

**GLOBAL SECTORAL INDUSTRY
APPROACHES TO CLIMATE CHANGE:
THE WAY FORWARD**

CEPS TASK FORCE REPORT

CHAIRMAN: BJÖRN STIGSON
President, World Business Council for Sustainable
Development

RAPPORTEURS: CHRISTIAN EGENHOFER
CEPS Senior Fellow

NORIKO FUJIWARA
CEPS Research Fellow

**CENTRE FOR EUROPEAN POLICY STUDIES
BRUSSELS**

This report is based on the discussions of a CEPS multi-stakeholder Task Force on Sectoral Industry Approaches to Address Climate Change, supported by the Cement Sustainability Initiative (CSI) of the World Business Council for Sustainable Development (WBCSD). Task Force members include stakeholders from a broad range of industry (e.g. energy supply, demand, equipment suppliers, etc.), industry associations and NGOs. During the meetings, the Task Force had ample opportunity to consult with officials from the EU institutions, international organisations and non-EU governments. A full list of members and invited guests and speakers appears in Appendix 8. Task Force members engaged in extensive debates in the course of three meetings and submitted comments on earlier drafts of this report. Its contents contain the general tone and direction of the discussion, but its recommendations do not necessarily reflect a common position among all Task Force members, nor do they necessarily represent the views of the institutions to which the members belong

More details on the CEPS Task Force can be found on the CEPS website (http://www.ceps.be/Article.php?article_id=565).

ISBN-13: 978-92-9079-791-3

© Copyright 2008, Centre for European Policy Studies.

All rights reserved. No part of this publication may be reproduced, stored in a retrieval system or transmitted in any form or by any means – electronic, mechanical, photocopying, recording or otherwise – without the prior permission of the Centre for European Policy Studies.

Centre for European Policy Studies
Place du Congrès 1, B-1000 Brussels
Tel: (32.2) 229.39.11 Fax: (32.2) 219.41.51
E-mail: info@ceps.eu
Website: <http://www.ceps.eu>

CONTENTS

Preface	i
Executive Summary	1
I. Key Messages	2
II. Recommendations	4
1. Introduction	7
2. Why global sectoral industry approaches?	12
3. Typology of Sectoral Approaches.....	16
3.1 Ongoing industry initiatives.....	17
3.2 Other schemes.....	19
3.3 Additional concepts	20
3.4 Sectoral industry approaches beyond climate policy	22
3.5 Unifying elements of all sectoral approaches	23
4. Main Challenges to Successful Global Sectoral Industry Approaches...26	
4.1 Data definition, collection and use	27
4.2 Risk of anti-competitive behaviour	31
4.3 Incentives for emerging economies	32
4.3.1 Incentives, their limitations and possible solutions	33
4.4 Governance	37
4.4.1 Challenges	37
4.4.2 Options	38
4.4.3 Sectoral approaches under the UNFCCC or a global agreement.....	41
5. Combining Sectoral Approaches with National and UN Climate Change Policy Priorities	43
5.1 How can sectoral approaches fit in with EU priorities?	44
6. The Way Forward	46
References.....	49

Appendix 1. Cement Sustainability Initiative (CSI) Sectoral Approach to Managing CO₂ Emissions53

Appendix 2. The Aluminium Industry’s Global Sectoral Approach to Climate Change.....55

Appendix 3. Proposal for a Global Sectoral Approach to Climate for the Steel Industry59

Appendix 4. Cement Sustainability Initiative (CSI) “Getting the Numbers Right” Project61

Appendix 5. The International Aluminium Institute’s Global Performance Data.....65

Appendix 6. The International Iron and Steel Industry (IISI) Global CO₂ Data Collection Methodology68

Appendix 7. List of Acronyms and Technical Terms70

Appendix 8. Members of the CEPS Task Force and Invited Guests and Speakers73

PREFACE

It has been my pleasure to chair the CEPS Task Force on Global Sectoral Industry Approaches to Climate Change. I agreed to take on this role because it is now so very clear that the challenges presented by climate change will not be solved without the focus, engagement, resources and strategic thinking of business.

