducing emission intensity to reducing absolute emissions;
- engaging trade associations;
- addressing crediting mechanisms that may hinder a level playing field by subsidising competitors; and
- integrating the sectoral approach with existing and developing national and regional regimes (such as the EU ETS).

The way forward

In the belief that a sectoral approach can improve the effectiveness of industry’s GHG mitigation efforts and offer strong incentives to developing economies and businesses, the CSI has advocated that provision be made for the sectoral approach as a policy option within the climate framework.

Recognising the need for further work by government and business to elaborate the details of a sector participation scheme and nationally appropriate carbon commitments, the CSI has expressed its willingness to assist governments in undertaking the following work:

- Defining the key elements needed to make a sectoral approach feasible, such as:
 - sector data requirements
 - measurement, reporting and verification practices
 - goal setting and crediting policies
- Identifying effective policy measures at national level to help reduce cement sector CO₂ emissions, such as:
 - revised cement product standards based on performance rather than composition
 - construction codes with increased emphasis on “green” building products, and energy-use reductions over the lifetime of a building
 - government purchasing choices oriented toward greener products
 - greater availability and use of alternative fuels via landfill bans
 - more widespread use of blending materials (which can reduce the energy intensity of cement)
- Structuring enhanced technology development and deployment programs for the cement sector, particularly around the application of carbon capture and storage.

“ A sectoral approach is the most pragmatic and efficient way to achieve progress on mitigation actions. . . Lafarge, together with the Cement Sustainability Initiative, is ready and willing to work with governments to make sectoral approaches feasible, to design effective national level policy measures to help reduce CO₂, and to structure enhanced technology development and deployment, particularly around the application of Carbon Capture and Storage. ”

Vincent Mages - Lafarge

Table 4
Summary review of the Cement sector

CEMENT SECTOR	
Sector overview (WRI, 2007)	
Share in GHG emissions	<ul style="list-style-type: none"> 4% of global emissions (process emissions and energy use) and 5% global CO₂ – this is expected to double in the next 40 years, most of the increase in developing countries, which account for 80% of emissions. 18% of all manufacturing emissions, emitted at various points in the production process. Energy-intensive activity and emission-intensive; missions mainly relate to process, but fuels and raw materials inputs also affect sector's CO₂ emissions.
Concentration of actors	<ul style="list-style-type: none"> Relatively low concentration, with the 16 largest companies accounting for around 25% of global output. About 81% of production takes place in 12 countries; China alone produces around half of the world's cement (China produced 1.2 billion tonnes in 2006). Demand for cement is increasing in Europe and North America – which may face supply constraints. Japan's demand has been cyclical and declining since late 1990s, with growing exports as a result. Between 1990 and 2005 the largest emitters in the sector were USA, India, China, Canada, Mexico, Brazil, Germany, Italy, Japan, Korea, Spain. Gradual increase in concentration of actors in the sector (due to growth of multinationals and foreign direct investment). The six leading multinational companies account for an estimated 21% of global cement production. While China has over 8,000 companies, in countries such as Brazil and the UK, the top five producers account for over 80% of the market. Factoring in China (which has 5,000 cement manufacturing facilities) and some other developing countries, however, suggests a sector with a lower concentration of actors.
GHG measurement / attribution	<ul style="list-style-type: none"> Little difficulty in measuring emissions from cement manufacturing. Production occurs at stationary facilities and is not heavily traded across borders.
Trade and investment flows	<ul style="list-style-type: none"> Given the abundance of limestone and other primary materials, along with the high density and low value of cement, the sector is not conducive to international trade. Less than 6% of global cement production is exported across borders. However, cross-border investment in the cement sector is significant and growing. Clinker can be transported more easily, which may result in more production without having to add clinker production capacity, which is where most of CO₂ is emitted.
Uniformity of products	<ul style="list-style-type: none"> Relatively homogenous product, based on a limited set of processes. Competitive edge is achieved by efficiency production, and knowledge of final cement mixes.
Government role	<ul style="list-style-type: none"> Not a heavily regulated enterprise.
Implications for Sectoral Approaches	<ul style="list-style-type: none"> The industry's goal is a mandatory sectoral agreement negotiated through the UNFCCC, with governments enforcing the agreed targets or actions. It also wants a strong element to support new technologies. Reasonably favourable conditions for international cooperation; in many ways cement is still a "local business," even with the increased presence of multinational enterprises, which makes the case for international harmonization or coordination less compelling. Fixed emission targets are unlikely to be attractive to either industry or governments. Cement lends itself best to a policy approach that uses emission intensities or CO₂ performance standards. In many cases, methods are available to reduce CO₂ intensities. An alternative option would be country-specific reduction requirements, or to focus technology and financial assistance toward countries such as China. If appropriate intensity metrics can be developed, this could be done in part through a crediting mechanism such as the CDM.
Sector Association	Policy Position
GLOBAL World Business Council: Cement Sustainability Initiative (CSI) <ul style="list-style-type: none"> 11 Members/sponsors world-wide The UN has accepted the CSI as a Type II partnership under the framework of the Johannesburg Summit. 18 companies operating in 100 countries collectively account for > 50% of world's cement production, excluding China (25% including China) 	<ul style="list-style-type: none"> The World Business Council for Sustainable Development has been working with the sector to develop a global approach to cutting emissions since 1999. Eighteen companies operating in 100 countries have signed up to its Cement Sustainability Initiative, which addresses a range of environmental and social issues as well as CO₂ emissions. The initiative has concentrated on developing a common approach to measuring and reporting emissions and the use of biomass as a fuel. Signatories are not required to adopt emissions reduction targets, though many have voluntarily done so. The Emission Reduction Task Force is developing good practice guidelines on monitoring and reporting significant emissions from cement manufacturing operations. Companies will set individual goals for emissions.
GLOBAL Asia Pacific Partnership on Clean Development and Climate – Task Force on Cement <ul style="list-style-type: none"> Account for 61% of the world's cement production Members: Australia, China, India, Japan, the Republic of Korea, and the US; US and India business associations actively involved 	<p>Objectives are:</p> <ul style="list-style-type: none"> To facilitate demonstration and deployment of energy-efficient and cleaner product formulation technologies in partnership countries to significantly improve GHG emissions intensity and the air pollutant emissions intensity of cement operations. Develop sector relevant benchmark and performance indicators. Identify opportunities to build infrastructure in developing countries and emerging economies that uses energy efficient materials.

Table 4 Summary review of the Cement sector (continued)

Sector Association	Policy Position
<p>EUROPE</p> <p>Cembureau</p> <ul style="list-style-type: none"> • 28 Members (27 Full Members and 1 Associate Member) • 2007: production of cement in the 27 member countries represented about 11.6% of total world cement production 	<ul style="list-style-type: none"> • Six position papers on emissions between 2004 and March 2007. • March 2007 Position Paper: <ul style="list-style-type: none"> - Oppose an emission trading scheme (ETS) for NO_x and SO₂ (together with iron and steel, mining and other industries in the same paper). - Already too regulated, monitoring and admin costs further increase, distortion of competition, legal stability lost if market regulated by two instruments, etc. - Integrated approach of IPPC will be compromised, unlikely possibility to account and reward industry for early actions. - Prefers the Integrated Pollution Prevention and Control Directive (codified into EU law and which is also used by US' EPA).
<p>USA</p> <p>Portland Cement Association (PCA)</p> <ul style="list-style-type: none"> • Members: 44 • Represents cement companies in the US and Canada 	<ul style="list-style-type: none"> • Supports APP for CDC and CSI (hosted APP Cement task force in May '08). • In the 1990s, PCA and its member companies joined the USEPA ClimateWISE programme. This voluntary programme assisted companies in improving energy efficiency and reducing CO₂ emissions. • In 2002, adopted a voluntary goal to reduce CO₂ emissions per ton of cementitious materials by 10% below a 1990 baseline by 2020. • In 2004, adopted a continuous improvement goal related to the adoption of environmental management systems (EMSs) - at least 40% percent of US cement plants to have implemented auditable and verifiable environmental management systems by the end of 2006, at least 75% by the end of 2010, and at least 90% by the end of 2020.
<p>INDIA</p> <p>Cement Manufacturers' Association (CMA)</p> <ul style="list-style-type: none"> • Members: about 50 	<ul style="list-style-type: none"> • Organisational chart shows a good structure; however (accessible) information on website is limited (content mainly geared to production statistics, benchmarking, maps of production and grinding sites, and distribution). • CMA is a participant of the Asia-Pacific Partnership.
<p>CHINA</p> <p>China Cement Association (CCA)</p> <ul style="list-style-type: none"> • Per IEA Report, China has about over 8,000 small cement plants, whereas the EU has 320 plants 	<ul style="list-style-type: none"> • China has been proactively engaged in various international initiatives such as the Asia-Pacific Partnership on Clean Development and Climate. • The Chinese government has extensively developed government policies and programmes to improve the energy efficiency and pollution control in the cement sector (the Industrial Development Policies on Cement) <ul style="list-style-type: none"> - Retrofitting cement kilns in China contributes to improving energy efficiency and reducing GHG emissions - Plans on "backward capacities elimination," phasing out low productivity kilns, which will also reduce China's CO₂ emissions - China is working closely with the Asian Development Bank to financially support its ambitious cement sector retrofit projects
<p>BRAZIL</p> <p>Brazilian Portland Cement Association (BPCA)</p> <ul style="list-style-type: none"> • Members: Camargo Corrêa (Cauê), Cimpor, Ciplan, CP Cimento, Holcim, Itambé, Lafarge Brasil, Nassau, Soeicom, Votorantim 	<ul style="list-style-type: none"> • Main focus is to be a partner in CSI and follow their guidelines.
<p>CANADA</p> <p>Cement Association of Canada / CPCA</p> <ul style="list-style-type: none"> • Comprises all 9 manufacturers of Portland cement in Canada • Cement is produced at 16 locations across Canada, cement-based products at more than 1,100 locations. 	<ul style="list-style-type: none"> • Key issues reflect CSI topics as well as Canadian interests. • Annual fluctuations in air emissions can be expected due to changes in fuel types used and the sources of raw materials. To help manage fluctuations, most Canadian cement manufacturing plants use, or are installing, continuous emissions monitoring systems (CEMS). • Continuous improvements in energy efficiency; Increasing replacement of a portion of cement in concrete with other cementitious materials; Increasing use of alternative sources of fuel in cement kilns; Promotion of the significant social, economic and environmental benefits of using concrete over other construction materials.

3.6. The Iron and Steel sector

“ The global problem of climate change requires a global solution. Policies to encourage improved energy efficiency and reduced CO₂ emissions are important in all regions. The growing importance of steel production in developing countries such as China and India means that the steel industry in these countries has a particularly important role to play. Policies imposing extra taxes and charges on steel production in Kyoto-countries merely results in a switch of production to other parts of the world. This is likely to increase, rather than reduce, global GHG concentrations. A competitive global industry such as steel requires new and imaginative approaches in the post-Kyoto period. ”

worldsteel

The world steel industry accounts for approximately 5% of total anthropogenic GHG emissions. It produces more than 1.3 billion tonnes of steel, with an average CO₂ intensity of 1.9 tonnes of CO₂ per tonne of steel produced. Around 40% of steel is internationally traded.

The steel industry is more complex in its processes than aluminium or cement: several different steelmaking techniques with different carbon footprints are used and there is considerable difference in the CO₂/t of individual steel sites depending on the product and process mix. In the European Union, for example, in discussing possible benchmarks for the steel industry in a post-2012 trading regime, a minimum of six different standards for the industry are being considered, depending on different processes.

Without abatement measures, global emissions in the sector are projected to grow by 3.2% annually through 2030. China is expected to have 55% of global sector emissions by 2030. The latest McKinsey GHG abatement cost curve suggests that identified abatement levers would cut emissions by 27% per annum relative to a BAU scenario. The main abatement levers are improved energy efficiency and carbon capture and storage (McKinsey & Co, 2009).

This brief review focuses on the activities of the World Steel Association. A broader summary of sectoral activity is provided in Table 5.

3.6.1. The World Steel Association

This review of the climate activities of the World Steel Association is based primarily on presentations and literature by worldsteel, and by the position paper on the worldsteel website. This summary review represents the authors' understanding of the literature, and should not be seen as constituting a formal sectoral position.

Established in 1967 as the International Iron and Steel Institute (IISI), the World Steel Association (worldsteel) represents approximately 180 steel producers (including 18 of the world's 20 largest steel companies), national and regional steel industry associations, and steel research institutes. Worldsteel members produce around 85% of the world's steel.

Policy to reduce steel-related GHG emissions

The steel industry has stated that its commitment to reducing GHG emissions will be demonstrated through seven actions:

- expanding the use of current efficient technologies, widely used in modern steelmaking sites, to minimise the generation of carbon dioxide;
- undertaking research and development for new technology to radically reduce the level of CO₂ emissions into the atmosphere for each tonne of steel produced;
- optimising and maximise recycling of steel scrap;
- maximising the value of steel industry by-products;
- facilitating the use of the new generation of steels to improve the energy efficiency of steel-using products in partnership with customers;
- adopting common and verified reporting procedures that account for and report progress towards achieving CO₂ emission reductions; and
- adopting a global sector-specific approach.

A global steel sector approach

In October 2007, at the annual worldsteel conference in Berlin, the steel industry announced its new global steel sector approach based on the following four building blocks:

- **establishing a common database for the industry worldwide** – the industry has agreed a common way of measuring CO₂ emissions, and since April 2008 has initiated a data collection programme that encourages all steel companies to submit data on a confidential basis; more than 66% of worldsteel members participate in this programme and it is anticipated that over the next year nearly all the major steel plants in the world will be participants;
- **spreading best practice amongst steel companies worldwide** – in this regard the industry supports the approach adopted by the Asia Pacific Partnership;
- **investing in research and development to develop radically new ways of steel-making** – this is seen as essential if the CO₂ emissions associated with steel production are to be reduced in the longer term; and
- **using steel as a key component of a greener world** – steel is seen to play an important role in providing energy efficient solutions in the transportation, construction, energy-generation and other sectors.

worldsteel uses an intensity-based approach to measuring CO₂ emissions, taking into account the CO₂ produced per tonne of steel rather than the total carbon dioxide emissions within a country or region. The association has put in place an expert group to oversee the collection of emissions data. This group is developing a reporting methodology and specific approaches to reduce the industry's global CO₂ emissions. At the same time, worldsteel is working on the transfer of the best available steelmaking technologies to developing countries. One opportunity for this is through wide distribution of the Asia Pacific Partnership State of the Art Technology Handbook.

Challenges and way forward

Recognising the past challenges that the industry has faced in trying to reach global agreements on matters such as trade or subsidies, the industry body suggests that:

- the principle of common but differentiated responsibility makes a single agreement for the steel industry an unrealistic objective;
- it is in the spirit of the UNFCCC that there should be a set of parallel agreements between steel companies, national steel associations and their respective national or regional governments which set out commitments on improvements on CO₂ intensity for the future; and
- by putting in place – through their sectoral approach – a parallel set of actions and commitments by all the major steel producers, there will be a strong case for governments to ensure their own policies do not

prejudice this common effort or distort the international steel market.

The nature of these challenges and the implications for the development of a sectoral approach in this sector, are highlighted in the following comments made in a personal communication with the Director General of worldsteel:

“ We do not see any prospect for a specific sectoral agreement for steel in the short and medium term. We are advocating a global sectoral approach that seeks the engagement of all the major steel producers around the world, and that focuses on the central issue of reducing global CO₂ emissions in the steel industry. We do not support the concept of sectoral crediting if it implies significant transfer payments between competitors within the steel industry. In our industry it is not a question of developing vs. industrialised countries; some of the most modern and best performing steel plants in the world in terms of CO₂ emissions are in developing countries. Our approach is to encourage every steel company to identify where they are today and the scope for improvement in their operations. ”

Ian Christmas – Director General worldsteel

Table 5
Summary review of the Steel sector

STEEL SECTOR	
Sector overview (WRI, 2007) (worldsteel, 2009)	
Share in GHG emissions	<ul style="list-style-type: none"> • Largest energy-consuming industry sector globally. • Steel-making accounts for about 3.2% of all GHGs and an estimated 4.1% of global CO₂ emissions. • Steel amounts to approx 15% of all manufacturing emissions – with 70% of emissions from direct fuel use and 30% emissions indirectly from electricity and heat. • With global demand for steel growing at 3-5% a year, there is an urgent need to curb the sector's emissions.
Concentration of actors	<ul style="list-style-type: none"> • Around 90% of total steel-making GHG emissions is produced by 9 countries or regions. • The top 25 steel-making companies collectively accounted for approx 43% of global production in 2006 • There are also a number of small producers, in particular the Chinese market.
GHG measurement / attribution	<ul style="list-style-type: none"> • Trade volume raises some difficulties in attributing emissions to specific countries, since exported products embody significant amounts of CO₂ emissions.
Trade and investment flows	<ul style="list-style-type: none"> • Sector has gradually become more internationalised over past few decades. • The share of steel traded across international borders has increased steadily.
Uniformity of products	<ul style="list-style-type: none"> • Production techniques do not vary widely globally, and are dominated by two processes: integrated steel mills that use either a blast furnace/open hearth or blast furnace/basic oxygen furnace, and mini-mills that use scrap in electric arc furnaces.
Government role	<ul style="list-style-type: none"> • Not a heavily regulated enterprise.
Implications for Sectoral Approaches	<ul style="list-style-type: none"> • Sector is reasonably well organised internationally, which might assist industry coordination in negotiating CO₂ emission controls. • Industry wants to use the emissions data collected by worldsteel and Chinese steel industry, to benchmark each plant and identify best practice and measures to cut emissions. This could help persuade governments take on commitments for the sector through the UN Framework Convention on Climate Change (UNFCCC). The industry wants an approach that is "intensity-based, verifiable and technology driven". • Sector lends itself more to carbon intensity benchmarking and less to fixed emission targets. An intensity benchmark could incentivize improvements in plant efficiencies, the use of lower-carbon fuels, and greater shifts to electric arc furnace steelmaking. Setting uniform benchmarks may be problematic, however, as different countries use different mixes of these processes. • Carbon intensity benchmarks would best be applied as mandatory targets, rather than as baselines against which developing country firms could earn credits. "No-lose" sector targets for developing countries or a sectoral crediting mechanism analogous to the Kyoto Protocol's CDM would exacerbate rather than alleviate competitiveness concerns, undermining a key rationale for sectoral cooperation.
Sector Association	Policy Position
<p>GLOBAL</p> <p>The World Steel Association (worldsteel) – formerly the International Iron and Steel Institute (IISI)</p> <ul style="list-style-type: none"> • 130 steel companies in 55 countries represent, and 50 regional and national associations – more than 90% of global steel production production 	<ul style="list-style-type: none"> • In 2007, the Board of Directors of worldsteel approved a climate change policy that takes a global steel sector approach. At the core of the new approach is the collection and reporting of CO₂ emissions data by steel plants in all the major steel producing countries. • Launched in October 2008 the first phase of its proposed sectoral approach involves the development of a common method for measuring and collecting data CO₂ emissions from all steel plants in the major steel producing nations. • By April 2008 worldsteel and the Chinese steel industry had agreed on a way to generate comparable CO₂ data from different processes and set up a secure website to collect the data, which is presented in terms of tonnes of CO₂ per tonne of steel produced.
<p>GLOBAL</p> <p>Asia Pacific Partnership on Clean Development and Climate – APP Task Force on Aluminium</p> <ul style="list-style-type: none"> • Member-countries: Australia, Canada, China, India, Japan, USA, Korea • Asia-Pacific Partners account for 60% of the world's iron and steel CO₂ emissions 	<p>The Steel Task Force commits to:</p> <ul style="list-style-type: none"> • facilitate the uptake of best available technology, practices and environmental management systems in Partnership countries together with increased recycling; • assist in the provision of expert advice in relation to the opportunities to reduce GHG and other emissions levels through the introduction of existing and emerging technologies; and • identify any other opportunities, with an initial focus on operations in China and India.