In particular, industry sectoral approaches that identify emissions on a sector-by-sector basis and the specific measures for dealing with these emissions are likely to quicken our collective response to climate change. This is because we will see increased rigour in measurement and analysis, along with realistic and viable implementation driven to a large extent by the specific industry sectors themselves.

Significantly, the process of developing sectoral approaches implies that business must be fully integrated in discussions with national and regional governments to ensure both innovative and workable solutions. It is precisely this form of cooperation that is highly valuable in facilitating the mutual understanding of issues and thus agreement on the way forward.

It is fair to say that there has been a lack of clarity in understanding what is meant by sectoral approaches and how they might be undertaken. This report proposes three well-defined options that will advance the debate on how best to proceed.

I would like to thank my fellow Task Force members for their excellent and positive contributions throughout the meetings. I was also fortunate to benefit from research staff of exceptional quality, headed by Christian Egenhofer and supported by Noriko Fujiwara.

I commend this comprehensive report and have no doubt it will perform a useful role in guiding current and future deliberations on sectoral approaches. This is particularly important as we head towards the

15th Conference of the Parties to the United Nations Framework Convention on Climate Change, in Copenhagen, in December 2009. Time is running out, and in dealing with one of the most demanding challenges of our century, we need to ensure that we find answers that are robust, viable and widely embraced.

Bjorn Stigson
Task Force Chairman
President
World Business Council for Sustainable Development

Geneva, May 2008

EXECUTIVE SUMMARY

There has been increasing interest in ‘global sectoral approaches’ to address climate change both within and beyond the UN context. The Bali Action Plan includes a specific reference to sectoral approaches, ensuring that they are part of the negotiations for the post-2012 agreement.

Some industrial sectors are concentrated to such a degree that even a small number of companies represent a significant share of global greenhouse gas (GHG) emissions. This makes these sectors a ‘natural’ focus for climate change policy. 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. In particular, such approaches may help to identify emissions on a sector-by-sector basis, building confidence that policies and measures can be put in place to reduce emissions. They can also help identify national or global commitments through the aggregation of sectoral data, if countries so wish. While sectoral approaches constitute a major opportunity to focus on individual sectors that make major contributions to global emissions, they also pose a number of challenges.

One challenge is that the term ‘sectoral approaches’ means different things to different people. There is no clarity on what sectoral approaches can or should mean. After reviewing on-going initiatives and existing concepts, this CEPS Task Force Report identifies three basic models:

- *sector-wide transnational* approaches, e.g. transnational industry-led approaches that aim to engage a sector on a broad international basis or global sectoral industry approach;
- bottom-up *country commitments*, possibly combined with no-lose targets; and
- top-down *sectoral crediting* as an incentive mechanism, e.g. a sectoral Clean Development Mechanism (CDM).

All sectoral approaches share three common features: 1) collection of data and information about the sector to establish performance indicators or benchmarks; 2) sharing and diffusion of ‘best practices’ within companies to enhance monitoring, reporting and verification of emissions and operational efficiency, including diffusion of technology within the sector; and 3) engaging major companies of emerging economies, where most emissions growth and reduction potential lies. In addition, some sectoral approaches aim to remove regulatory and other barriers to rational energy use, to help governments and businesses better understand each other, and to enhance technology diffusion or cooperation in the development of new technology within a sector.

The analysis presented in this CEPS Task Force Report concentrates on category one, i.e. global sectoral industry approaches, which is similar to what the International Energy Agency (IEA) calls “sector-wide transnational approaches”. These are transnational industry-focused initiatives that aim to engage a sector on a broad international basis. They include industry-led initiatives (i.e. aluminium, cement and steel) and public-private partnerships (e.g. the Asia-Pacific Partnership on Clean Development and Climate or APP). This report focuses on transnational industry-focused initiatives because they are the principal means through which progress on sectoral approaches is currently being made. Therefore, further in the text, ‘sectoral approach’ is synonymous with ‘global sectoral industry approach’, unless otherwise stated.

While the range of questions associated with sectoral approaches in general is very broad, this CEPS Task Force Report focuses on how and by whom global sectoral industry approaches might be advanced in order for them to play a role in a post-2012 framework; how they could be implemented in practice; and identifies principal challenges and possible solutions.