3.7. The Transportation sector

The transport sector as a whole (as defined by IPCC Source Category 1A3), accounts for approximately 14% of global GHG emissions. Within this sector, road transport accounts for 72% of transport emissions, while aviation accounts for about 12% of this sector's GHG emissions (Bradley et al, 2007).

Transport has not functioned particularly well in terms of the current international mitigation framework, with only two transport projects approved at CDM level, no JI projects and very few in the voluntary market. There is thus scope for ensuring that any post-Kyoto framework is better adapted to provide for some of the specifics of the transport sector, including in particular the wide differences within the sector. These differences, which require different expertise across the various sub-sectors, coupled with the paucity of existing transport projects, means that it would take some time to gain sufficient maturity in terms of monitoring, measuring and reporting, thus hindering the potential for a sectoral approach across the transport sector as a whole.

A brief review is provided below of some of the characteristics and activities within the aviation, road and maritime sectors.

3.7.1. Air transport

“ Aviation is unique among industries. When it comes to environment, no other global industry is as united, ambitious or determined. Our message to governments at ICAO is simple. We need a global sectoral approach to reducing aviation emissions... The global sectoral approach would mean that governments account for aviation's emissions at a global level and as an industrial sector, rather than within national targets. This would ensure that airlines pay for their climate cost just once, not several times over, and it would drive emissions reductions with global standards on a level playing field. ”

Giovanni Bisignani - IATA Director General

Aviation represents approximately 2% of total global GHG emissions, and around 12% of CO₂ emissions from the transport sector. The impacts are amplified when provision is made for NOx emissions, contrail formation, water vapour release and other high-

altitude effects; the IPCC has estimated that aircraft produced an estimated 3.5% of total radiative forcing from human activities (IPCC Special Report on Aviation and the Global Atmosphere, 1999).

Aviation emissions (along with maritime shipping bunker fuels) are excluded from the Kyoto Protocol. Emissions are measured at the point of refuelling and do not depend on subsequent destinations, the nationalities of passengers, or on high-altitude effects. For this reason attributing aviation emissions to particular countries is controversial; hence their exclusion from the Kyoto Protocol.

The experience in the aviation sub-sector – which would seem to be conducive to a sectoral approach – highlights some of the potential challenges in developing sector-wide agreements. While the characteristics of the aviation sector would suggest that technology or performance standards may be the most appropriate approach, there are already significant financial incentives to operate the most efficient aircraft on the most efficient routes; this would suggest limited scope for standards to impact aviation emissions in the short term (Bradley et al, 2007).

The recent relevant activities of the ICAO are summarised below; a broader summary of the aviation sector is provided in Table 6.

3.7.2. The International Civil Aviation Organisation (ICAO)

Created in 1944 by the Chicago Convention, the International Civil Aviation Organisation (ICAO) is a specialised agency of the UN. Its membership consists of 190 Contracting States. Its work on managing aviation emissions is managed through its Committee on Aviation Environmental Protection (CAEP).

GIACC Programme of Action

In 2007, the 36th Session of the ICAO Assembly established the Group on International Aviation and Climate Change (GIACC), consisting of 15 high-level government officials from States geographically representative of developed and developing countries, tasked with developing an aggressive Programme of Action on International Aviation and Climate Change and a common strategy to limit or reduce greenhouse gas emissions. After four meetings, the GIACC adopted the GIACC Programme of Action, which recommends a global aspirational goal of 2% annual improvement in fuel efficiency of the international civil aviation in-service fleet. This would represent a cumulative improvement of 13 % in the short term (2010 to 2012), 26% in the medium term (2013 to 2020) and about 60% in the long term (2021 to 2050), from a 2005 base level.

Given diverging views on the application of market-based measures across national borders, the GIACC recommended that the ICAO Council establish a process to develop, expeditiously, a framework for market-based measures in international aviation, taking into account the conclusions of an ICAO high-level meeting in October and the outcome of the COP-15 in Copenhagen.

ICAO Working Paper: A Global Sectoral Approach for Aviation

In October 2009, at ICAO's High Level Meeting on Aviation and Climate Change, the International Air Transport Association (IATA), in a joint paper with the Airports Council International, the Civil Air Navigation Services Organisation and the International Coordinating Council of Aerospace Industries Associations, called for governments to build on the positive GIACC outcome and adopt a global sectoral approach for managing aviation's emissions in the post-Kyoto period.

The industry urged governments to work through ICAO and UNFCCC to adopt a global sectoral approach for aviation guided by the following targets:

- a cap on aviation CO₂ emissions from 2020 (carbon-neutral growth);
- improving fuel efficiency by an average of 1.5% annually from 2009 to 2020; and
- reducing net carbon emissions by 50% by 2050 on 2005 levels.

In their agreement, the aviation sector proposes that development and implementation of the sectoral approach be undertaken by ICAO, and that provision is made for the following elements:

- that aviation's carbon emissions are accounted for at a global level, not by state;
- that aviation should be fully accountable for its CO₂ emissions, but only required to pay once for these emissions; and
- that industry has access to global carbon markets to offset emissions until technology can provide the ultimate solution.

A useful overview of the proposed approach is provided in the publication *A Global Approach to Reducing Aviation Emissions* available from the IATA website.

3.7.3. Automotive sector

The automotive sector accounts for approximately 10% of global GHG emissions; this is expected to increase by 50% by 2020, and is the fastest growing source of GHG emissions in a number of countries, including South Korea, Indonesia, and China. Most of the abatement potential relates to the use of existing technologies

to improve the efficiency of the internal combustion engine, with additional opportunities associated with biofuels and hybrid and electric vehicles.

The automotive sector is characterised by a high concentration of actors, significant international integration among manufacturers, and high uniformity of products and processes, suggesting that the sector may be very conducive to a sectoral approach. This could focus for instance on coordinated international action around fuel efficiency, or the development of common technology standards for example on hybrid-electric vehicles (WRI, 2008).

Key challenges in developing a sectoral approach, however, include the highly competitive nature of the sector, the often iconic status of national manufacturers, and the potential risk of stimulating technological lock-in (WRI, 2008). This is further complicated by the lack of adequate data in certain regions regarding the nature of the national fleet, its age and associated emission factors.

A summary review of sectoral activities in the automotive sector is provided in Table 7.

Table 6
Summary review of the Air Transportation sector

AIR TRANSPORTATION SECTOR	
Sector overview (WRI, 2007)	
Share in GHG emissions	<ul style="list-style-type: none"> Aviation contributes about 2% of global emissions, but 3.5% of total radiative forcing from human activities; this is expected to grow (scheduled passenger traffic forecast to increase at 4.6% per annum from 2005-2025). Approximately 12% of CO₂ emissions from the transport sector when international flights included.
Concentration of actors	<ul style="list-style-type: none"> Production of aircraft is highly concentrated – nearly all commercial jet aircraft are manufactured by five companies operating primarily in North America and Europe; some smaller countries with large regional hubs (Hong Kong, Singapore).
GHG measurement / attribution	<ul style="list-style-type: none"> Global warming effect of aviation is larger than suggested by the numbers and emissions trends and are amplified when ozone-producing NOx emissions, contrail formation, water vapour release, and other high-altitude effects of aircraft use are included – this is difficult to determined due to high levels of uncertainty in these effects. Aircraft accounted for only 2% of anthropogenic emissions in 1992; they produced approx 3.5% total radiative forcing from human activities.
Trade and investment flows	<ul style="list-style-type: none"> Cross-border trade significant due to high concentration of actors in US and EU.
Uniformity of products	<ul style="list-style-type: none"> Highly uniform, as nearly all commercial aircraft rely on jet engine propulsion.
Implications for Sectoral Approaches	<ul style="list-style-type: none"> Attributing aviation emissions to particular countries is controversial, hence emissions in this sector are excluded from the Kyoto Protocol. Assistance from the International Civil Aviation Organization (ICAO) has been sought. Aviation sector an excellent example of how – even where conditions are ready for a sector-specific agreement, cooperation remains challenging. Technology or performance standards may be appropriate.
Sector Association	Policy Position
GLOBAL International Air Transport Association (IATA) <ul style="list-style-type: none"> Formal IATA Membership only applies to airlines. But other industry partners can participate in different IATA programs About 230 airline members 	Four-pillar strategy: <ul style="list-style-type: none"> Technology: global specifications for cleaner fuels and performance indicators, stable regulatory environment to foster R&D efforts, technology roadmap for medium and long-term goals developed by all involved. Operations: extending existing fuel conservation programmes and promoting environmental management systems across all airlines. Infrastructure: Governments must adopt policies and remove obstacles to allow airspace and airport inefficiencies to be halved over the next five years, thereby saving 40 million tonnes of CO₂ emissions per year. States and ICAO should implement ICAO's Global Air Navigation Plan at the regional level. Economic measures: ICAO and IATA should work with international financial institutions to explore new funding mechanisms to provide clean technologies to the developing world. Supports the development of minimum standards to calculate flight emissions.
EUROPE Association of European Airlines (AEA) <ul style="list-style-type: none"> 35 members 	<ul style="list-style-type: none"> AEA, in cooperation with other aviation stakeholders, developed an Emissions Containment Policy, based on four pillars: technological progress, operational measures, infrastructure improvement and market-based solutions. This policy also supports the inclusion of aviation into the Emissions Trading Scheme (ETS), but without distortions to competition, by minimising administrative burdens and delivering solid environmental gains. Improvements in Air Traffic Management and other operational procedures (avoiding flying circuitous routes and holding patterns over airports), could further reduce fuel burn by between 8% - 18%.
UK British Air Transport Association (BATA) <ul style="list-style-type: none"> Astraeus, bmi, British Airways, DHL Air, XL Airways, First Choice Airways, flybe, Jet2.com, MK Airlines, Monarch Airlines, Thomas Cook, Thomsonfly, Virgin Atlantic Airways 	<ul style="list-style-type: none"> Supports a comprehensive global policy framework, as unilateral action would significantly impact on UK competitiveness with negligible impact on emissions. A simple and equitable inclusion of aviation in the EU emissions trading scheme would be a positive step to a global solution. Research: target to improve NOx efficiency for new aircraft by 80% by 2020 compared to 2000. Sustainable Aviation Initiative: includes airlines, airports and manufacturers. BATA Calls for more research re. non- CO₂ emissions. Initiative launched in July 2005, sets out eight goals and 34 commitments on diverse sustainability issues such as climate change, noise, local environmental impacts, and social and economic development.

Table 7
Summary review of the Automobile Manufacturing sector

AUTOMOBILE AND TRUCK MANUFACTURING SECTOR	
Sector overview (WRI, 2007)	
Share in GHG emissions	<ul style="list-style-type: none"> 10% of global emissions – expected to increase by 50% by 2020 (sector is the fastest growing source of GHG emissions in some countries: South Korea, Indonesia, and China). Accounts for 72% of transport sector emissions.
Concentration of actors	<ul style="list-style-type: none"> High concentration of actors and significant international integration among manufacturers. Total production of private and commercial vehicles ~73 million (2007); Japan is the largest producer with 11.5 million vehicles; US produces 10.7 million and China 8.8 million. Five multinational automakers – Toyota, General Motors, Ford, Volkswagen, and DaimlerChrysler – produce about half of all motor vehicles.
GHG measurement / attribution	<ul style="list-style-type: none"> Emissions invariably occur within the same national boundaries where fuels are purchased.
Trade and investment flows	<ul style="list-style-type: none"> Significant international integration among manufacturers and hugely diverse customer base.
Uniformity of products	<ul style="list-style-type: none"> High uniformity – most vehicles produced on assembly lines, with similar production methods. Almost all road vehicles use one of a few major types of internal combustion engine.
Government role	<ul style="list-style-type: none"> Governments play as much of a role in the transport sector as in electricity. Interventions tend to be oriented around safety and fuel efficiency regulations and around transportation infrastructure.
Implications for Sectoral Approaches	<ul style="list-style-type: none"> Certain cooperative ventures potentially fruitful; motor vehicles more conducive than electric power production to technology or performance standards. High concentration of actors conducive to bringing on board the relevant stakeholders. Common technology standards, either for hybrid-electric or other low-emitting technologies, might also be pursued; selecting the appropriate technology standard is a persistent challenge for technology-based policies. Automobile sector is fiercely competitive; Governments may be more likely to protect the parochial interests of their national manufacturers.
Sector Association	Policy Position
GLOBAL International Organization of Motor Vehicle Manufacturers (OICA) <ul style="list-style-type: none"> 31 full members, all associations, including European and US automobile associations 	<ul style="list-style-type: none"> Supports a coherent and pragmatic integrated approach to emissions reduction that covers not only vehicle technologies, but also fuels, the fuel infrastructure, improved roads and traffic management and consumers. To be effective, policies must involve all stakeholders, including energy suppliers, the research and development community, the financial investment community, government at all levels, and especially consumers. Prudent policy must address availability of diverse fuels, development of fuel infrastructures, and consumer usage, as well as automobile technology. (Long "lead times" are necessary in the production of automobiles; new fuels need infrastructure support and must be truly sustainable; vehicles must be affordable to consumers; a stable, predictable political and fiscal environment is necessary; worldwide action is necessary, etc).
EU European Automobile Association (ACEA) <ul style="list-style-type: none"> Members: BMW, DAF, Daimler, FIAT, Ford, GM, MAN, Porsche, Citroen, Renault, Scania, Toyota, VW, Volvo 	<ul style="list-style-type: none"> Comprehensive approach involving all relevant actors is needed. The European automobile industry urges the EU to shape the upcoming legislation on CO₂ from cars realistically and constructively around the industry's manufacturing cycles. Legislation also needs to reward and encourage 'eco-innovations'. Detailed positions very similar to OICA. ACEA members are committed to reducing average new car fleet CO₂ emissions to 140g per km.
JAPAN Japan Automobile Manufacturers Association Inc. (JAMA) <ul style="list-style-type: none"> 14 members: Daihatsu, Fuji Heavy Industries, Hino Motors, Honda Motors, Isuzu Motors, Kawasaki, Mazda, Mitsubishi Motors/Truck&Bus, Nissan Diesel, Nissan Motors, Suzuki, Toyota, Yamaha. "Former member & friend": GM Japan Has offices in Asia, Europe, US, and China 	<ul style="list-style-type: none"> Supports EU's objective to further reduce emissions (EURO 6) to 120g CO₂ /km, but disagrees with targets in terms of years (postponement from 2012 to 2015 earliest) due to lead times / product cycles. Concurs with OICA's and ACEA's that a more "integrated approach" should be adopted, including improved road infrastructure and driver behaviour. Supports a segmentation system and CO₂ taxation per weight categories that encourages the use of light-weight vehicles. Supports bio-fuels.
USA Alliance of Automobile Manufacturers (AAM) <ul style="list-style-type: none"> 10 car and light truck manufacturers: BMW Group, Chrysler LLC, Ford Motor Company, General Motors, Mazda, Mercedes-Benz USA, Mitsubishi Motors, Porsche, Toyota and Volkswagen. Represent 77% of all car and light truck sales in the United States. 	<ul style="list-style-type: none"> Supports one comprehensive nation-wide CO₂ law as opposed to state laws and a multi-sector approach that involves all stakeholders (more fuel choices, fuel infrastructure, R&D, US investment community, involve government and consumers). Supports the 2007 US Energy Bill which was introduced to achieve a 30% in emission reduction by 2020, contributing towards the United Nations Bali Climate Change Summit's goal of a 50% reduction in CO₂ emissions by 2050.