I. Key Messages

1. Sectoral approaches are not new. They are common in many countries. The difference between global sectoral industry approaches and national approaches is that the former needs global coordination: either voluntary cooperation or coordination of national approaches, or a post-2012 framework to account for the transnational character of the industries. While such cooperation can moderate competitiveness, it requires a careful balance to deal with potential winners and losers.

2. To answer some of the difficult questions concerning the post-2012 framework, the global sectoral industry approaches analysed in this report must face four major challenges:
 - technical issues related to data definition and collection;
 - risk of anti-competitive behaviour;
 - identifying workable incentives for companies and governments from developing countries, mainly emerging economies, to engage in sectoral approaches; and
 - forming a suitable governance structure.

The report shows that progress has been made in the first two areas. As to the latter two, the report points the way forward.

3. In particular, the report identifies a number of possible incentives to engage companies or governments of emerging economies. They include both financial transfers (e.g. through crediting or public funds) between developed and developing countries, and sector-level cooperation focused on improving performance of the least efficient companies.
4. Sectoral approaches risk creating 'CO₂ havens', which are detrimental to the common objective of global climate change policy. Different marginal abatement costs between sectors increases the overall economy-wide cost of achieving a given climate change target. How sectoral industry approaches are linked to GHG emissions trading schemes or, more generally, the global carbon market must be determined.
5. Existing transnational industry approaches remain bottom-up schemes to collect information about the status of a sector, e.g. performance benchmarking. Thus they place both national policies and measures and international negotiations on a firmer footing, by identifying win-win mitigation options; discovering hitherto unknown abatement potentials in developed and especially emerging economies; realising cost-effective solutions based on understanding the industry; or making national or industry efforts comparable. Data collection by sectoral approaches will provide essential information to governments and negotiators when discussing policies, national goals and commitments.
6. As sectoral approaches emerge and their design evolves, the question of how they can fit into existing national or regional and global

policies and practices becomes more urgent. Governments such as the EU have developed a policy framework to deal with climate change policy. New initiatives such as sectoral approaches will most likely need to complement existing national frameworks rather than replace them. Support for global sectoral industry approaches will increase if they are seen as facilitating rather than complicating global climate change negotiations.

7. Ultimately, support within the EU by governments and stakeholders will increase if sectoral approaches constructively interact with existing EU policies. This report identifies four ways of such 'constructive interaction', all relating to data collection and formulating sectoral performance benchmarks.
 - If sectoral performance benchmarks are based on 'best practice', or the best available technology in a sector, they can be used for setting the cap.
 - Sectoral benchmarks can also be used for allocation, at least as long as free allocation continues.
 - Linking carbon markets would be helped and accelerated by coordination in central design options such as monitoring, reporting and verification (MRV) of emissions, cap-setting and (free) allocation. Sectoral approaches, notably sectoral benchmarking, can facilitate such coordination.
 - Experiences from data collection and benchmarking exercises under sectoral approaches could become a tool to give concrete meaning to the Bali developing country paragraph. Both 'measuring, reporting and verification' of 'actions' to which developing countries have signed on in the Bali Action Plan, and 'measurable and verifiable' assistance in financing and technology transfer by developed countries – a commitment in place since the UNFCCC – may be more easily implemented at the sectoral level than across the entire economy.

II. Recommendations

In order to accelerate the development of global sectoral industry approaches, we propose the following practical steps:

1. 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.

2. 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.
3. 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.
4. Industry should reinforce its efforts to develop practical performance benchmarks that are acceptable in sectors across a range of developed and developing economies.
5. 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 recently launched WBCSD working group on sectoral approaches is an example.
6. 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.
7. 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.
8. Those advocating sectoral approaches should identify what COP 15, 2009 in Copenhagen will need to decide in order to maintain or even accelerate the momentum of sectoral approaches.
9. 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.

1. INTRODUCTION

Since 2005, there has been increasing interest in ‘global sectoral approaches’ to address climate change. Key developments have been the 2005 OECD high-level roundtable on transnational sectoral agreements for climate policy,¹ the July 2005 G8 Gleneagles Plan of Action, and the sectoral task forces under the Asia-Pacific Partnership on Clean Development and Climate (APP, 2006; Fujiwara, 2007). There have also been calls for the analysis of sectoral dimensions, including ‘competitiveness’ issues and sectoral approaches, within the negotiations of the UN Framework Convention on Climate Change (UNFCCC), which could ‘complement’ country-wide commitments or embody a separate pillar based on, for example, ‘pledge-and-review’ approaches.² Sectoral approaches were a prominent subject during the global climate change negotiations in Bali, Indonesia, in December 2007. The Bali Action Plan includes a specific reference to sectoral approaches, thereby ensuring that they are part of the negotiations for the post-2012 agreement (Box 1.1).

Within the EU, the communication on climate change prepared by the European Commission (2007a) for the March European Council that subsequently adopted the EU integrated climate and energy policy made explicit reference to “sectoral approaches”, albeit within the context of

¹ Transnational sectoral agreements for reducing greenhouse gas emissions have been discussed at the high-level Roundtable on Sustainable Development on 1-2 June 2005 in Paris.

² Pledge and review describes unilateral pledges by large emitters and/or countries to undertake specific actions and policy commitments (of any form from cap-and-trade, to taxes, to technology standards, etc.), which will then be periodically reviewed within an international forum, see, e.g. Pizer, W. (2007).

“action in developing countries”. The European Commission’s High-Level Group on Competitiveness, Energy and the Environment in its fifth report (European Commission, 2007b: 3) calls for a “roadmap...to set out the route to operationalise sectoral approaches”. Finally, the Commission’s proposal to revamp the EU Emissions Trading Scheme post-2012 in Article 10b (European Commission, 2008a: 26) that deals with “measures to support certain energy intensive industries in the event of carbon leakage” states that any “binding sectoral agreements...subject to mandatory enforcement arrangements” shall be taken into account if measures countering carbon leakage are designed.

Box 1.1. Sectoral approaches in the Bali Action Plan

The Bali Action Plan notes under 1. (b) (iv) the consideration of “cooperative sectoral approaches and sector-specific actions, in order to enhance implementation of Article 4, paragraph 1(c), of the Convention”. Article 4.1 (c) of the UNFCCC Convention requires governments to “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” (Decision CP 13). The first meeting of the Ad-hoc Working Group on Long-term Cooperative Action (AWGLCA), in Bangkok, Thailand, from 31 March to 4 April 2008, which established the work plan for implementing the Bali Action Plan, agreed to hold a workshop on cooperative sectoral approaches and sector-specific actions during the third meeting of the AWGLCA.

In addition, the OECD/IEA, in the context of the work of the Annex I Expert Group under the OECD, has produced a number of reports, initially focusing on sectoral crediting, but now broadening its focus to sectoral industry approaches. An IEA Information Paper of November 2007 explores the issues for energy-intensive industry (Baron et al., 2007).

This CEPS Task Force Report builds upon an Interim Report that identified the principal issues associated with sectoral approaches in general. It was presented and discussed at the global climate negotiations in Bali, Indonesia, in December 2007 (Egenhofer et al., 2007). This new CEPS Task Force Report extends this analysis by investigating how to implement sectoral approaches in practice. The report is divided into six

chapters; after this introduction, chapters 2 and 3 examine the rationale for sectoral approaches and provide an overview on existing approaches. Chapter 4 presents the principal analysis by identifying the preconditions that would allow sectoral approaches to be implemented, followed by chapter 5 on the interactions of sectoral approaches with existing climate change policies. The concluding chapter 6 sketches a possible way forward.

Sectoral approaches may mean different things to different people (see Box 1.2 for the IEA typology). This CEPS Report focuses on global sectoral industry approaches, similar to what the IEA calls “sector-wide transnational approaches” and which describe transnational industry-led initiatives that aim at engaging a sector on a broad international basis.³ This report focuses on transnational industry-led initiatives because – in addition to the Asia Pacific Partnership on Clean Development and Climate – they are the principal means through which progress on sectoral approaches is currently being made. In most other areas, actions remain more or less limited to developing theoretical concepts and models yet to be tested.