Table 8
Summary review of the Maritime Transport sector

MARITIME TRANSPORTATION SECTOR	
Sector overview (WRI, 2007)	
Share in GHG emissions	<ul style="list-style-type: none"> 1.4% of global emissions; 10% of transport emissions.
Concentration of actors	<ul style="list-style-type: none"> As of 2004 the top 10 leading shipping countries represent 71.6% of the total world merchant fleet in terms of tonnage. The top five shipping countries in 2005 were Greece, Japan, Germany, China, and the US.
GHG measurement / attribution	<ul style="list-style-type: none"> Large ships emit less per unit load than smaller ships: a coastal carrier emits 11 times more CO₂ per unit load than a very large crude carrier, whereas large cargo ships emit about 1.7 times more.
Sector Association	Policy Position
GLOBAL International Chamber of Commerce (ICC) / Committee on Maritime Transport <ul style="list-style-type: none"> About 160 members, mostly large corporations 	<ul style="list-style-type: none"> Supports the revisions on vessel air emissions (MARPOL Annex IV regulations) proposed by the Marine Environment Protection Committee of the International Maritime Organisation in April '08 and to be adopted in October '08. Elements include: <ul style="list-style-type: none"> progressive reduction in SOx emissions, with the global cap reduced initially to 3.5%, from the current 4.5%, effective from 2012; then to 0.5%, effective from 2020, subject to a feasibility review to be completed by 2018. The limits applicable in Sulphur Emission Control Areas (SECAs) would be reduced to 1%, beginning 2010 (from the current 1.5%); being further reduced to 0.1%, effective 2015. Progressive reductions in NOx emissions: most stringent controls on so-called "Tier III" engines, i.e. those installed on ships constructed on or after Jan 2016, operating in emission control areas.
GLOBAL International Chamber of Shipping (ICS) <ul style="list-style-type: none"> Represents the collective views of the international industry from different nations, sectors and trades ICS membership comprises national ship owners' associations representing over half of the world's merchant fleet 	<ul style="list-style-type: none"> Aims to develop emission reduction proposals for maritime transport by 2009. Possible technical solutions: reducing ship speeds, use of alternative fuels, and new energy sources such as solar, wind and fuel cells. Possible improvements to hull design and more fuel-efficient propellers and engines. Index for measuring carbon efficiency of new ship designs. For the foreseeable future, fossil fuels will likely remain the predominant source of power for the majority of the shipping industry. Does not rule out ETS and carbon taxes, but only if "flag neutral", in order to avoid market distortions. Possibility of reducing emissions in a moderately significant way (i.e. 15% in the next 5-15 years, with new and bigger ships eventually bringing additional improvements). No guarantee of absolute reduction by shipping as a whole, due to projected growth in demand worldwide arising from the increasing global population and economy. Strong incentive for shipping companies to reduce their fuel consumption (and GHG emissions): bunker costs have increased by about 300% in the last five years. Provides detailed methods to reduce CO₂. IMO remains the focal point for maritime discussions.
GREECE Hellenic Chamber of Shipping <ul style="list-style-type: none"> Greek ship owners control the world's largest fleet amounting to 16.5% of world tonnage. The fleet represents 48% of EU tonnage. Greeks operate 22.3% of the world's bulk carrier tonnage and 21.8% of the tanker tonnage. 	<ul style="list-style-type: none"> Objective is to improve energy efficiency of the global system. Disposal of refinery waste: the production of distillates creates substantial emissions which must also be calculated (hence, not a solution). The sequestration of sulfur from heavy fuel oil is probably easier to do. Scrubber technology and others are developing to tackle the problem. Larger ships are more energy efficient; port infrastructure should be adjusted to handle larger ships. Cold ironing should be made available where shore electricity is produced more efficiently. A 20% reduction in average speed of ocean-going ships, close to the EU, would result in a 55-65% reduction in fuel consumption and emissions; such logical suggestions of shipowners are countered by others promoting untried solutions which appear to support the interests of other industries. A basic economic premise is the encouragement of behaviour through the price mechanism. Supports revisions to MARPOL (Annex VI).
GERMANY Verband Deutscher Reeder (VDR) <ul style="list-style-type: none"> 300 members, representing all Germany shipping companies 	<ul style="list-style-type: none"> Supports MARPOL resolutions and emission reduction goals.
USA Pacific Merchant Shipping Association (PMSA) <ul style="list-style-type: none"> Represents owners and operators of marine terminals and US and foreign vessels operating globally Members: approx 60 international shipping companies, including bulk, breakbulk and containerised carriers, terminal operators, tank vessel operators, tug and barge operators, cruise ship lines, bunker providers and steamship agents 	<ul style="list-style-type: none"> Member companies proactively work to reduce emissions by exploring a wide variety of cleaner fuels, engines, and retrofit technologies that exceed any existing requirements. PMSA has led efforts in the US Congress, the California Legislature, and many local governments in support of the ratification of an international marine pollution treaty, MARPOL Annex VI. The treaty allows signatory nations to establish Sulfur Emission Control Areas, where cleaner fuels must be used by all ships operating in those areas. PMSA supports the creation of a North America Sulfur Emission Control Area to reduce air pollution at or near busy ports. This is the fairest and most effective way to improve coastal air quality. PMSA members have begun implementing aspects of MARPOL.

3.8. The Electricity sector

The electrical utility sector is a critical player in the climate change debate, being the source of an estimated 25% of global GHG emissions, and 41% of global energy-related carbon emissions. It has been estimated that 50% more energy will be needed in 2030 if economic growth is to continue at the same pace, and that its emissions will grow by 58% globally by 2030 unless new policy measures are introduced.

The latest McKinsey GHG abatement cost curve suggests that identified abatement levers would cut emissions between 40-60% below 2005 levels by 2030. The main abatement options relate to renewable energy, CCS, nuclear energy and energy efficiency (McKinsey & Co, 2009).

The potential for growth in electricity-related CO₂ emissions is most pressing for developing countries, where electricity demand growth is particularly high, and where there is a serious risk of “carbon lock-in” if new carbon-intensive power plants are constructed. *The IEA's World Energy Outlook 2008* suggests that unchecked growth in fossil fuel-based electricity outside the OECD could result in a doubling of emissions by 2030 making it impossible to achieve the required global mitigation targets. This highlights the need for the electricity sector to be engaged as a priority in a global climate framework.

Electric power generation, transmission and distribution is typically dominated by a diverse range of local and national entities, with the ten largest emitters accounting for 81% of global electricity and heat emissions; the US, China and the EU are the largest emitters, accounting for 25, 16 and 14% respectively (WRI 2007). Practices for estimating emissions from electricity generation processes are well understood and estimates are generally easily calculated when fuel consumption data is available. Hydropower reservoirs are a current exception that is likely to be overcome shortly through the UNESCO / International Hydropower Association GHG Status of Freshwater Reservoirs Research Project. This thus makes GHG measurement a fairly straightforward exercise.

The low levels of international trade in the electricity sector – which undermines the traditional “competitiveness rationale” for a sectoral approach – coupled with the political sensitivity and predominant role of government in the management of national electricity, as well as the variations between countries in fuel mix and generation technologies, suggests that concluding a sectoral agreement would be particularly challenging in this sector.

Despite these difficulties, the high carbon-contribution of electricity and the potential for new investments in power generation to be locked-in to carbon-intensive technologies – particularly in rapidly growing developing countries – suggests that

opportunities for international cooperation in this sector should be further explored.

A summary review of sectoral activities in the electrical power sector is provided in Table 9.

3.8.1. WBCSD Electricity Utilities Sector Project

The WBCSD Electricity Utilities Sector Project was initiated within the WBCSD in January 2000, bringing together nine member companies to develop a deeper and more concrete understanding of the sustainability challenges facing the sector, examine potential business contributions, and explore policy needs.

In 2007, the project focused more specifically on climate change and the role of the power sector. In November 2007 they launched *Powering a Sustainable Future: Policies and measures to make it happen*, a study that highlighted the need for integrated policy and regulatory measures to support investment in low carbon technologies. Throughout 2008 the project members undertook an extensive stakeholder consultation process to seek feedback on their interim report. The outcomes of this process are reflected in the final report, *Power to Change: A business contribution to a low-carbon electricity future*, which was launched at the UN climate change conference in Poznan, Poland. This document includes specific recommendations relating to the potential for sectoral approaches in the electricity sector.

Noting the highly fragmented nature of the sector globally, the predominant impact of national energy policy and the extremely wide spectrum of technologies for electricity generation, the study suggests that “in contrast to other industrial sectors, the challenge for the electricity sector should not be to establish benchmarks by technology (mandatory performance standards).”

Arguing that the real challenge is to achieve decarbonisation of the electricity mix, it suggests that a cooperative sectoral approach with the power generation sector could be used to enhance technology cooperation and scale-up the deployment of existing technologies. The study contends that a sectoral approach in electricity could consist of:

- **At the national level** – public policies that enable authorities to identify the most appropriate zero or low-emission technologies in accordance with local or regional contexts.
- **At the international level** – technology cooperation and scaled-up technology transfer facilitated, for example, through favourable cross-border fiscal policies, new price instruments such as enhanced CDMs, and collaborative research and joint R&D for promising technologies such as generation IV nuclear, photovoltaics or CCS.

In their subsequent report, *Towards a Low-carbon Economy* – which also considers the potential for a cooperative sectoral approach in the power generation sector – the WBCSD argues that programs such as the APP could be extended to assess and create enabling frameworks for technology diffusion. To further enhance incentives for private sector participation in such initiatives, they suggest that these activities should be recognised as NAMAs under the post-2012 framework. In the case of technologies that are already mature, they propose the creation of an approach under the UNFCCC framework that provides crediting to foster the rapid scale-up of proven technologies and technology transfer across countries.

3.9. The Chemicals sector

The chemical manufacturing sector accounts for approximately 5% of total GHG emissions. While the sector is highly concentrated geographically – with the EU, US, Japan and China accounting for approximately 75% of global chemical production – it is characterised by a large diversity of products and production processes, as well as large number of actors and markets.

Although the high levels of international trade and competitiveness in the sector, together with the significance of energy as a production input, indicates that there would be benefit in an international sectoral approach to promote a level playing field in GHG abatement, the diversity of products, processes, markets and actors would make the negotiation of such an approach particularly challenging (WRI, 2007).

In their assessment of the sector, a WRI study concludes that international agreements on GHG emissions or energy technologies are not promising in this sector, but that “several production processes that are of particular concern from the climate perspective may be significant enough in themselves to justify an agreement” (WRI, 2007).

A summary review of sectoral activities in the chemicals sector is provided in Table 10.

3.10. The Oil & Gas sector

The oil & gas sector contributes around 6% of total global GHG emissions. In the absence of abatement measures, global emissions are projected to grow by 33% by 2030. The latest McKinsey GHG abatement cost curve suggests that identified abatement levers would reduce emissions to 14% less than 2005 levels, with much of this at a net benefit to society. The main abatement options are process changes and improvements (mainly in developing countries), energy efficiency and carbon capture and storage (McKinsey & Co, 2009).

A brief review of some of the activities of relevant sectoral associations is provided in Table 11.

Table 9
Summary review of the Power Generation sector

POWER GENERATION SECTOR	
Sector overview (WRI, 2007)	
Share in GHG emissions	<ul style="list-style-type: none"> • 25% of global emissions (the largest sector). • Electricity generation accounts for 68% of the sector and 17% of global GHG emissions. • 50% more energy will be need in 2030 if growth continues at the same pace. Main contributors to this increase will be China and India.
Concentration of actors	<ul style="list-style-type: none"> • Electric power generation, transmission and distribution is typically dominated by a diverse range of local and national entities. • The ten largest emitters account for 81% of global electricity and heat emissions – US, China and EU by far the largest emitters; largest emitters per capita, in order, are: Australia, US, Saudi Arabia and Russia.
GHG measurement / attribution	<ul style="list-style-type: none"> • Emissions dominated by fossil fuel combustion. • Practices for estimating emissions from these processes are well understood and estimates are easily calculated when fuel consumption data are available. GHG measurement is consequently straightforward (hydropower reservoirs being a current exception that is likely to be overcome shortly).
Trade and investment flows	<ul style="list-style-type: none"> • Low level of international exposure. • Trade plays a minor role – only approximately 3% of world electricity production is traded across borders; most electricity trade occurs within Europe and North America.
Uniformity of products	<ul style="list-style-type: none"> • Mixed characteristics: electricity is almost completely fungible and the components of generating technologies, such as turbines, are also fungible; however, fuels and conversion technologies used to generate electric power are very diverse
Government role	<ul style="list-style-type: none"> • Government role remains heavy despite liberalisation and international investment trends. In most countries, electricity production is either publicly owned or a regulated enterprise.
Sector Association	Policy Position
GLOBAL e8 <ul style="list-style-type: none"> • e8 is a non-profit international organisation, composed of 9 leading electricity companies from the G8 countries, which promotes sustainable energy development. 	<ul style="list-style-type: none"> • Supports the expansion and promotion of large hydro plants, large efficient coal plants, nuclear, and other large renewable projects. • Focus on large-scale plants, especially for investments in developing countries • Upgrading and construction of new transmission lines is crucial.
GLOBAL Asia Pacific Partnership on Clean Development and Climate–APP Task Force on Power Generation & Transmission <ul style="list-style-type: none"> • Chair: US Co-chair: China • All members are on the task force: Australia, Canada, China, India, Japan, USA, Korea 	<ul style="list-style-type: none"> • The APP has six key objectives for cooperation: assessment of opportunities in terms of generation and transmission; facilitate practices, technologies and processes to improve efficiency; enhance collaboration; enhance synergy with other APP task forces; identify potential projects within partner countries; and identify opportunities to enhance investment climate. • Despite a growing demand for power, the potential for increased efficiency in power generation, with associated benefits for reduced emissions in Partner countries is substantial. For example, simple and inexpensive improvements in Indian power plants can increase efficiency by more than 1.5%.
EUROPE Union of the Electricity Industry (EURELECTRIC) <ul style="list-style-type: none"> • Membership is based on national electricity association or leading power enterprise in each country. Currently 33 Full Members, including all 27 EU Member States, current applicants negotiating to join the Community, and other European OECD countries • There are 22 non-voting Affiliate Members (representing the electricity industry across the rest of Europe, in the Mediterranean basin and on four other continents), as well as 12 Associate Members drawn from the electricity sector, plus 24 Business Associates from other sectors with stakeholder links to or interest in the electricity industry 	<p>Elements of EURELECTRIC policy positions include:</p> <ul style="list-style-type: none"> • Auctions of emissions allowances must be fair, efficient and timely. The auction process must not distort the market price for carbon. To this end they support a common interface for auctioning. The initial auction must be brought forward to 2011 to maintain efficient operation of the electricity market. They acknowledge that some exposed sectors or sub-sectors may require temporary relief until an international emissions trading regime is established. • Transitional measures are needed for the electricity sector. • Additional use of CDM and Joint Implementation (JI) should be allowed. • There should be no differentiation between electricity generation technologies, including CHP. • Proper control must be applied to the release of commercially sensitive data. • Linking to schemes outside the EU needs more scrutiny. • Over-provision for New Entrants should be reduced. • Captured and stored carbon should be treated as not emitted.
USA Electric Power Supply Association (EPSA) <ul style="list-style-type: none"> • 43 members, companies as well as associations. • Accounts for nearly 40% of the installed generating capacity in the United States. 	<ul style="list-style-type: none"> • Urged House of Representatives to review the restrictions for wind and natural gas in Energy Policy Reform and Revitalization Act of 2007, which in their view are unnecessary. • Support competitive markets, not regulations, as a means to reduce emissions.
CHINA China Electricity Council (CEC) <ul style="list-style-type: none"> • Consolidated organization of all China's power enterprises and institutions • Operates under the supervision of the State Electricity Regulatory Commission • Mainly operates under the "Dept of Environment Protection and Resources Conservation" 	<ul style="list-style-type: none"> • Four district gas-fired cogeneration projects under construction, each replacing dozens of conventional coal-fired boilers, to provide heating and power to residential buildings. • Focus on nuclear energy (plan for 2-3 new reactors annually, coal (double capacity based on 2006), and hydro. • China has a National Climate Change Programme prepared by the National Development and Reform Commission. Includes the Renewable Energy Law of the People's Republic of China. Several key areas for GHG mitigation, including a sustainable and stably expanding market for renewable energy (...) and obligation of national electricity grids (...) to purchase renewable energy products.
JAPAN Federation of Electric Power Companies of Japan (FEPC) <ul style="list-style-type: none"> • 10 member companies that supply power strictly separated by region. 	<ul style="list-style-type: none"> • Supports the APP task force. • Emission credits derived from Joint Implementation / CDM projects should be incorporated in the market for emissions trading. • Seller liability would be more advisable than buyer liability. • The industry actively promotes a "Keep the Air Clean" policy with regard to fuel, equipment and operating procedures, with concrete technologies.

Table 10
Summary review of the Chemicals sector

CHEMICALS SECTOR	
Sector overview (WRI, 2007)	
Share in GHG emissions	<ul style="list-style-type: none"> Chemical manufacture accounts for 5% of global emissions. Accounts for 23% of emissions associated within manufacturing and construction industries, which represent 21% of global emissions.
Concentration of actors	<ul style="list-style-type: none"> Highly concentrated geographically – the EU, US, Japan and China account for 75% of global chemical production. Diversity of products means that overall there is a low concentration of actors in this subsector; small and medium-sized enterprises, which may have a single facility producing a single product, are common.
GHG measurement / attribution	<ul style="list-style-type: none"> Direct emissions from fossil fuel combustion, indirect emissions from electricity consumed during production, and release of non- CO₂ gases from various industrial processes. Very high trade volumes in the chemicals sector raises some challenges related to attribution of emissions.
Trade and investment flows	<ul style="list-style-type: none"> Chemicals trade has increased steadily over past two decades; double-digit annual growth rates.
Uniformity of products	<ul style="list-style-type: none"> Diverse products and production processes. The industry includes fertilizers, pesticides, pharmaceuticals, plastics, resins, synthetic rubber, refrigerants, paints, solvents, soaps, perfumes, and synthetic fibres, as well as chemicals derived from fossil fuels.
Government role	<ul style="list-style-type: none"> Government regulations in this sector vary widely between product and process types, and between jurisdictions. This diversity reinforces the fact that the chemicals sector is difficult to characterise consistently.
Implications for Sectoral Approaches	<ul style="list-style-type: none"> High degree of international trade and competitiveness in this sector, together with the importance of energy as a production input, points to promoting a level playing field on GHG abatement through international cooperation. However, given the high number of products, markets, and actors in this sector, negotiating appropriate cooperation would be challenging. The sector is also poorly organised and lacks a global governing body. One approach would be to cover the sector under country-specific emission caps. Another would involve adopting technology or performance standards. Overall, international agreements on GHG emissions or energy technologies are not promising in the chemicals sector as a whole.
Sector Association	Policy Position
GLOBAL International Council of Chemical Associations (ICCA) <ul style="list-style-type: none"> Main channel of communication between the chemical manufacturers and producers and various international organisations Accounts for more than 75% of chemical manufacturing operations; almost 30% of which production is traded internationally Promotes and coordinates Responsible Care and other voluntary sectoral initiatives 	<ul style="list-style-type: none"> According to ICCA member JPIA, the ICCA launched the adoption of a sectoral approach for sub-sectors within chemical industry to set clear goals for each sub-sector. It also reportedly defined energy and climate change as top priority for the global chemical industry, established a working group and globally aligned chemicals industry's efforts. Under the long-range Research Initiative (LRI): the European Chemical Industry Council (Cefic), the American Chemistry Council (ACC) and the Japan Chemical Industry Association (JCIA) have jointly committed to support research with the impacts of chemicals as priority. The ICCA undertakes capacity building activities under the Responsible Care Global Charter once the Global Product Strategy that in addition to some specific further activities support implementation of the Strategic Approach to International Chemicals Management (SAICM). Support Action Plan on Chemicals agreed during World Summit on Sustainable Development 2002. Global Product Strategy, Product stewardship is the industry's management of the health, safety and environmental aspects of a product throughout its total life cycle, working in cooperation with upstream and downstream users. Favour the implementation of a global system for the classification and labelling of chemicals and a global strategic approach to chemicals management. Roadmap towards energy efficiency improvement.
EUROPE European Chemical Industry Council (CEFIC) <ul style="list-style-type: none"> Maintain and develop a prosperous chemical industry in Europe by promoting the best possible economic, social and environmental conditions to bring benefits to society with a commitment to the continuous improvement of all its activities 	<ul style="list-style-type: none"> See emissions trading as a potentially cost-effective means for companies to reduce their GHG emissions. However, emphasis on all weaknesses of EU ETS. Bangkok 2008: promote a global agreement on climate policy with defined roles for countries and shared objectives. Policy approaches must acknowledge energy-intensive sectors' economic importance and nature. Choice of a baseline, early actions should be rewarded (made before the time of the baseline). Policy should encourage and reward efficiency improvements, avoid rewarding reduction of production level or relocation. Apply energy efficiency criteria by increasing use of benchmarking as a way to reward emissions efficiency (e.g. for free allocation of allowances in emissions trading). The diversification of chemical processes means this approach should focus on the bulk of emissions (major building block processes). Apply policies in a proportionate way (e.g. exclude small emitters from emissions trading). Provide information availability on power stations efficiency and grid losses.
EUROPE American Chemistry Council (ACC) <ul style="list-style-type: none"> Represents the leading American companies in the business of chemistry 	<ul style="list-style-type: none"> In 2005 the American Chemistry Council published their work plan "US Chemical Industry Response to the President's Global Climate Business Challenge" including: emission measurement and reporting protocols, identify and implement cost-effective opportunities, develop cross-sector projects for reducing GHG emission intensity, accelerate investment in R&D and commercialization of advanced technology. Support Responsible Care® To measure improvement: The Environmental Protection Agency (EPA) tracks, reviews and publicly discloses its Toxics Release Inventory (TRI) – a database of companies' performance on chemical releases, transfers and other waste management activities.
JAPAN Japan Chemical Industry Association (JCIA) <ul style="list-style-type: none"> Comprising approx 200 corporations engaged in the chemical industry in Japan and about 90 associations of individual chemical product sectors. 	<ul style="list-style-type: none"> Supports voluntary emission reductions programmes; supports the Keidanren Voluntary Action Plan. Increased their energy efficiency target from 10 to 20%. Supports the responsible care global charter of ICCA; additional partnership approach with the Japanese government, in whose framework they have been working on safety management on chemicals. Address in general "emerging chemical issues" such as the REACH directive of the EU.

Table 11
Summary review of the Oil & Gas sector

OIL & GAS SECTOR	
Sector Association	Policy Position
<p>GLOBAL International Petroleum Industry Environmental Conservation Association (IPIECA)</p> <ul style="list-style-type: none"> • Represents upstream and downstream oil and gas industry on key global environmental and social issues • Membership includes petroleum companies and associations from around the globe • IPIECA (and OGP) members together produce about two thirds of the world's oil and gas • IPIECA provides a forum for encouraging continuous improvement of industry environmental and social performance and is a non-advocacy organisation 	<ul style="list-style-type: none"> • IPIECA has a long-established Climate Change Working Group active in the following areas: <ul style="list-style-type: none"> - Carbon Capture and Storage (CCS) - Developing practical guidance on greenhouse gas emissions management best practices - Greenhouse gas reporting guideline updates - Engaging in the UNFCCC and IPCC processes • Offers Petroleum Industry Guidelines for Reporting Greenhouse Gas Emissions from operations, as well as for GHG reduction projects including CCS, and flaring and venting. • Though actions differ from company to company, they incorporate common steps such as: <ul style="list-style-type: none"> - reducing GHG emissions through more efficient use of energy, efficiency improvements from operations and investment in cogeneration facilities; - achieving GHG emissions reduction from operations by deploying CCS technology, reducing venting and flaring wherever possible and reducing fugitive emissions from natural gas transmission networks; - deploying existing low-carbon technologies and investing in new fossil and non-fossil fuel technologies including renewables, hydrogen, cleaner fuels, biofuels and fuel cell technologies; participating in voluntary market-based initiatives and agreements such as emissions trading, Joint Implementation (JI) and the Clean Development Mechanism (CDM) that seek cost-effective reductions across diverse operations; - taking action to educate and encourage consumers and others to use petroleum products more efficiently; and - working in partnership with research organizations, other sectors and governments to develop collaborative and innovative solutions to meet the challenge of supplying energy in an environmentally sustainable manner. • Through these steps, the oil and gas industry intends to be a source of solutions for the challenges and concerns triggered by GHG emissions from its operations and products.
<p>GLOBAL International Association of Oil and Gas Producers (OGP)</p> <ul style="list-style-type: none"> • Encompasses most of the world's leading publicly-traded, private and state-owned oil & gas companies, industry associations and major upstream service companies • OGP members produce more than half the world's oil and about one third of its gas 	<ul style="list-style-type: none"> • Supports the internationalisation of key standards used by the petroleum and natural gas industries, i.e. ISO. • Support CCS, technology development. • Mentions energy mix. • Endorsed Oil and Gas Industry Guidance on Voluntary Sustainability Reporting: not all of the twenty-four participating companies state their emissions or update their annual reports. • OGP has an environmental quality committee. • Over the past 8 years, the OGP has collected environmental information from its member companies (as a combined total) on an annual basis. • Held a workshop with the World Climate Research Programme and the Joint Technical Commission for Oceanography and Marine Meteorology (JCOMM) on climate change in May 2008. It appears that current Global Climate Models (GCMs) as used for the last IPCC scenario planning are not yet reliable enough to answer questions on region/location specific.
<p>UNITED STATES American Petroleum Institute (API)</p> <ul style="list-style-type: none"> • National trade association that represents all aspects of America's oil and natural gas industry • 400 corporate members, from the largest major oil company to the smallest of independents, come from all segments of the industry - producers, refiners, suppliers, pipeline operators and marine transporters, as well as service and supply companies that support all segments of the industry 	<ul style="list-style-type: none"> • Three main programmes to address climate change: <ul style="list-style-type: none"> - API Climate Action Challenge focuses on strategies for reducing emissions. Includes a commitment by API-member refining companies to improve their energy efficiency by 10% by 2012. - API Climate R&D Challenge involves support for enhanced R&D leading to new and improved technologies as part of a longer-term effort to reduce or sequester GHG emissions. - API Climate Greenhouse Gas Estimation & Reporting Challenge to implement more robust methods for calculating, reporting and tracking emissions industry-wide. • Published Oil and Natural Gas Industry Guidelines for GHG Reduction Projects with IPIECA and Compendium of GHG Emissions Methodologies for the Oil and Gas Industry. • States that it is necessary to be able to measure to manage emissions. • Supports CCS. • Supports voluntary initiatives.

4. Sectoral approaches in a post-Kyoto climate framework

This final chapter reviews some of the key questions and issues that need to be addressed as part of the process of finding workable solutions on sectoral approaches within the UNFCCC negotiations process. The chapter closes by briefly reviewing the negotiations in the run-up to Copenhagen and reflects on the actions required by negotiators in finalising the agreement on sectoral approaches. The analysis and recommendations provided in this chapter are informed by the discussion in the preceding three chapters.

4.1. Sectoral approaches and the post-Kyoto regime: A useful way forward?

In seeking to contribute to the ongoing discussions and activities relating to sectoral approaches – at a national, regional and international level – this final chapter frames some of the key considerations regarding the way forward in the context of the following four questions:

1. Should sectoral approaches be part of the post-2012 climate framework?
2. If so, which are seen to be the most feasible and effective sectoral approaches to be focusing efforts on in the lead up to and beyond COP-15?
3. What issues associated with each possible sectoral approach need to be addressed by negotiators?
4. What activities are being undertaken by negotiators to facilitate the effective integration and adoption of sectoral approaches in a post-Kyoto framework?

4.2. Should sectoral approaches be part of a post-Kyoto climate framework?

In its recent highly publicised and much cited report, *Pathways to a Low-Carbon Economy: Version 2 of the Global Greenhouse Gas Abatement Cost Curve*, McKinsey & Company suggests that there is *potential* by 2030 to reduce GHG emissions by 35% on 1990 levels (or 70% against business as usual). Citing the IPCC's Fourth Assessment Report, they suggest that this "would be sufficient to have a good chance of holding global warming below a 2 °C threshold." They stress, however, that capturing enough of

this potential will be highly challenging, requiring action that is both profound and prompt.

Reflecting the sentiments that are shared in numerous high-level policy statements, the paper argues that not only would all regions and all sectors have to capture close to the full potential for abatement available to them, but even deep emission cuts in some sectors would not be sufficient. In their analysis of five different implementation scenarios, only two of these would achieve pathways with a significant chance of containing warming below 2°C, and both of these envisage the developed and developing world each capturing at least 90% of all technical levers for mitigation.

In this context it is evident that energy intensive sectors in developing countries need to be included as soon as possible within global climate mitigation activities:

- these sectors currently account for between eight to 15% of global CO₂ emissions, and it is estimated that 97% of the growth in energy-related emissions between now and 2030 will come from non-OECD countries (IEA, 2008);
- with high levels of new infrastructure development forecast in these countries, measures are needed to avoid long-term carbon lock-in; and
- mitigation options outside Annex I countries include some of the lowest cost and most effective mitigation options available.

While it is recognised that a comprehensive, even-handed approach to emissions reductions is the "first best" option in terms of environmental effectiveness and economic efficiency – allowing emissions reductions to occur where they are the cheapest – there

are nevertheless strong arguments in favour of including a sectoral approach within the post-Kyoto architecture. Properly designed and effectively implemented, sectoral approaches have the potential to overcome a number of political and technical issues of concern to both developed and developing countries (CCAP (2009)):

- by allowing responses to be targeted and tailored to specific sectors – rather than setting potentially onerous economy-wide commitments – they provide the possibility for developing countries to reduce energy and emissions intensities while at the same time enabling economic growth and being consistent with the principle of common but differentiated responsibilities;
- in focusing on identifying the mitigation potential within a given sector, the discussion moves from the abstract to the tangible: feasible emission-intensity targets can be set, specific technologies identified, best practice performance standards shared, and regionally-specific resource constraints taken into account;
- they provide an opportunity for developed nations to meet their responsibilities for financing and technology transfer – including opportunities for innovation towards a post-carbon economy – while addressing some of the current funding and mitigation limitations associated with the clean development mechanism; and
- they can be designed to address (even if only partially) some of the concerns relating both to competitiveness and GHG leakage between countries and between and within sectors.

As this document has shown, there is increasing recognition of the potential for sectoral approaches, not only in terms of the recommendations of research bodies and think tanks (Chapter 2), but also in the activities of industry sectoral bodies (Chapter 3) and in the submissions of Parties to recent UNFCCC meetings (Annex I).

On the question, then, as to whether there is a role for sectoral approaches in a post-Kyoto regime, as one of the leading researchers on this subject put it at the 2008 UNEP Business and Industry Dialogue: “Do we have a choice?”

4.3. Identifying feasible and effective options for sectoral approaches

While there are thus seen to be significant potential benefits in introducing sectoral approaches as part of a post-Kyoto climate framework, it is evident that there are some substantial challenges – political, institutional and technical – associated with developing and implementing sectoral approaches that are effective, efficient and equitable.

As the earlier discussion has indicated, a variety of different

options for sectoral approaches have been mooted – both in the literature and by Parties to the negotiations (see Annex I) – each of which has very different implications in terms of its contribution to international mitigation efforts, its impact on global carbon markets, and its political and technical feasibility.

In finalising the development and implementation of sectoral approaches – and seeking to find a suitable balance between the sometimes competing policy objectives of environmental effectiveness, economic efficiency, social equity, and political and technical feasibility – negotiators and policy-makers will need an informed appreciation of the nature of these implications.

This section briefly reviews the implications of each of these policy objectives on the nature and design of sectoral approaches. Building on the earlier discussions, this assessment is framed in the context of the following options:

- domestic-oriented sectoral-crediting mechanisms (including sectoral CDM and “no-lose” targets);
- domestic non-credited sectoral approaches, for example as part of sustainable development policies and measures (SD-PAMs), or within nationally appropriate mitigation action (NAMA) commitments; and
- transnational sector-based initiatives, comprising
 - transnational quantitative sectoral approach; and
 - sector-based technology cooperation.

(A useful review of sectoral approaches in terms of the four principal criteria for evaluating environmental policy instruments – environmental effectiveness, cost effectiveness, equity and distributional issues, and technical and institutional feasibility – is provided in the September 2008 Ecofys study referenced in Chapter 2.6 above; see also Table 1).

4.3.1. Environmental effectiveness

Ultimately, the underlying priority of any chosen sectoral approach should be to ensure its environmental effectiveness as measured by its contribution to the reduction of global greenhouse gases. Of the options presented above, the transnational quantitative sectoral approach and domestic sectoral no-lose targets offer the greatest potential for environmental effectiveness. This is of course entirely subject to the stringency and nature of the accompanying targets, including as to whether it is an absolute or intensity-based target; if the latter, then provision would need to be made for efforts to reduce demand for the associated products. Regarding transnational sectoral targets, it is important to bear in mind the possible role of the global industry sector in the decision-making process and the implications this might have on the level of

ambition of the target.

The environmental effectiveness of SD-PAMs and sector-based technology cooperation will depend on the nature of the technology commitment, and the nature and number of sectors that are engaged. As this is typically a voluntary co-operative effort, with an emphasis on its contribution to the country's sustainable (economic) development, there is a danger that while it may prove politically more feasible this may be at the expense of environmental ambition.

An important consideration in the design of all options will be to ensure the timely participation of priority sectors, particularly those that have significant and rapidly growing emissions, and/or that have a risk for carbon lock-in. On the basis of the review in the preceding chapters, it is suggested that there would be particular priority in encouraging the participation of the aluminium, cement, and iron and steel sectors (at the level both of transnational and domestic sectoral approaches), as well as electricity generation (at the level of domestic sectoral approaches).

Ensuring the environmental effectiveness of the sectoral approach will present challenges associated, for example, with:

- ensuring sufficient participation of individual firms within the sector, for example through the development and enforcement of appropriate national policy measures;
- defining an appropriate sectoral boundary;
- using effective units of measurement; and
- setting appropriate and suitably ambitious targets, relating, for example, to emissions reduction and/or technology uptake.

Various considerations associated with these and related challenges are reviewed further in Box 13.

While environmental effectiveness may be the underlying goal of any climate mitigation measure, this desire for improved performance needs to be tempered by an appreciation of what is realistic in the context of competing political priorities and existing technical and institutional constraints.

4.3.2. Economic efficiency

A second key policy criterion to guide the choice and design of sectoral approach relates to cost-effectiveness: the ability of the sectoral instrument to achieve its objective at minimum cost. Key considerations here include an assessment of the direct and indirect costs of the sectoral approach – associated for example with its administration or with addressing necessary capacity constraints – as well as the extent to which the approach makes use of efficient market mechanisms, including particularly the global carbon market. A key consideration in evaluating the efficiency of the

agreement – including its implications in terms of transaction costs – will be the nature and efficacy of the national policy measures and domestic incentive structures that are implemented to encourage sectoral improvements.

To a large extent, the economic efficiency of the chosen sectoral approach will be a function of its technical and institutional feasibility, the implications of which are reviewed further below. As is argued later, at a general level the domestic-oriented sectoral-crediting mechanisms and the transnational quantitative sectoral approach, will be accompanied by higher costs than the non-credited sectoral approaches such as SD-PAMs and technology cooperation. Of course the extent to which these higher costs are offset by an associated higher level of environmental outcome will depend on the impact of the policy measures and the stringency of any negotiated targets.

4.3.3. Social equity and political feasibility

In the context of the global climate negotiations, the desire for ensuring an equitable approach is to a large extent framed in the context of the principles of common but differentiated responsibilities and respective capabilities.

In accordance with these principles most developing countries are not willing to accept country-wide emissions reduction targets, nor are they generally willing to accept a transnational quantitative sectoral approach, which many fear would be used “to bring targets in through the back door.” Similarly, as regards any suggested bottom-up sectoral approach, while some developing countries have highlighted the potential value of this approach being used to set targets in terms of technology deployment goals, such an approach has been opposed in terms of providing a basis for emissions- or energy-intensity commitments.

Most developing countries have emphasised that any sectoral approach should be developed specifically in terms of Article 1 of the Bali Action Plan, with a focus explicitly on supporting cooperation in the development, application, diffusion and transfer of technologies. Of the various sectoral approaches, domestic sector-based approaches are politically seen to be the most feasible, including those relating to technology transfer in specific sectors, the evolution of market mechanisms (such as sectoral CDM or “no lose” sectoral intensity crediting baselines), and/or sectoral policies and measures that could be seen as a sub-set of sustainable development policies and measures.

4.3.4. Technical and institutional feasibility

The development of sectoral approaches poses some significant technical and institutional challenges for both developed and

developing countries, and raises questions regarding the feasibility of building sufficient capacity in a timely manner. The different forms of sectoral approaches clearly have different implications for capacity: sectoral-crediting approaches, for instance, would need significant capacity development (both in countries and sectors) associated with the gathering and verification of data, the development of baselines and the administration of credits; by contrast, a technology exchange agreement would have substantially lower demands on capacity needs.