It is often argued that other sectors such as power or transport would also lend themselves to sectoral approaches. However, there are important differences between energy-intensive sectors and power and transport. The main difference between energy-intensive sectors and power is that the latter is not trade-exposed in principle and therefore is better suited to domestic policy approaches, which accommodate domestic concerns more effectively. The difference between the energy-intensive sectors and transport is even greater. While energy-intensive industries can be relatively easily defined by a fixed number of production processes, the transport value chain is very complex, consisting of many different actors, including car producers, refiners, infrastructure providers and the driver, to name the most important ones. In addition, while some parts of the transport chain are essentially domestic, others, such as cars and fuels, are highly trade-intensive. This makes the currently existing global sectoral industry approach model inapplicable for transport.

This is not true, however, for international aviation or maritime transport, which would lend themselves well to global sectoral approaches.

³ It includes purely industry-based initiatives, public-private partnerships and technology-oriented approaches.

As these two sectors are currently beyond the Kyoto Protocol (KP), they would ideally be suited to a global sector approach. However, the current slow progress in the International Civil Aviation Organisation (ICAO) and the International Maritime Organisation (IMO) will most likely be reversed if governments take a more active role.⁴

Box 1.2. IEA typology of sectoral approaches

The different sectoral approach models can be categorised in different ways. The IEA has made the following pragmatic distinction, dividing existing sectoral approaches into four different categories:

Country focus

1. Country-specific quantitative approach: a country's initiative limited to a sector and recognised by the international community (e.g. UNFCCC) such as the "no-lose" target approach.
2. Sustainable development policies and measures: a country would pledge a policy that delivers both sustainable development objectives and lower greenhouse gas emissions.

Industry focus

3. Transnational quantitative sectoral approaches, where companies or associations within a single sector agree, across countries, to achieve a reduction goal.
4. Technology-oriented approaches ranging from pooled or coordinated R&D to diffusion of low-carbon technologies and best practices.

Source: Baron et al. (2007), chapter 2.

Criteria for categorising sectoral approach models could include geographical coverage (e.g. global, regional or national), organisation (e.g. purely industry-led or public/private partnership), focus and direction (e.g. addressing competitiveness, benchmarking, engaging developing countries or technology development and diffusion) and scale of emissions (e.g. GHG-intensity or share of total emissions). This report implicitly focuses on the sectors that fall under two criteria: scale of emissions (i.e.

⁴ For sectoral approaches to aviation and maritime transport, see Åhman (2008) and Zetterberg (2008).

energy-intensity and considerable share of total global emissions) and trade exposure. These criteria are chosen for very pragmatic reasons. Focusing only on scale of emissions would entail including power and transport, both domestic and international, in addition to energy-intensive industries. As we have seen, however, initiatives in these sectors are far less advanced, and the specific features of these sectors would require broader concepts. This point is discussed in greater depth in chapter 2. Trade exposure is chosen as a criterion because concerns about ‘competitiveness’ have been cited as justification for not imposing more stringent emissions reduction measures in energy-intensive industries.

For reasons of simplicity and readability, we use the term ‘sectoral approaches’, which has made its way into the jargon of international climate change policy. Therefore, this report uses the term ‘global sectoral industry approaches’, or ‘sectoral approaches’ for short, but, unless otherwise indicated, remains focused on a limited number of energy-intensive industries.

2. WHY GLOBAL SECTORAL INDUSTRY APPROACHES?

Even in the absence of a common global long-term target, the urgency of addressing climate change is now accepted. This has been reiterated by the Gleneagles and Heiligendamm G8 summits, the Major Economies Meetings (MEM), and the Bali Action Plan's reference to the work of the IPCC Fourth Assessment Report. At the same time, global CO₂ emissions from energy production and use are expected to grow rapidly. For example, the 2007 IEA World Energy Outlook (IEA, 2007), representing all OECD countries, projects that under a 'business-as-usual' scenario – i.e. if governments stick with current policies – the world's primary energy needs would grow by 55% between 2005 and 2030, at an average annual rate of 1.8%. As fossil fuels are expected to remain the dominant source of primary energy, accounting for 84% of the overall demand increase, global energy-related CO₂ emissions between 2005 and 2030 are also projected to increase. For example, CO₂ emissions are expected to rise by 57% between 2005 and 2030.⁵ Developing countries, whose economies and populations are the world's fastest growing, contribute 74% of the increase in global primary energy use in this scenario, while China and India alone account for 45%. If greenhouse-gas concentrations are to be stabilised at a level that would prevent dangerous interference with the climate system, there is no doubt that urgent action is