Some of the potential technical and institutional challenges include:

- **Data availability and verification** – Managing current data gaps, and the process of developing and verifying against baselines, will be crucial to any sector-based approach. While some valuable work has been undertaken in this area – most notably through some of the industry sectoral initiatives, such as those in the aluminium and cement sectors (Chapters 3.4 and 3.5), or through the work of various research bodies (such as those reviewed in Chapters 2.6 and 2.8) – there are nevertheless some substantial remaining challenges regarding the availability and management of necessary data, at the level both of the host country government and the individual firm. Not only are there challenging technical issues, associated for example with establishing a verifiable GHG emissions inventory, but there are also the institutional challenges associated with managing industry’s protection of data for the reasons of commercial confidentiality. The extent of the challenge relating to data management and access is particularly apparent in China with the large number and diverse nature of its facilities.
- **Administration of global carbon markets** – In terms of their potential impact on global carbon markets, sectoral-based initiatives present important technical and institutional challenges associated both with administering credits (nationally and internationally), and with evaluating and providing for their potential impact in the design of the sectoral approach. The efficacy of any crediting sector-based actions would be dependent on a matched increase in demand for credits, so as to ensure against a decrease in global carbon prices that would remove incentives for further reductions. This requires consideration of issues such as the eligibility to generate carbon credits under a post-2012 regime and their fungibility with existing instruments in the carbon market.
- **Developing local policies and measures** – Governments participating in a sectoral approach would need to implement effective policies and measures – in some instances including local baseline and credit schemes – to provide sufficient incentive for industry participation. This is dependent upon sufficient political will, appropriate institutions and the availability of adequate resources.
- **Legal status of transnational sectoral approaches** – The development of transnational sectoral approaches would present some interesting institutional challenges in terms of their status in international law. While international industry sectoral bodies have been instrumental in driving the development of these initiatives, their international legal status precludes them from imposing binding legal obligations on individual companies. Given that industry associations lack legal personality under national law, any agreement involving them would either need to be developed through a series of legally-binding country-based agreements, or through the creation of an international treaty with obligations on private entities, something that has only previously been done in the context of international criminal law relating to genocide and torture. (Baron et al (2007)). In addition, due to the sector-wide coordinated activity, there may also be complications in terms of antitrust law.
- **Negotiation capacity** – Finally, one needs to consider some of the practicalities and capacity demands associated with national negotiators developing sectoral approaches. While some commentators have suggested that “breaking the challenge of climate policy down on a sector-by-sector basis will present a more manageable task for negotiators” (Bradley et al (2007)), others suggest that “UNFCCC negotiators may worry that sectoral details would exhaust their expertise and negotiation capacity” (Baron et al (2009)). The Climate Group has argued for example that: “sectoral approaches introduce a significant risk of an insuperable negotiating burden. At a stage where time to conclude the negotiation by Copenhagen is already short, detailed and technical sector-level discussions are out of the question – for one thing, most UNFCCC delegations do not have the staffing required to enter into such discussions.”

Many of these institutional and technical constraints are, of course, not unique to the development of sectoral approaches, and would impact on developing countries’ ability to deliver on broader economy-wide goals as well, and potentially more so. Notwithstanding the challenges outlined above, it is suggested that in many respects it would nevertheless be more feasible to seek to mobilise mitigation potential and build required capacity domestically on a sectoral, rather than economy-wide, basis.

It has been argued, for example, that the process of implementing sectoral approaches would provide a valuable opportunity for building capacity – through sharing of best practice policy, training,

technology diffusion and targeted financial support – that would assist in preparing for the possible adoption of broader economy-wide commitments: As a recent OECD paper puts it, “this may be the single biggest advantage of sectoral approaches: the opportunity they provide to focus the minds of governments and industries on the practicality of emissions reduction in some of the most emissions-intensive sectors.” (Stephenson (2009)).

4.4. What issues need to be addressed as part of a post-Kyoto framework?

As the above review has demonstrated, there are various different options for sectoral approaches, each of which has very different implications in terms of their potential impact and on the nature of the required preparatory process.

This section briefly considers each of the main sectoral approaches, and outlines what have been identified as the core issues relating to each approach on which agreement is needed if there is to be timely progress on integrating sectoral approaches as part of a post-Kyoto framework. This review draws significantly from the latest consultative work in this area by the IEA and the OECD, as well as on the recommendations emanating from the “road-testing” of different sectoral approaches undertaken by Ecofys (Ecofys, 2008), and by the Centre for Clean Air Policy-Europe and its partners (CCAP, 2008). (These studies are each reviewed above in Chapter 2).

4.4.1. Issues to resolve: Domestic-oriented sectoral crediting mechanisms

One of the most researched of the sectoral approaches, the domestic-oriented sectoral crediting approach – which includes sectoral-CDM and sectoral “no-lose” targets – is seen to present a compelling “point-of-entry” for developing countries that might be willing to adopt GHG mitigation commitments at a sectoral rather than economy-wide level. This approach has been the subject of various “road-tests” and has been proposed in the formal submissions of Parties. Not surprisingly, as is shown later (see section 4.6), specific provision has been made for a version of this approach as part of suggested improvements to both the clean development mechanism (CDM) and emissions trading.

A OECD/IEA study (Baron et al. 2008) identifies the following issues that would require near-term decisions for a framework agreement relating to domestic sectoral efforts in developing countries:

- **Sectoral eligibility** – On what basis should sectors be selected or prioritised for domestic sectoral approaches? (Possible criteria could include cost-effectiveness of mitigation, the lock-in

characteristics of sectors, the ability to measure and verify emissions, and their overall mitigation potential). Should the focus be on certain global priority sectors, or should developing countries be able to self-select sectors and activities depending on national conditions? If so, 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.

- **Country eligibility** – 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?
- **Crediting** – Can sectoral actions and approaches in developing countries generate carbon credits, and if so, to what extent? How would one ensure that there is sufficient balance between the supply of new credits and global demand for such credits?
- **Institutional arrangements** – What form of international coordinating body will be needed? What would be its composition and mandate?
- **A pilot phase** – Should a pilot phase for the elaboration of domestic sectoral approaches be initiated, starting prior to the Copenhagen meeting 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.
- **Integration into the UNFCCC regime and negotiation mandate** – In addition to agreeing the substantive questions above, it will be necessary to identify how this approach could be effectively integrated within the current UNFCCC instruments. The approach that has been adopted in the pre-Copenhagen negotiations in the AWG-KP is reviewed in Section 4.6 below. Currently this forms part of discussions in both the Ad Hoc Working Group on Long-Term Cooperative Action Under the Convention (AWG-LCA) and the *Ad Hoc Working Group on Further Commitments for Annex I Parties Under the Kyoto Protocol (AWG-KP)*. How this will be addressed post-Copenhagen remains unclear, and will in part be informed by the outcome of the politically sensitive discussions relating to the durability of the “dual track” approach.

The recent OECD review of the feasibility of introducing a domestic sectoral crediting agreement in the electricity sector in China (Stephenson, 2009), highlights the need to recognise and provide for the following potential challenges inherent in such an approach:

- In defining the reference case for future emissions and emissions intensity, how does one provide for the impact of current and planned policies, distinguishing, for example, between those that are concrete and those that are aspirational, or accounting for those that have uncertain but potentially significant impacts on emissions (such as carbon capture and storage)?
- Who would be in the market to purchase the potentially significant number of offset credits, and what impact would this have on the global price of carbon and, in turn, on global climate stabilisation objectives?
- What domestic policies and measures would be needed to provide the necessary impetus to exceed a no-lose target, and how politically feasible are these?
- How would one overcome significant existing concerns relating to the poor quality of emissions monitoring and data collection?

Underpinning these potential risks and obstacles is the need to find an appropriate balance between setting sufficiently stringent Annex I commitments – so as to prompt developed-country funding – with ensuring suitably ambitious no-lose targets, thereby providing “just the right amount of funding and offsets.”

In their preliminary conclusions on the potential for sectoral crediting mechanisms, an OECD study suggests that while such an approach in the power sector could certainly scale up financial flows and link emission reductions in developing countries to specific abatement opportunities by focusing attention on sector-specific opportunities, the impact is highly uncertain, and there is potential that offset credit would be generated in such quantities as to undermine global activities.

4.4.2. Issues to resolve: Domestic non-credited sectoral approaches (SD-PAMs)

Another useful domestic sector-based approach is through non-credited efforts that are intended to provide access to funding opportunities to assist for example in the development and implementation of sector-based policies and measures, or other NAMAs. It has been argued that through this approach there is scope to achieve significant gains in fostering improved energy policy and practice, with resulting reductions in GHG emissions, building for example on the detailed analysis of energy efficiency best policy practice undertaken by the IEA (Baron et al, 2007).

As has been identified in the earlier discussions, this is seen to be a potentially attractive option for engaging developing countries in mitigation commitments as part of the post-Kyoto framework, and one that is increasingly visible in the submissions of developing country Parties. Such an approach could be linked with the measuring, reporting and verification of actions by developing countries as well as other elements of the Bali Action Plan, including in particular those relating to financing and technology collaboration for mitigation. (Baron et al, 2008).

In seeking to provide for such an approach in a post-Kyoto framework, it is suggested that the current preparatory work should be focused on securing decisions at COP-15 on the following issues (Ecofys, 2008, and Baron et al., 2008):

- identifying the levels of funding and technological support available from developed countries;
- clarifying the rules that are needed to provide incentives for developing sufficiently ambitious SD-PAMs;
- agreeing the modalities for reviewing SD-PAMs and on the allocation of developed-country support;
- securing agreement by Parties on the format for submitting proposals on SD-PAMs, and the process for monitoring and sanctioning implementation;
- assessing the general nature of the commitment from relevant developing countries on applying SD-PAMs in certain sectors; and
- clarifying whether, in terms of their nationally appropriate mitigation actions, Parties may take more defined commitments in specific sectors, opening up the possibility to broaden crediting and/or to receive specific support to increase their capacity to reduce emissions.

In addition to agreeing the substantive questions above, it will be necessary to identify how the approach could be effectively integrated within the current UNFCCC instruments. In their IEA/OECD paper Baron et al. (2008) suggest that this would most feasibly occur in the AWG-LCA in terms of paragraph 1(b)(ii) and possibly 1(b)(iv) of the Bali Action Plan. Articles 4(1)(b) and 4(1)(c) of the UNFCCC are also pertinent. If non-binding, it is suggested that non-credited actions such as policies or measures, could simply be recognised by way of COP decisions without an amendment to the UNFCCC. As outlined below (Section 4.6) the issue of potential crediting on the basis of nationally appropriate mitigation actions is being considered within the work of the AWG-KP relating to possible improvements to emissions trading and the project-based mechanisms under the Kyoto Protocol.

4.4.3. Issues to resolve: Transnational sectoral emissions agreements

Sector-based technology cooperation

It has been argued that it would be useful to build on the various technology-related activities currently within the UNFCCC and the Kyoto Protocol, and to streamline an approach to technology based on a sectoral structure rather than by addressing technology in an open-ended fashion; the experience of the Asia Pacific Partnership and the “thematic work programmes” of the Convention on Biological Diversity are seen to provide a useful precedent for doing so (Baron et al, 2008). It is suggested that in addition to simply addressing technology transfer, a sector-based technology cooperation approach could address issues (at a sectoral rather than project-specific level) such as:

- cooperative financing of research and development on technology breakthroughs;
- facilitating technology deployment through a sector-specific approach to financing;
- capacity-building initiatives in specific sectors; and
- providing support for sectoral data collection and baseline monitoring.

The IEA/OECD paper suggests that if a sector-based approach to technology is to be included in the post-2012 framework, Parties would need to clarify the following issues so as to enable further refinement of this approach:

- How would such an approach be integrated with existing technology-related activities?
- How would priority sectors be identified? Would priorities be set, for example, on the basis of relative cost of mitigation, the size of the potential reduction, existing gaps in mitigation (both in countries and sectors), and/or the need to achieve technological breakthroughs?;
- How would mitigation potentials and costs be quantified, and how should the industry federations’ experiences on best available technologies and best practice be utilised?
- Would funding for sector-specific cooperation be distinct from existing financial mechanisms?

In terms of integrating sector-based technology collaboration within the current UNFCCC negotiation mandate, this is seen to fall firmly within the remit of paragraph 1(b)(iv) of the Bali Action Plan.

Transnational quantitative sectoral approach

While there is seen to be some merit in developing transnational quantitative sectoral agreements, unlike for domestic sector-based activities there are not at present any specific proposals from Parties for such agreements to be included within the UNFCCC process, and – for the reasons outlined earlier – most developing country Parties have voiced objections to such an approach.

There is currently no formal mechanism for “importing” these private-sector efforts into the UNFCCC process, other than through project descriptions and methodologies developed for the CDM. An IEA/OECD paper on sectoral approaches, suggests that should Parties wish to include such agreements within the UNFCCC regime, this would probably need to be negotiated under the auspices of the Convention, not the Kyoto Protocol, and that it could take the form of an amendment to the Convention or the development of a new protocol, in each case possibly with annexes for the sectors and Parties covered. Alternatively, there could be a non-binding agreement, in which case a Conference of the Parties (COP) decision would be sufficient.

In addition, (some) Parties could choose to develop such an agreement outside the framework of the UNFCCC, building for example on the experience of the Asia Pacific Partnership, or on industry-to-industry initiatives such as those outlined in Chapter 3. In doing so, it is important to acknowledge that while these initiatives have a valuable role to play – for example in terms of facilitating GHG data collection, and identifying and sharing best practice – on their own, without government intervention and strong domestic policies, there is the concern that they might not result in sufficiently ambitious emissions reductions commitments. Furthermore, provision would need to be made for some of the potentially significant associated legal challenges referred to earlier.

In its review of the potential for these approaches, the recent IEA/OECD paper suggests that if transnational sectoral approaches are to be included within the post-2012 UNFCCC framework, then Parties would need to consider the following issues (Baron et al, 2009):

- ensuring coherence between any transnational sectoral goals with existing nation-wide commitments by developed countries and other mitigation actions by developing countries;
- reaching agreement on the core elements of any negotiation, including, for example, technology cooperation, common methodology for GHG baselines, target types, and various trade aspects;
- organising technical sectoral expertise in a coordinated manner (possibly using the technology and economic assessment

panels of the Montreal Protocol as a model);

- identifying the sectors to be covered within such an approach; and
- clarifying how the (often significant) existing data gaps in these sectors would be addressed.

For such an approach to succeed there would need to be sufficient incentive for both Annex-I and non-Annex-I Parties to participate. While Annex-I countries might see the benefits, for example, associated with reduced concern amongst domestic industry regarding lost competitiveness and emissions leakage, the potential benefits for developing countries – such as the revenue from sales of emissions permits, and increased levels of institutional capacity – are likely to be less visible, particularly in the context of concerns that developing countries might outgrow their emissions caps due to increased economic development. The submissions of developing country Parties on this issue (see e.g. Annex I) shows that there does not appear to be sufficient incentive to attract enough high-emitting developing countries to be part of such an approach. Notwithstanding this concern, some commentators have argued that there is nevertheless merit at this stage in seeking to reach agreement on the guiding principles that could govern any future negotiations on transnational quantitative sectoral approaches (Baron et al, 2009).

4.5. The UNFCCC Negotiations on sectoral approaches: Preparing for Copenhagen and beyond

“ Rio was the first step along the way, Kyoto the second and Copenhagen will be another step, but Copenhagen will not be about working out the detail needed to operationalise or make an agreement usable. There will be an awful lot of work to do after Copenhagen to implement a deal. Therefore another step will be required after Copenhagen. ”

Yvo De Boer – UNFCCC Secretary General (Bangkok, October 2009)

As policy-makers and negotiators prepare for Copenhagen and the “awful lot of work” that will follow that meeting, some effort will be required to ensure the effective integration of sectoral approaches within a post-2012 climate framework.

In undertaking this work, they will need to consider the merits, feasibility and implications associated with each of the various design options that have been placed before them. To ensure timely decision-making on these issues, it will be important to adopt a structured approach. Key elements to consider in such an approach include:

- identifying those sectoral options for priority focus, and screening those that are unlikely to win support (see e.g. Section 3);
- clarifying how any sectoral approach would interact with a post-2012 carbon market, and assessing what the implications would be both for the design of that market (negotiated in Copenhagen) and for the structure of the sectoral approach itself (see e.g. the reports on this issue by OECD and CCAP);
- assessing the potential data and capacity requirements for implementing a sectoral approach, and, as far as possible, identifying and supporting capacity-building opportunities to address these constraints; and
- identifying and addressing those issues on which agreement is needed at Copenhagen and as part of the process thereafter, both at the sector-specific level (building on the analysis undertaken above) and at the level of overarching principles (examined further below).

In this section we review the extent to which these issues have been addressed in the negotiations leading into Copenhagen.

4.5.1. Sectoral approaches and the dual track process

Most of the work on sectoral approaches within the UNFCCC negotiating bodies has been undertaken through the following two subsidiary bodies, both of which were tasked to complete their work at COP-15 in December 2009:

- **The Ad Hoc Working Group on Long-Term Cooperative Action Under the Convention (AWG-LCA)** – established in Bali at COP-13 with the mandate of launching a comprehensive process on long-term cooperative action, focusing on four work streams relating to the Bali Action Plan, namely: developing a “shared vision” for long-term cooperative action; enhanced action on mitigation; enhanced action on adaptation; and technology and finance. The AWG-LCA discussion on sectoral approaches has been undertaken largely in the context of Article 4, paragraph (1) of the UNFCCC.
- **The Ad Hoc Working Group on Further Commitments for Annex I Parties Under the Kyoto Protocol (AWG-KP)** – established in December 2005 at COP/MOP1, with the mandate of discussing future commitments for all Kyoto Protocol Parties.

The discussions on sectoral approaches in the context of the Kyoto Protocol relate to suggested improvements to both the CDM and emissions trading, and to the provision for integrating sectoral approaches within the market mechanisms.

These two groups are a function of the dual track negotiation approach that characterises the current Kyoto regime – one track relating to the UNFCCC commitments and the other involving negotiations specific to Parties to the Kyoto Protocol (and thus excluding the US). The future of this dual track system is the subject of strongly diverging opinions, and in the view of some commentators could constitute a crucial stumbling block to sealing a deal in Copenhagen.

Most developed countries are in favour of merging the two tracks into a comprehensive international agreement that involves the US and key developing countries in mitigation efforts. By contrast, developing countries are adamant that the two tracks be kept separate, arguing that this is crucial to maintaining the current distinction in the Convention between developed and developing countries, and to ensuring that only developed countries have binding mitigation commitments.

The discussion on sectoral approaches is one of the areas where there has been a degree of overlap between the two bodies. While for some Parties this demonstrates one of the suggested benefits in adopting a consolidated approach, for other Parties this has provided cause for them to resist efforts to transpose any of the existing market mechanisms under the Kyoto Protocol (including revised provisions relating to sectoral approaches) to the AWG-LCA, thereby potentially undermining the chance for these forming part of any new agreement in Copenhagen should the Kyoto track not be concluded.

This divergence in opinion is symptomatic of the high levels of distrust between developed and developing countries, with many developing countries seeing sectoral crediting or trading as an attempt by the developed world to impose targets and caps on major developing economies.

4.5.2. The perspective of Parties

In assessing the feasibility and potential nature of sectoral approaches in a post-Kyoto framework, it is useful to have a sense of the negotiation position of the various Parties in the UNFCCC process. An overview of these positions is provided for general reference purposes in Annex I.

In March 2009, as the AWG-LCA shifted from workshop mode to negotiation mode, the AWG-LCA Chair issued a note (*FCCC/AWG/LCA/2009/4*) that sought to assist the negotiating process

by describing areas of convergence in the proposals of Parties, exploring options for dealing with areas of divergence, and identifying gaps that may need to be filled. This provides a good synopsis of some of the key debates and a useful background to the subsequent brief review of the negotiations.

On the general nature of sectoral approaches, the Chair's paper suggests that there is broad convergence between the Parties on the following issues:

- sectoral approaches should not replace national emission reduction targets in developed countries and should not lead to trade sanctions and restrictions or the application of international standards;
- sectoral approaches should be used to enhance implementation of Article 4, paragraph 1(c), of the Convention (although views diverge as to whether sectoral approaches should go beyond technology cooperation and involve, for example, the establishment of sector-specific agreements or targets);
- sector-wide mitigation programmes and national sector-based mitigation actions and standards could constitute NAMAs by developing countries, and these could be registered within a proposed registry of NAMAs, with these pledges of mitigation actions being matched by pledges of financial support from developed countries (there is divergence, however, on whether broad categories of NAMAs should be agreed at the international level and to what extent such categories would determine eligibility for financial and other support);
- technology support for mitigation by developing countries should be directed to technologies in sectors with the most emissions and/or the greatest potential for emissions reductions;
- market-based instruments (including sectoral approaches proposed in the AWG-KP – see below) can play a positive role in making mitigation efforts cost-effective; greater use of these instruments, and greater coherence between them, would lead to benefits such as narrowing the range of prices for carbon allowances and credits worldwide (in the subsequent negotiations, however, a number of developing country Parties have been vocal in their opposition to market-based instruments); and
- priority areas for sector-specific cooperation should be defined at the national level, taking into account national circumstances and development priorities.

To some extent the proposals by a number of developed countries for sectoral approaches have been informed by the concern that domestic climate regulations on their own will reduce the international competitiveness of domestic firms and products, and

result in “carbon leakage” by prompting the migration of energy-intensive industries to developing countries. Developing countries, on the other hand, have been concerned that sectoral approaches might impede their development opportunities, for example by establishing new international standards on a sectoral basis or justifying the introduction of trade barriers by developed countries on particular products or technologies (see e.g. Third World Network (undated)). Annex I provides a more detailed review of the stated position of Parties in early stages of the negotiations.

4.5.3. Sectoral approaches in the AWG-LCA

The issue of sectoral approaches has been considered in various guises within the AWG-LCA since its establishment in Bali. At the third session (held in Accra, Ghana, from 21-27 August 2008) – which formed the basis for the Chair’s first version of a negotiating text – a workshop was held specifically on the issue of cooperative sectoral approaches and sector-specific actions. A summary of views exchanged at this workshop is provided in Box 15 (Annex I).

In the run-up to Copenhagen, the negotiations on text within the AWG-LCA were undertaken through the forum of six contact groups (established at the start of the seventh session of the AWG-LCA) each of which deals with a key element of the Bali Action Plan (BAP), namely: a shared vision for long-term cooperative action; adaptation; mitigation; technology development and transfer; capacity-building; and finance.

The negotiations on sectoral approaches have taken place within the contact group relating to mitigation, which itself was divided into six sub-groups, each dealing with the sub-paragraphs of Paragraph 1(b) of the BAP. The negotiations relating to the following sub-paragraphs have had the greatest bearing on the possible nature of sectoral approaches:

- Sub-paragraph 1(b)(ii) on NAMAs by developing countries;
- Sub-paragraph 1(b)(iv) on cooperative sectoral approaches and sector-specific actions; and
- Sub-paragraph 1(b)(v) on various approaches to enhance the cost effectiveness of mitigation action, including markets.

A brief review of the approaches reflected in the text developed within each sub-group is provided below.

Sub-paragraph 1(b)(ii) of BAP – NAMAs

Nationally appropriate mitigation actions (NAMAs) by developing country Parties are “those voluntary actions determined and formulated at the national level, in the context of sustainable development, and enabled and supported through finance, technology and capacity-building from developed country Parties,

in a measurable, reportable and verifiable manner.”

The informal draft negotiation text on NAMAs¹ includes specific provision for the use of a sectoral crediting mechanism or sectoral trading mechanism, as well recognising the potential role of “no-lose” sectoral intensity targets. For the purposes of sectoral emissions intensity targets – intended for those developing country parties that have “substantial contribution to the global emissions of GHGs and have appropriate response capabilities” – specific reference is made to the iron and steel, cement, aluminium and power generation sectors as (non-exclusive) examples of major sectors.

The text includes various provisions relating to the nature of the mechanisms to register and facilitate implementation of NAMAs, as well as to the measurement, reporting and verification of GHG emissions reductions by developing countries.

Sub-paragraph 1(b)(iv) of BAP – Sectoral approaches

The draft negotiation text on cooperative sectoral approaches (CSAs) was developed initially on the basis of an informal exchange among Parties in response to the following five questions posed by the facilitator of this informal sub-group:

- What should CSAs do?
- What should CSAs do for all Parties?
- What should CSAs do for Parties included in Annex I to the Convention?
- What should CSAs do for Parties not included in Annex I to the Convention?
- What should CSAs not do?

Additional questions that were raised for consideration include:

- Identifying the nature of the sector: should it include only those whose emissions cannot be attributed to a particular economy (e.g. international bunker fuels), who can be attributed or both?
- What guidance is required for sectors whose emissions can (and those who cannot) be attributed to a particular economy?
- How should the work be integrated within the climate change regime?

In the run up to the Copenhagen meeting, the text included provision, *inter alia*, for the following issues:²

- Sectoral approaches be used to enhance implementation of UNFCCC Article 4.1(c), and Article 4.1(g) and (h), and be applicable to all relevant sectors.
- Sectoral approaches be of a voluntary nature, be used in the definition and implementation of mitigation actions in developed and developing countries, as a tool for analysing mitigation

¹ As reflected in AWG-LCA Non-Paper No.51 (Barcelona 2-6 November 2009).

² As reflected in AWG-LCA Non-Paper No.49 (Barcelona 2-6 November 2009) – this is heavily bracketed.

potential and informing national mitigation efforts (through bottom-up sectoral analysis), and contribute to the enhancement of Parties' measurement, reporting, and verification (MRV) actions.

- Sectoral approaches should not undermine the differentiation between Annex I and non-Annex I Parties, be used to replace the national targets of developed countries, lead to new commitments for developing countries, or be used for the imposition of trade barriers.
- Specific, more detailed provision is included for sectoral approaches relating to agriculture and international bunker fuels. The text relating to international bunker fuels – which comprises a number of bracketed options – includes provision for:
 - using multilateral collaborative action working through the International Maritime Organization (IMO) and the International Civil Aviation Organization (ICAO);
 - setting global reduction targets for emissions from aviation and marine bunker fuels, with units from existing and new flexibility mechanisms contributing to these targets; and
 - commencing negotiations on two global sectoral agreements to address international aviation and marine emissions, with a view to concluding these by COP-17.

The text on sectoral approaches remains significantly bracketed in the lead-in to Copenhagen, reflecting the nature and number of areas of disagreement. The likely outcome of the Copenhagen discussions on this issue, and the implications for the post-Copenhagen work plan, thus remain particularly uncertain.

Sub-paragraph 1(b)(iv) of the BAP – “Various approaches”

Leading into Copenhagen the negotiation text relating to paragraph 1(b)(v) of the Bali Action Plan³ – which relates to “various approaches to enhance the cost-effectiveness of mitigation action, including markets” – includes several proposals for the use of market-based approaches aimed at engaging private sector participation and establishing a global carbon market. These include:

- a crediting mechanism for (NAMAs);
- a crediting and trading mechanism for NAMAs, consisting of separate crediting and trading tracks;
- sectoral crediting; and
- sectoral trading.

The proposals on *NAMA/sectoral crediting* include elements relating to:

- the establishment, prior to the start of a period, of a reference level for emissions by sources, or removals by sinks, within a given

boundary – the proposals vary in a number of characteristics, such as how reference levels are expressed, whether they are in absolute or intensity terms, their relationship to business-as-usual emissions or removals, the level of aggregation applied, the types of mitigation action that are covered and the governance structure under which reference levels are registered;

- the requirement that during the period, the emissions or removals within the given boundary are monitored, reported and verified, under the supervision of the governance structure and in accordance with detailed modalities to be developed and agreed; and
- the issuing of credits, during or shortly after the period, on the basis of the difference between the reference level and the actual emissions or removals that have occurred.

The proposals relating to *NAMA/sectoral trading* include the following basic elements:

- the establishment, prior to the start of a period, of a reference level for emissions by sources, or removals by sinks, within a given boundary – this reference level represents a target for emissions or removals within the boundary;
- the issuing of units for trading in a quantity equal to the volume of emissions prescribed by the established reference levels;
- the requirement that during the period, the emissions or removals within the given boundary are monitored, reported and verified, in accordance with detailed modalities to be developed and agreed, and that the trading of units is tracked; and
- the retirement of units, during or shortly after this period, in a quantity equal to the verified emissions within the boundary during the period.

These proposals relating to the use of markets as a tool to enhance the cost-effectiveness of mitigation actions have not been without some controversy, with some developing country Parties expressing vocal concern (largely from an ideological perspective) with the use of market mechanisms to mitigate climate change.

A more specific concern that has been voiced by some observers – and that reflects a rather different perspective – is that the suggested approaches do not make sufficient provision for the participation of non-government or private sector actors, and that the proposed transitional provisions could undermine the confidence of investors regarding the continuity of their investments in existing market mechanisms (see e.g. Box 13).

³ As reflected in AWG-LCA Non-Paper No.42 (Barcelona 2-6 November 2009)

BOX 13:**A carbon investor's perspective on sectoral approaches**

“The lack of engagement and cross-over between the private sector and negotiators on critical issues and the design of the sectoral mechanism is worrying.”

In a recent commentary on the progress being made at the Bangkok climate negotiations in October 2009, a lawyer from the international legal practice, Norton Rose Group, who was covering the negotiations on new market mechanisms, provided the following account of his discussions in a working session with a number of key government negotiators from around the

world:

“I raised a number of ‘private sector’ issues with proposals for sectoral mechanisms in general. These include:

- The importance that any sectoral mechanism isn't anathema to the private sector if the private sector are going to invest in it.
- The need to ensure continuity of the existing flexible mechanisms and protect existing private sector investments.
- The need to allow for ‘direct crediting’ for credits to investors and for investors to be able to get security over

credits.

- The need to avoid investors having to take the risk of a whole sector achieving a certain target before getting a return on their investments
- The importance of any credits being fully fungible with other credits in issuance

My suggestion was to organise some lengthy and detailed workshops with all participants to work the proposals through from cradle to grave based on some concrete investment case studies. Though the idea had resonance, some showed trepidation at the idea of

being stuck in a room full of lawyers and bankers for days (of course, project developers, country representatives and industry experts would also be required...)

The unit head for climate strategy, international negotiation and monitoring of EU action in the European Commission's Directorate-General for the Environment, suggested that we might see a short enabling clause on sectoral mechanisms (with details to be worked out at a later date). Without addressing the issues above this could prove problematic for attracting private investment.”

4.5.4. Sectoral approaches in the AWG-KP

At its resumed sixth session in Poznan in December 2008, the AWG-KP agreed its work programme for 2009, concluding that its focus will be on agreeing on further commitments for Annex I Parties. In outlining its work programme (FCCC/KP/AWG/2008/8), the AWG-KP identified the need for further work to be conducted on a number of issues, two of which have a specific bearing on the development of sectoral approaches, namely: improvements to emissions trading and the project-based mechanisms; and the development of possible approaches targeting sectoral emissions.

Parties were invited to make submissions on these issues for consideration by the AWG-KP at its seventh session in Bonn. These submissions informed the foundational text that served as the basis for the initial negotiations. In this text provision was made for sectoral approaches as part of suggested improvements to both the CDM and emissions trading. In terms of sectoral-related improvements to the CDM, two proposals were made:

- introducing sectoral CDM for reductions below a baseline defined at a sectoral level – this would require including sectoral activities in the definition of CDM “project activity”, as well as clarifying the nature of sectoral-activities; and
- introducing sectoral crediting of emission reductions below

a previously established no-lose target – this would require amending the Protocol, either by revising the CDM or by a new mechanism and ensuring that there is a provision that allows units from this new mechanism to be added to the assigned amounts of Annex I Parties.

In terms of introducing emissions trading based on sectoral targets, it is suggested that an amendment would be required, either through amending Article 17 or adding a separate Article, with an additional amendment for units issued under such trading schemes to be added to the assigned amounts of Annex I Parties and used for compliance with their commitments under Article 3.

In the final negotiation text on proposed revisions to the Kyoto Protocol being considered in the run-up to Copenhagen, provision is made for:

- revising Article 2 to provide for global emissions reduction targets (still to be defined) for the international aviation and maritime sectors, working with ICAO and IMO;
- revising Article 3 to allow for units issued under NAMA and sectoral crediting and/or trading schemes to be added to the assigned amounts of Annex I Parties;
- revising Article 17 to allow for emissions trading based on sectoral emission targets, with the proviso that the strong modalities and

procedures are developed on sectoral emissions to ensure the setting of ambitious targets, clear boundaries and adherence to effective monitoring, reporting and review requirements;

- inserting a new Article that establishes a sectoral [no-lose] crediting mechanism for developing countries, and that outlines the expectations relating to the modalities and procedures for such a mechanism;
- inserting a new Article that recognises a NAMA crediting mechanism, which allows for credits arising, inter alia, from sectoral mitigation activities; and
- inserting a new Article on transitional provisions and double counting in relation to mechanisms, that provides for an orderly transition between mechanisms and that excludes new CDM projects in sectors for which absolute sectoral emission thresholds or targets are defined.

4.6. Introducing sectoral approaches in the post-Copenhagen framework

In the later stages of the negotiating process leading into Copenhagen it has become evident that due to the ambitious timeframe, and the fact that some of the key developing countries lack sufficient information to commence more detailed sector-based discussions, a two-phased process for developing sectoral approaches will be required. Similar to the experience with negotiating the Kyoto Protocol, it is anticipated that COP-15 will seek to reach agreement on the broader principles and processes relating to sectoral approaches, with the more detailed specifics relating to each option being finalised in subsequent negotiations.

4.6.1. Framework decisions on sectoral approaches for Copenhagen

Based on the discussions and studies outlined earlier, it is suggested that in finalising the guiding principles and processes relating to sectoral approaches, agreement is needed (ideally in Copenhagen) on the following issues (Baron et al., 2008; Stephenson, 2009; Ecofys, 2008):

- **Coordination and coherence within the post-2012 climate framework** – Clarity will be needed on the relationship between any sectoral goals, the economy-wide commitments adopted by developed countries and other mitigation actions by developing countries, with a view to striving to coordinate the likely levels of supply and demand for credits generated within the post-2012 carbon market.
- **Process issues** – Agreement should be reached on a range of suggested “process” elements pertaining to sectoral approaches, including:

- identifying the core elements associated with the negotiation
 - these could include issues pertaining to technology cooperation, a common methodology for GHG baselines, and the types and nature of possible targets;
 - whether sectoral agreements would be voluntary, and if so whether a critical mass is necessary to bring the agreements into force;
 - identifying a short list of possible sectors, and agreeing an approach for defining sectors and their boundaries;
 - agreeing on how to move forward with addressing data gaps in identified sectors, including considering the possible role and nature of a pilot phase;
 - agreeing the format of a registry structure for recording pledges, and setting timelines for the submission of any such pledges (within the current work pertaining to nationally appropriate mitigation actions; and
 - agreeing the post-Copenhagen timelines for finalising the development of sectoral approaches.
- **Institutional aspects** – To facilitate the process of developing sectoral approaches, Parties should agree on the institutional mechanisms for reviewing and evaluating submissions relating to sectoral approaches; this could, for example, include the establishment of an “expert group” that could be involved in the review of submission and in contributing to the further design of such approaches.
 - **Funding issues** – Finally, there will need to be agreement on the level of funding that might be available to develop a sectoral crediting mechanism and/or to fund the provision of direct technology assistance and capacity building initiatives. Ideally the mechanism for generating financial resources from developed countries should be established and agreement should be reached on the process for allocating these funds to developing countries.

These are substantial issues on which agreement will be needed, adding to an already overwhelming agenda facing climate negotiators. Finalising agreement on sectoral approaches will not be easy; they undoubtedly add complexity to a process that was never simple.

As the earlier brief review of the negotiations leading into Copenhagen has shown, it is evident that not all of these issues will be clarified in Copenhagen. Whatever the outcome of the COP-15 meeting, there will be significant further work after the meeting, both at a global level in finalising details of the policy framework for sectoral approaches, as well as at the level of policy-makers in developing countries.