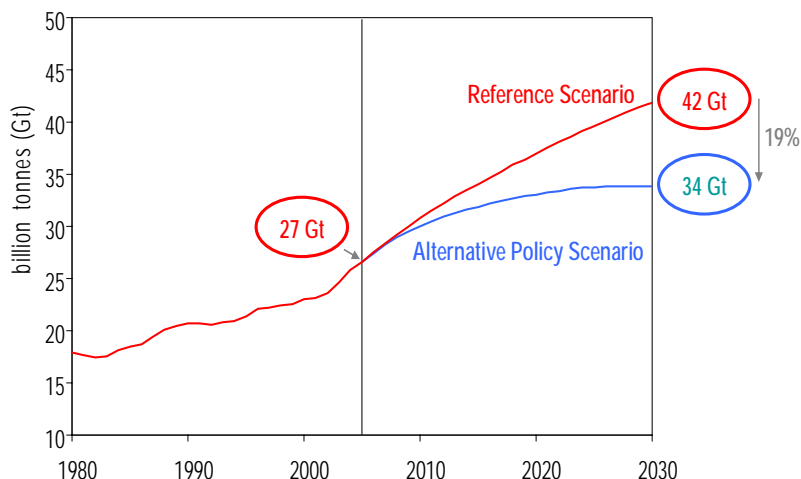
⁵ The United States, China, Russia and India contribute two-thirds. China is by far the biggest contributor to incremental emissions, overtaking the United States as the world's biggest emitter in 2007. India will become the third-largest emitter by around 2015.

needed. At their 2005 meeting IEA ministers firmly stated that the current energy path is not sustainable.

On its own, the existing international policy framework, comprised of the UNFCCC and the Kyoto Protocol (KP), will not be able to reverse this trend. Despite the Bali Action Plan agreed to at COP13, the content of the future global framework is still unknown and it remains to be seen whether the agreement that is envisaged for Copenhagen will deliver the necessary reductions. Against this background, since 2005 at the latest, the idea of targeting the principal emitters has gained support.

Figure 2.1 Emissions trajectories

Global CO₂ Emissions from Energy – Reference and Alternative Policy Scenarios



Source: IEA 2007

Many countries, especially fast-growing emerging economies, have not yet accepted country-wide targets or legally binding constraints for the post-2012 period. As firm commitments even at sector level may still take years, another motivation behind sectoral approaches is to identify win-win opportunities by improving technology and operational efficiency. Sector-

based commitments, therefore, are seen by some as a way to engage industry and governments of hitherto reluctant developing countries, notably emerging economies, in global efforts to combat climate change.

Closely linked to the first motivation is the second. More stringent commitments by developed countries are often cited as being restrained by ‘competitiveness’ concerns that may affect trade-exposed industries.⁶ GHG reduction policies increase costs for companies that are regulated compared to those that are not, thereby potentially leading to a loss of market share and reduced profits and stock market value.⁷ In return, this is seen as limiting governments’ ability to impose additional measures. The assumption is that sectoral approaches would gradually submit all competing industries to a similar carbon constraint and thereby overcome the ‘competitiveness’ barrier.

More specific, sectoral approaches in general and global sectoral industry approaches are to target the potential to reduce GHG emissions from major emitting industries such as aluminium, cement, steel, float glass, a few heavy, high volume/energy intense chemicals and electricity producers (see Box 2.1). In these sectors, technology development and investment patterns will be determined by a small number of large companies. To meet current and future climate change targets, the large firms of energy-intensive industries in developed and emerging economies alike will have to be subject to some sort of reduction commitment. Sectoral policies are expected to have the biggest impact, as they concentrate on sector-specific circumstances and can formulate targeted policies.