4.6.2. Framework challenges that may need to be addressed post-Copenhagen

While it is impossible to anticipate the outcome of COP-15 – both at a general level and more specifically as regards the nature of any agreement on sectoral approaches – it is nevertheless evident that there will be some important sectoral-related challenges to be addressed in the period after Copenhagen. Although the exact nature and extent of these challenges will be informed by the outcome of the December negotiations, it is suggested that the following issues will require further work as part of the process of developing and implementing sectoral approaches:

- ensuring the participation of the appropriate major developing economies in these initiatives;
- facilitating effective engagement of industry sectors and business organisations, building on the existing work being undertaken by certain sectors and ensuring appropriate provision for their various concerns (see Section 3);
- in the case of market-related sectoral mechanisms: ensuring sufficient provision for the interests of private sector investors and the functionality of global carbon markets;
- assigning responsibility for setting and revising benchmarks and for developing sufficiently robust targets; and
- agreeing the approach for integrating sectoral approaches with existing and anticipated national and regional policy regimes and carbon markets (such as the EU ETS).

4.6.3. Challenges facing developing-country policy-makers

In addition to the above broader macro-level challenges, there are a number of specific policy challenges that will need to be addressed at a national level by policy-makers in developing countries. These include, for example (see also Box 14):

- **Identifying the sector to be covered within a sectoral approach, and agreeing the boundaries that define the scope of activities to be included within the agreement** – recognising that inappropriately set boundaries can undermine the potential benefits of sectoral approaches by screening valuable mitigation opportunities, rewarding ineffective actions, and/or creating misplaced incentives, it is suggested that systematic and consistent technical rules or guidelines will need to be developed, similar to those that have been used in the construction of GHG inventories from Annex I countries.
- **Setting the benchmarks** – while sectoral benchmarks may seem attractive at first sight, it has been argued (including particularly by developing country Parties) that it would be very

difficult to develop a single intensity benchmark for a sector, as there are differences across technologies (even for relatively homogeneous sectors), and also between countries, with provision also being needed for the principle of common but differentiated responsibilities.

- **Setting emissions baselines for industry sectors and estimating the GHG reduction potential with the potentially targeted sectors** – this will require an understanding, for example, of the availability of existing technologies, current and anticipated production capacities, regional market dynamics and the nature and impact of possible policy interventions, as well as access to plant-level data (which is often scarce and in many instances considered to be confidential).
- **Agreeing the chosen measurement unit and targets relating to any specific emissions reductions measures** – typically one of the more difficult areas to negotiate, some of the issues to consider include: which GHG gases are measured, whether targets are absolute or intensity-based, and how often they are reviewed and refined; in setting targets it is useful to recognise that the process of doing so in developing countries will be similar to setting caps in Annex I countries.
- **Implementing appropriate policy measures** – pulling all of the above elements together, while at the same time ensuring that there are appropriate incentives to prompt sufficient engagement of relevant parties, will require the development and implementation of targeted policy measures that include an appropriate mix of rewards and penalties.
- **Identifying and addressing capacity-building requirements** – the nature of capacity-building needs required to ensure effective implementation of sectoral approaches, and the possible means for addressing these needs.

Climate change presents international policy-makers with a challenge of the highest order. Responding meaningfully to this challenge will require profound leadership, courage and action from political and business decision-makers across national and commercial boundaries. If the commitment to containing warming below a 2 °C rise on pre-industrial levels is to be realised, then, for the reasons outlined in this document, it is suggested that innovative sectoral approaches should form part of the post-2012 framework.

BOX 14:

Providing for the core characteristics of sectoral approaches

In negotiating the terms of the chosen sectoral approach – and subject to the choice of approach – decisions will need to be taken on some or all of the following elements typically associated with sectoral approaches (see Stephenson, 2009):

- **Boundary issues** – As part of the process of defining the sector, there will need to be full clarity on the scope of activities that fall within the remit of any sectoral agreement. Setting inappropriate boundaries can undermine the potential benefits of sectoral approaches by screening valuable mitigation opportunities, rewarding ineffective actions, and/or creating misplaced incentives (Centre for Clean Air Policy (2008)). To avoid this risk, it is suggested that systematic and consistent technical rules or guidelines will need to be developed, similar to those that have been used in the construction of GHG inventories from Annex I countries (Stephenson (2009)). The experiences of the CCAP sectoral study in Mexico, China and Brazil (Chapter 2.8) underline the importance of retaining flexibility in defining sectoral boundaries. They suggest that, as a matter of principle, each country/sector pairing should be able to set different boundary definitions above a defined minimum for each sector, and that boundaries should be kept as wide as possible so as to maximize flexibility and reduce costs, while at the same time minimising possibilities for double-counting.
- **Benchmarking** – While using benchmarks may be valuable for the purposes of identifying best practice and setting intensity targets, it is typically a data-intensive activity and thus can be time-consuming and costly. Concerns may arise relating to asymmetry of information between industry and government. Furthermore, there are concerns that benchmarking may simply serve to highlight what is the best approach within the current paradigm, rather than fostering any disruptive innovation that may be necessary within that sector. In determining appropriate benchmarks, it is important that provision is made for domestic conditions. While sectoral benchmarks may seem attractive at first sight, it has been argued (including particularly by developing country Parties) that it would be very difficult to develop a single intensity benchmark for a sector, as there are differences across technologies (even for relatively homogeneous sectors), and between countries, and provision needs to be made for the principle of common but differentiated responsibilities.
- **Baselines** – Sectoral approaches will depend on having a baseline or measure of performance on which common or differentiated objectives can be based. Setting emissions baselines for industry sectors raises some potential significant technical and political challenges that will need to be considered by policy-makers as they seek to design effective sectoral agreements (see e.g. Baron et al. (2007)).
- **Units of measurement** – If the sectoral approach includes reference to specific emissions reductions (as opposed for example to technology-based commitments) then agreement will need to be reached on the chosen measurement unit. Typically one of the more difficult areas to negotiate, some of the issues to consider include: which GHG gases are measured, whether targets are absolute or intensity-based, and how often they are reviewed and refined. As noted earlier in the review of Parties' submissions there is a general preference from developing country Parties for technology-based commitments, and that where there are any emissions-reduction commitments these should be intensity-based.
- **Incentives** – Having the right incentives to ensure sufficient engagement of relevant parties is critical to the success of any sectoral approach, and is often its most defining characteristic. Some of the issues to consider in designing the agreement include: whether tradable permits are part of the agreement, and if so in what form; whether incentives are attributed to specific outcomes (such as emissions reductions, thus requiring monitoring and verification processes) or actions (such as introducing a particular technology); and whether it includes explicit rewards and penalties.
- **Institutional arrangements** – The sectoral approach will need to provide for relevant institutional arrangements relating,

for example, to the measurement, reporting and verification of commitments, or the provision of technical advice on benchmarks and standards. Some of the specific institutional challenges associated with the various approaches are reviewed above. Options to consider here include: developing new bodies under the UNFCCC; building on existing UNFCCC institutional arrangements (such as the CDM Executive Board); making use of industry sectoral bodies; or a combination of each of these.

- **Funding arrangements** – An underlying consideration in the design of any sectoral approach relates to how any institutional arrangements – and the implementation of any commitments – are funded. On the basis of its experience in road-testing various sectoral approaches, and discussion with developing country policymakers, the CCAP has identified three main financing approaches that could be utilised to promote sectoral mitigation actions (CCAP (2008)):
 - for advanced technology deployment, coordinated international assistance could be provided to write down the costs of high-cost, not-yet-commercial technologies – such as carbon capture and storage – or to provide technical assistance to small- or medium-sized enterprises to build their capacities to utilise advanced technologies and to pay for some or all of the associated operation and maintenance costs;
 - a second option would be to create new financing tools, such as special purpose vehicles, to reduce or eliminate barriers to finance, for example by assisting in financing those efficiency improvements that developing-country commercial banks do not have the capacity to support; or
 - financing to reduce the domestic cost of incentive-based policies, such as feed-in tariffs, for mitigation options such as renewables and energy efficiency.
- **Time frames** – The sectoral approach will need to specify processes and time frames relating to its negotiation, entry into force, evaluation, and termination.

Annex I – Overview of Parties' Submissions on Sectoral Approaches

The following account is based on the Revised Note by the Chair of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA), which assembles the proposals presented by Parties on the elements contained in paragraph 1 of the Bali Action Plan (FCCC/AWGLCA/2008/16Rev.1)

Objectives of sectoral approaches

On the objective of sectoral approaches and sector-specific actions, Parties have proposed that such approaches should:

- be consistent with the principle of common but differentiated responsibilities and respective capabilities (EU, Japan, Indonesia, Norway);
- enhance implementation of UNFCCC Article 4, paragraph 1 (c) (China, Indonesia, G77 and China, Saudi Arabia);
- contribute to enhancing measurable, reportable and verifiable actions (Indonesia);
- involve a critical mass of Parties that account for most of the GHG output from a particular sector (USA);
- consider possible cross-sectoral synergy and impacts in order to achieve mutually beneficial outcomes (AOSIS);
- ensure that the economic activities covered are comparable within and among countries (Switzerland);
- be based on a realistic evaluation of the mitigation potential (Iceland, Japan, Switzerland), and the energy efficiency and carbon intensity at the sector level (Japan);
- be nationally driven so that each country decides on how to implement these approaches and actions (Saudi Arabia);
- be compatible with the global carbon market whenever market instruments are introduced (EU);
- prevent carbon leakage and address competitiveness concerns (Norway, Canada) of energy intensive, internationally competing industries (Switzerland);
- complement national actions (USA) for developed countries (EU) or national strategies and goals (Indonesia);
- be subordinate, and not additional, to economy-wide targets under the KP (Australia), not replace national emission reduction targets (Japan, AOSIS, Bangladesh) under the KP/UNFCCC (Norway), and not replace legally binding absolute emission reduction targets for all Annex I Parties (G77 and China); and

- not lead to the application of single common standards to all countries (Japan), to global standards or benchmarks (China), to emission targets (Indonesia, China, G77 and China), to trade barriers or punitive trade measures (China), to standards for developing countries (AOSIS, China), or to unjustifiable discrimination or disguised restriction of access for non-Annex I Parties to international trade (Indonesia).

Nature of sectoral approaches

On the nature of cooperative sectoral approaches and sector-specific actions, Parties have proposed:

- strictly focusing on enhancing the implementation of Article 4, para 1 (c) of the UNFCCC (China) and promoting the development, deployment, diffusion and transfer of technology and enhancing sectoral cooperative actions (G77 and China, Saudi Arabia);
- making broad use of sectoral approaches and sector-specific actions, for example by:
 - establishing sector-specific agreements and approaches (Canada) or voluntary global sectoral agreements in energy-intensive industries (Turkey);
 - recognising, supporting and/or establishing focused and voluntary technology oriented agreements that would include, inter alia, cooperation on specific sectors or gases (EU);
 - using a sectoral bottom-up approach to set ambitious and feasible national emission reduction targets for developed countries, ensuring comparability of efforts by applying methodologies that use indicators such as energy efficiency or GHG intensity (Japan),
 - establishing absolute sectoral binding caps (through international benchmarks) for developed countries (Switzerland);
 - developing sectoral approaches, particularly for major emitting developing countries (AOSIS);
 - using a sectoral bottom-up approach to accelerate mitigation actions in developing countries (Japan);
 - implementing nationally appropriate mitigation actions in a major part of globally key emitting sectors in developing countries (EU);
 - establishing, for developing countries, intensity targets

(Japan, Switzerland) that are binding (through international benchmarks) and/or no-lose (negotiated country-by-country) (Switzerland);

- establishing binding actions based on cooperative sectoral approaches for those Parties without a binding national target (Australia);
- developing a “sectoral system of national commitments”, including a set of target parameters of “clean development” subject to international verification (Russian Federation); or
- establishing a “sectoral system of target quantitative indicators” (Uzbekistan).

Identifying target sectors

On the selection of target sectors, Parties have proposed:

- a comprehensive sectoral coverage (Norway) without bias (Algeria);
- giving priority to specific sectors, with priority areas being identified sector-by-sector and technology-by-technology (China) depending, for example, on their contribution to global emissions as well the capability of countries to take action in those sectors (EU). The following specific sectors have been identified in the submissions of Parties:
 - Power generation (Bangladesh, Republic of Korea, Japan, AOSIS)
 - Iron and steel (Japan, AOSIS, Republic of Korea)
 - Cement (Japan, AOSIS, Republic of Korea)
 - Residential/commercial (Japan)
 - Aluminium (Japan, AOSIS, Republic of Korea)
 - Transport (Bangladesh)
 - Chemical industry (Republic of Korea)
 - Pulp and paper (Republic of Korea)
 - Forestry (Bangladesh, Japan, Iceland)
 - Agriculture (Japan, New Zealand)
 - Waste (Japan)

Scope of sectoral approaches

On the scope of sectoral approaches and sector-specific actions, Parties have proposed:

- adopting approaches and actions that could apply at the national, regional or global levels (EC);
- following a domestic focus on economic sectors, as opposed to an “industry” one (Argentina);
- establishing an independent legally binding agreement for some sectors (Norway);
- using sectoral approaches to target emissions that are not included in national totals (EU, Australia); and
- addressing, in particular, emissions from international transport (Norway, EU, Australia), for example:
 - agreeing on an emission target on total GHG emissions from international shipping and inviting IMO to develop a legally binding regime (Norway); and
 - accelerating progress within ICAO and IMO in cooperation with the processes under the UNFCCC and its Kyoto Protocol / KP (AOSIS).

Nature of sector-specific actions

On the nature of the sector-specific actions, Parties have proposed:

- increasing technology deployment and enhancing technology R&D in key sectors, and enhancing technology cooperation and technology-oriented agreements on a sectoral basis (China, EU, G77 and China, Saudi Arabia);
- promoting the transfer of best practices and best available technologies at the sectoral level (Mongolia, Japan, Indonesia);
- implementing domestic sectoral policies (EU, Japan) and sustainable development policies and measures (EU);
- setting policies at the sectoral level as a means for moving beyond project-based mechanisms (Norway);
- addressing emissions from specific sectors through direct regulation-like technical standards (Iceland, Norway, EU), caps (Norway, EU) or benchmarks (Iceland, EU);
- developing strategies, guidance and programmes for sectors (China);

BOX 15:

Summary of the AWG-LCA Workshop on sectoral approaches

The Ad Hoc Working Group on Long-term Cooperative Action under the Convention (AWG-LCA) held a workshop on cooperative sectoral approaches and sector-specific actions in Accra from 21-27 August 2008. Presentations were delivered at the workshop by the following eight Parties: Philippines on behalf of the Group of 77 and China; the European Community; India; Japan; Bangladesh speaking on behalf of the least developed countries; China; Indonesia; and the Republic of Korea. After the presentations, interventions were made by representatives of Australia, Qatar, Colombia, Saudi Arabia, the United States of America, Iceland, Switzerland, the Republic of Korea, the European Community, Norway, Japan, Philippines, China, New Zealand, Grenada on behalf of the Alliance of Small Island States, India, Brazil, Mexico, Argentina, Timor-Leste and Chile.

Following is a summary of some of the key issues raised in the discussion (FCC/AWG-LCA/2008/CRP.4):

- Many Parties (particularly those from developing countries) stressed that discussions on sectoral approaches should be seen specifically in the context of Article 4, paragraph 1(c), of the Convention, and should be undertaken explicitly in terms of technology cooperation focusing on the specific needs of the specific sectors.
- Some parties highlighted the importance of principles to guide the discussion and implementation of sectoral approaches; examples of such principles include:
 - ensuring that sectoral approaches deliver real climate benefits;
 - observing the principle of common but differentiated responsibilities;
 - providing for national circumstances;
 - ensuring compatibility with the global carbon market and existing or emerging regional emission trading schemes; and
 - avoiding the application of international standards across countries.
- It was generally agreed that cooperative sectoral approaches and sector-specific actions should not replace emission reduction targets of developed countries nor form the basis of proposals for sectoral mitigation commitments or international technology benchmarks.
- Some Parties noted that these approaches and actions should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade.
- It was suggested that the implementation of approaches would differ between developed and developing countries.
 - As regards developed countries, Parties largely agreed that these approaches and actions could complement national emission reduction targets. Some Parties suggested that they could be used to ensure comparability of efforts between developed countries if information at the sector level was used to determine mitigation potentials.
 - As regards developing countries, several Parties noted that these approaches and actions should focus strictly on technology cooperation, addressing all stages of the technology cycle and all technologies that control, reduce or prevent GHG emissions.
- Other Parties noted the importance of these approaches and actions in providing opportunities for nationally appropriate mitigation actions by developing countries. In this context, many Parties indicated that the process of identifying and implementing sector-specific actions should be voluntary and country-driven. Further, for developing countries this process of identifying and implementing sector-specific actions should be flexible and determined by their national capabilities and development goals.
- Various ideas for sectoral approaches actions were suggested including:
 - programmes for research and development of sector-specific technologies;
 - funds and other mechanisms to support compulsory licensing, the setting of sector-specific norms or non-binding energy efficiency programmes, and the development of policy instruments, strategies, guidance and programmes for specific sectors; and
 - cooperation in the sharing of best available technologies and practices.
- The following sectors were highlighted as being suitable for sectoral approaches: the energy, transport, cement, iron and steel, and aluminium. In terms of the level at which these approaches and actions would apply:
 - several Parties suggested focusing on approaches defined and applied domestically;
 - a few Parties suggested these approaches could apply at the global level for those sectors whose emissions are difficult to attribute to a specific country (such as international aviation and marine bunker fuels); and
 - it was noted that mechanisms established at the international level may limit the flexibility of Parties in focusing action at the national level on the most relevant sectors.
- The following challenges associated with implementing sectoral approaches were identified:
 - the costs and social implications of sectoral restructuring and diffusion of advanced technologies;
 - a lack of qualified human resources;
 - weak infrastructure for policy enforcement;
 - the diversity of sectors and industries as well as of factors that determine emissions;
 - a lack of homogeneity of technologies and processes preventing the setting of norms; and
 - inhibited technological innovation resulting from closely held intellectual property rights.
- Specific proposals for sectoral approaches included:
 - crediting-mechanisms involving sectoral crediting and no-lose targets;
 - identifying sector-specific actions based on the analysis of emission reduction potentials and indicators;
 - setting a target for emissions from international shipping; and
 - using indicators such as energy- and carbon-intensity and activity levels.

- establishing norms on packaging, reuse and recycling, and national non-binding energy efficiency programmes, supported by a fund (India);
- catalysing and encouraging sectoral cooperation and providing a means of recognising the benefits of sector-specific actions (USA);
- setting up robust governance schemes for monitoring, reporting and verification (EU) to ensure environmental integrity and compliance (Norway);
- enhancing data collection (Japan);
- establishing a group of experts for sectoral technology cooperation with the participation of public- and private-sector experts (Japan);
- developing the regulatory framework (codes and norms) for technology agreements in sectors (EU); and
- using simple sectoral baselines and politically viable standards on energy generation and efficiency (Republic of Korea).

Instruments and mechanisms for sectoral approaches

On instruments and delivery/support mechanisms, Parties have proposed:

- instruments and/or mechanisms based on market approaches, such as:
 - programmatic and/or sectoral CDM based on efficiency standards (Republic of Korea);
 - supplementing the CDM using benchmarking (Australia) or CDM crediting (Switzerland);
 - sectoral no-lose mechanisms (EU) or targets (Australia);
 - sectoral crediting (Canada, Japan, Republic of Korea) based on no-lose targets with voluntary and non-binding targets (EU);
 - no-lose sectoral crediting baselines (South Africa);
 - a baseline and credit system (Switzerland);
 - emissions trading on a sectoral basis or sectoral trading systems (EU), including ETS (Norway); and
 - transnational market-based instruments (Iceland).
- other mechanisms and instruments, such as:
 - mechanisms for capacity-building and finance (China);
 - technical and financial support provided by developed countries for energy efficiency targets or action plans in developing countries (Japan);
 - a sector-specific technology information platform (EU); and
 - technical panels to support an executive body on technology on, inter alia, sectoral, cross-sectoral, and cross-cutting cooperation (India).

Selected References

- Aasrud, A., Baron, R., Buchner, B. and McCall K. (2009) *Sectoral Market Mechanisms: Issues for Negotiation and Domestic Implementation* COM/ENV/EPOC/IEA/SLT(2009)5
- African Ministerial Conference on the Environment (2009) *Review and Analysis of the LCA Negotiating Text in the light of the Specific Circumstances of Africa*
- Akimoto, K. (2008), *Joint Dialogue on Future International Actions to Address Climate Change, Toward Deep Emission Cuts by the Joint Efforts of Developed and Developing Countries through Sectoral Approach*. Research Institute of Innovative Technology for the Earth (RITE), February
- APP (2007), *Asia-Pacific Partnership on Clean Development and Climate – Action Plans*.
- Aviation Global Deal Group (2009) *Communiqué on International Aviation Emissions & Climate Change Policy: A sectoral approach to meeting environmental goals while maintaining competitiveness*
- Baron, R. – IEA, (2008), *Sectoral Approaches to GHG Mitigation “Mandatory Transnational Agreements”, Pre-Major Economics Meeting, Workshop on sectoral approaches*
- Baron, R. (2006). *Sectoral Approaches to GHG Mitigation: Scenarios for integration*. No. COM/ENV/EPOC/IEA/SLT(2006)8. Paris:IED/OECD.
- Baron, R. and J. Ellis, (2006), *Sectoral Crediting Mechanisms for Greenhouse Gas Mitigation*:
- Baron, R., B. Buchner, and J. Ellis (2007), *Sectoral Approaches to Greenhouse Gas Reductions: Issues and Definitions*. Presentation at the Seminar of the Annex I Expert Group on the UNFCCC. OECD/IEA, Paris, 20 March 2007.
- Baron, R., Buchner, B. and Ellis, J. (2009). *Sectoral Approaches and the Carbon Market*. COM/ENV/EPOC/IEA/SLT(2009)3
- Baron, R., I. Barnsley, and J. Ellis (2008) *Options for Integrating Sectoral Approaches into the UNFCCC* COM/ENV/EPOC/IEA/SLT(2008)3
- Bondansky, D (2007), *International Sectoral Agreements in a Post-2012 Climate Framework, A Working Paper*. Pew Center on Global Climate Change.
- Bradley, R., K. Baumert, B. Childs, T. Herzog and J. Pershing. (2007). *Slicing the Pie: Sector-Based Approaches to International Climate Agreements – Issues and Options*. ISBN 978-1-56973-668-5 World Resources Institute.
- Burniaux, J., Chateau, J., Duval, R. and Jamet, S. (2008) *The Economics of Climate Change Mitigation: Policies and Options for the Future* ECO/WKP(2008)66
- Burniaux, J., Chateau, J., Duval, R., Dellink, R., and Jamet, S. (2009) *The Economics of Climate Change Mitigation: How to Build the Necessary Global Action in a Cost-effective Manner* ECO/WKP(2009)42
- Centre for Clean Air Policy (2008) *Sectoral Approaches: A Pathway to Nationally Appropriate Mitigation Actions*
- Centre for Clean Air Policy (2009) *How Will Sectoral Credits Affect the CDM Offset Market?*
- Centre for Clean Air Policy (2009) *Technology-based sectoral NAMAS: a preliminary case study of china’s cement and iron & steel sectors*
- Centre for Clean Air Policy (August 2006) *Sector-based Approach to the Post-2012 Climate Change Policy Architecture*
- Chase, R., IAI, (2008), *The Aluminium Industry’s Global Approach to Climate Change: Theory, Method & Practice*. ICC Workshop on Sectoral Approaches, June
- Colombier, M., E Guerin (2008), Institut du Developpement Durable et des Relations Internationales (IDDR), *Breaking the climate deadlock*
- COM/ENV/EPOC/IEA/SLT(2006)4,
<http://www.oecd.org/dataoecd/36/6/36737940.pdf>
- Council of the European Union (2009) *Council Conclusions on the further development of the EU position on a comprehensive post-2012 climate agreement*, Brussels, 2009
- Earth Negotiations Bulletin Vol. 12 No 439 *Summary of the Bangkok Climate Change Talks: 28 September – 9 October 2009*
- Earth Negotiations Bulletin Vol. 12 No 447 *Summary of the Barcelona Climate Change Talks: 2-6 November 2009*
- Helme, N., D. Klein, I Mushkola. (2008). *Sectoral Approaches as Part of the Post-2012 Framework – Future Actions Dialogue*. Center for Clean Air Policy, July
- Helme, N., I. Musholaj, D. Klein. (2008). *Technical workshop on sectoral approaches: Benchmarking, sector boundary & monitoring, reporting and verification issues*. Brussels Workshop. Center for Clean Air Policy, September.
- Helme, N., *Sectoral Approaches to the Post-2012 Climate Change Policy Architecture*. Center for Clean Air Policy, April
- Hombu, K. (2008), *Four Proposals on Sectoral Approach*, MEM WS on Sectoral Approach, April
- IAI (2007) *Aluminium for Future Generations/2007 update*
- IAI (2008), *Aluminium – Pioneering a Voluntary Global Industry Sectoral Approach*, Version 3, September
- IEA (2008) *World Energy Outlook 2008* OECD/IEA Publications, France
- IEA (2009) *Sectoral Approaches in Electricity: Building Bridges to a Safe Climate*
- Klein, D. (2008) *Other Issues for Sectoral Approaches*. Brussels workshop, Center for Clean Air Policy, September
- Mages V., Lafarge (2008), *Cement Sustainability Initiative Global Cement Sectoral Approach*. Presentation to the ICC workshop on Sectoral Approach
- McKinsey & Co (2009) *Pathways to a Low-Carbon Economy: Version 2 of the Global Greenhouse Gas Abatement Cost Curve*
- Norton Rose UNFCCC *Global Climate Change Negotiations Blog: Bangkok* (<http://www.nortonrose.com/keystrengths/energyinfrastructure/insightintoclimatechange/default23231.aspx?lang=en-gb>)

- Schmidt, J, N. Helme, J. Lee and M. Houdashelt (2006b). *Sector-based Approach to the Post-2012 Climate Change Policy Architecture*. Center for Clean Air Policy, August
- Schmidt, J. et al. (2004). *Sector-Based Greenhouse Gas Emissions Reduction Approach for Developing Countries: Some Options*, Washington, DC: Center for Clean Air Policy.
- Stephenson, J. (2009) *Post Kyoto Sectoral Agreements: A Constructive or Complicating Way Forward?* OECD (SG/SD/RT(2009)1), March 2009
- Tachibana, Y., The Tokyo Electric Power Co. Inc, (2008), *Let's make Sectoral Approaches "MRV"able – Lessons being learnt under the APP*. ICC SBSTA-28 Side Session. June
- Tezuka, H. (2008), *Global Steel Sectoral Approach – Initiatives by JISF, APP, and IISI*. MEM workshop, April
- Third World Network (undated) *Sectoral Approaches in Climate Negotiations: Considerations for Developing Countries*
- Tyrell, K. "Heavy Industry explores global emissions deal" in *ENDS Report 403*, August 2008, pp 32-35
- UNDP (2008), *Climate change mitigation negotiations, with an emphasis on options for developing countries*
- UNDP (2008), *The Bali action plan: key issues in the climate negotiations. Summary for policy makers.*
- UNFCCC/AWGLCA/2008/16/Rev.1 *Ideas and proposals on paragraph 1 of the Bali Action Plan Revised note by the Chair*
- UNFCCC/AWG-LCA/2008/CRP4 *Report on the workshop on cooperative sectoral approaches and sector-specific actions in order to enhance implementation of Article 4, paragraph 1 (c), of the Convention (25 August 2008)*
- UNFCCC/AWGLCA/2009 – *Non Papers No's 17, 26, 20, 42, 49, 51*
- UNFCCC/AWGLCA/2009/13 *Scenario note on the resumed seventh session*
- UNFCCC/AWGLCA/2009/3 *Summary of views expressed during the fourth session of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention: Note by the Chair*
- UNFCCC/AWGLCA/2009/INF.2/Add.1 *Reordering and consolidation of text in the revised negotiating text*
- UNFCCC/AWGLCA/INF.2 *Reordering and consolidation of text in the revised negotiating text*
- UNFCCC/AWGLCA/INF.2/Add.2 *Reordering and consolidation of text in the revised negotiating text*
- UNFCCC/KP/AWG/2006/L.2/Rev.1 *Ad hoc working group on further commitments for Annex I Parties under the Kyoto Protocol, Planning of future work.*
- UNFCCC/KP/AWG/2008/8 *Report of the Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol on its resumed sixth session, held in Poznan from 1 to 10 December 2008*
- UNFCCC/KP/AWG/2008/INF.3 *Elaboration of possible improvements to emissions trading and the project-based mechanisms under the Kyoto Protocol: Note by the Chair*
- UNFCCC/KP/AWG/2009/10/Add.1/Rev.1 *Proposed amendments to the Kyoto Protocol pursuant to its Article 3, paragraph 9*
- UNFCCC/KP/AWG/2009/10/Add.2 *Other proposed amendments to the Kyoto Protocol*
- UNFCCC/KP/AWG/2009/13 *Scenario note on the first part of the ninth session*
- UNFCCC/KP/AWG/2009/4 (Parts I and II) *Fulfillment of the Bali Action Plan and components of the agreed outcome: Note by the Chair*
- UNFCCC/KP/AWG/2009/4 *Possible elements of a text relating to issues outlined in document FCCC/KP/AWG/2008/8, paragraph 49: Note by the Chair*
- UNFCCC/KP/AWG/2009/INF.2 *Further elaboration of possible improvements to emissions trading and the project-based mechanisms under the Kyoto Protocol: Note by the Chair*
- Varin, P. (2008) *Address to the Annual Conference of the World Steel Association*, Washington DC.
- Ward, M (2008), *Architecture of a global climate change agreement. Breaking the climate deadlock, Briefing paper*. Global Climate Change Consultancy (GtripleC)
- Ward, M. *Implementing SNLTs (Sector No-Lose Targets) for Developing Countries*. Side Events at UNFCCC Sessions, Bonn
- Ward, M., C. Streck, H. Winkler, M. Jung, M. Hagermann, N. Hohne and R. O'Sullivan. (2008). *The role of sector no lose targets in scaling up finance for climate change mitigation activities in developing countries*. Research report for Department for Environment, Food and Rural Affairs (DEFRA), United Kingdom.
- WBCSD (2002), *The cement sustainability initiative – our agenda for action*.
- WBCSD (2008), *Power to Change: A business contribution to a low-carbon electricity future*
- WBCSD (2008), *The cement sustainability initiative – A Sectoral Approach: GHG mitigation in the cement industry*
- Winkler H., R. Spalding-Fecher, S. Mwakasonda and O. Davidson (2002) "Sustainable Development Policies and Measures: Starting from Development to Tackle Climate Change" in K.A. Baumert (ed) *Options for Protecting the Climate* World Resources Institute
- Worldsteel (2007) *A Global Sector Approach to CO₂ Emissions Reduction for the Steel Industry*

Weblinks

Alliance of Automobile Manufacturers (AAM)	www.autoalliance.org/
Aluminium NCP	www.aluminium-union.ru/
Aluminum Association of Canada (AAC)	www.aac.aluminium.qc.ca/index2.html
American Petroleum Institute	www.api.org
Asia Pacific Partnership	www.asiapacificpartnership.org/AluminiumProjetcs.htm
Association of European Airlines (AEA)	www.aea.be
Brazilian Portland Cement Association (BPCA)	www.abcp.org.br/
Cembureau	www.Cembureau.be
Cement Association of Canada / CPCA	www.cement.ca
Cement Manufacturers' Association (CMA)	www.cmaindia.org/index.html
China Cement Association (CCA)	www.dcement.com
China Electricity Council (CEC)	www.cec.org.cn/cec-en/index.htm
China Nonferrous Metals Industry Association (CNI-A)	www.cmra.cn
E8	www.e8.org
Electric Power Supply Association (EPSA)	www.epsa.org
European Aluminium Association (EAA)	www.eaa.net
European Automobile Association (ACEA)	www.acea.be;
European Chemical Industry Council (CEFIC)	www.cefic.org
European Mining Association	www.euromines.org
Federation of Electric Power Companies of Japan	www.fepc.or.jp
Hellenic Chamber of Shipping	www.nee.gr
International Air Transport Association (IATA)	www.iata.org
International Aluminium Institute (IAI)	www.world-aluminium.org/
International Association of Oil and Gas Producers	www.ogp.org.uk
International Chamber of Commerce (ICC)	www.iccwbo.org/policy/transport/id2498/index.html
International Chamber of Shipping (ICS)	www.marisec.org/;
International Council on Mining and Metals (ICMM)	www.icmm.com
International Organization of Motor Vehicle Manufacturers (OICA)	http://oica.net/
International Petroleum Industry Environmental Conservation Association	www.ipieca.org
Japan Automobile Manufacturers Association Inc. (JAMA)	www.jama.or.jp/
National Mining Association (NMA)	www.nma.org
Pacific Merchant Shipping Association (PMSA)	www.pmsaship.com/
Portland Cement Association (PCA)	www.cement.org/
Sustainable Aviation initiative	www.sustainableaviation.co.uk
The Aluminum Association	www.aluminium.org/
The Japanese Shipowners' Association	www.jsanet.or.jp
Union of the Electricity Industry (EURELECTRIC)	www2.eurelectric.org/
Verband Deutscher Reeder (VDR)	www.abendblatt.de
World Coal Institute	www.worldcoal.org
worldsteel	www.worldsteel.org

About the UNEP Division of Technology, Industry and Economics

The UNEP Division of Technology, Industry and Economics (DTIE) helps governments, local authorities and decision-makers in business and industry to develop and implement policies and practices focusing on sustainable development.

The Division works to promote:

- > sustainable consumption and production,
- > the efficient use of renewable energy,
- > adequate management of chemicals,
- > the integration of environmental costs in development policies.

The Office of the Director, located in Paris, coordinates activities through:

- > **The International Environmental Technology Centre** - IETC (Osaka, Shiga), which implements integrated waste, water and disaster management programmes, focusing in particular on Asia.
- > **Sustainable Consumption and Production** (Paris), which promotes sustainable consumption and production patterns as a contribution to human development through global markets.
- > **Chemicals** (Geneva), which catalyzes global actions to bring about the sound management of chemicals and the improvement of chemical safety worldwide.
- > **Energy** (Paris), which fosters energy and transport policies for sustainable development and encourages investment in renewable energy and energy efficiency.
- > **OzonAction** (Paris), which supports the phase-out of ozone depleting substances in developing countries and countries with economies in transition to ensure implementation of the Montreal Protocol.
- > **Economics and Trade** (Geneva), which helps countries to integrate environmental considerations into economic and trade policies, and works with the finance sector to incorporate sustainable development policies.

*UNEP DTIE activities focus on raising awareness,
improving the transfer of knowledge and information,
fostering technological cooperation and partnerships, and
implementing international conventions and agreements.*

For more information,
see **www.unep.fr**

For more information, contact:

**UNEP DTIE
Sustainable Consumption
and Production Branch**

15 Rue de Milan
75441 Paris Cedex 09
France
Tel: +33 1 4437 1450
Fax: +33 1 4437 1474
E-mail: unep.tie@unep.org
www.unep.fr/scp

www.unep.org

United Nations Environment Programme
P.O. Box 30552 Nairobi, Kenya
Tel: ++254-(0)20-762 1234
Fax: ++254-(0)20-762 3927
E-mail: unepub@unep.org



This Discussion Paper reviews the potential role for sectoral approaches (broadly defined) as part of a post-2012 climate regime.

The paper:

- *identifies some of the key issues relating to the development of sectoral approaches as part of a post-2012 global climate change agreement;*
- *reviews some prominent recent publications and workshop contributions of research bodies and think tanks on sectoral approaches;*
- *outlines the positions and activities of relevant industry bodies on sectoral approaches; and*
- *provides an analysis of the implications of the above review, identifying some of the key challenges, risks and opportunities associated with sectoral approaches and suggesting what is required, workable and politically realistic as possible solutions for a post-Kyoto regime, before reviewing the implications of the recent UNFCCC negotiations on sectoral approaches.*