⁶ ‘Competitiveness’ in this context means competitiveness of firms, which compete for market share.

⁷ See, for example, Carbon Trust (2004), Reinaud (2005), Demailly & Quirion (2006), McKinsey & Ecofys (2006) and Climate Strategies (2007), for the case of a specific unilateral climate change policy, i.e. the EU Emissions Trading Scheme.

Box 2.1 Candidates in industry for sectoral approaches

Aluminium 0.9% of world GHG emissions (2004)
10 biggest producers = 54% of the world market

Cement 4.6% of world GHG emissions (2005)
10 biggest producers = 25% of global output

Steel 5.22% of world GHG emissions (2005) (direct emissions only)
10 biggest producers = 26% of global output
20 biggest producers = 35% of global output

Other potential industries include other energy-intensive industries such as float glass, a few heavy chemical industries, paper and pulp.

Source: Vieillefosse (2007) and Baron et al. (2007).

3. TYPOLOGY OF SECTORAL APPROACHES

Sectoral approaches are not new. They are a common feature in many countries. The difference between global sectoral approaches compared to national ones is that the former requires a global framework: either voluntary cooperation or coordination of national approaches, or a post-2012 framework to account for the transnational character of the industries, hence some sort of government involvement.

Vanderborght (2007) has described sectoral approaches as “...a policy, based on multiple systems with efficiency objectives and implementation mechanisms tailored to the characteristics of the sectors of society and the regional socioeconomic development”. Sectoral approaches are typically used in a situation where an unregulated sector gradually becomes regulated or when a change of regulation takes place to accommodate sector specifics. Cooperation of countries and/or sectors in different jurisdictions can avoid competitiveness concerns undermining government policies. This cooperation does not only increase complexity but also requires a careful balancing act to deal with the ‘winner/loser’ conundrum.

The analysis below lists the most important sectoral approach initiatives and highlights their differences and similarities. The analysis draws a distinction between ongoing industry initiatives in the aluminium, cement, and steel sectors and by the APP (section 3.1); other initiatives (3.2); additional concepts (3.3); and sectoral industry approaches beyond climate change (3.4). The chapter will conclude with an attempt to distil the unifying elements of all sectoral approaches (3.5) that have been reviewed in this section.

3.1 Ongoing industry initiatives

Ongoing industry initiatives are the principal focus of this report. Therefore, they will be presented first. They also are the most important initiatives when judged according to participation, momentum or public exposure.

1. In the **aluminium** sector, sectoral approach participants from the International Aluminium Institute (IAI), a group of major aluminium companies worldwide, have set themselves a voluntary objective of achieving an 80% reduction of PFC (process) emissions and a 10% reduction in energy intensity, compared to 1990, by 2010. Having nearly reached the PFC reduction objective, the IAI is already considering setting more stringent targets for 2020. Discussions are being pursued within the industry on the potential applicability of a global sector crediting, no-lose model. This approach is based on an externally audited, comprehensive data-gathering system, under an IPPC-recognised protocol, from which the sector benchmark is developed (Porteous, 2007). Further details are provided in Appendix 1.
2. Discussions are currently taking place within the cement sector in the context of the **Cement Sustainability Initiative (CSI)** under the auspices of the World Business Council for Sustainable Development (WBCSD). At first, the initiative focused on a data-gathering exercise called 'Getting the Numbers Right', including a database for existing technologies in the sector and a benchmarking system. In a second step, the CSI is moving towards policy proposals and intends to propose possible country or regional baselines, negotiated with governments to form the basis of intensity-based objectives and a crediting system. Governments of emerging economies could engage by aiming for no-lose targets (see below), which would most likely be broken down into sectoral sub-targets. The initiative also examines how a cement sectoral approach could suit EU climate change priorities and especially the EU ETS.
3. The **International Iron and Steel Institute (IISI)**, representing some 200 steel-producing companies, including those from China, Russia and India, and representing more than 70% of global steel production, proposed to replace cap-and-trade emissions trading regimes in May 2007 with a sector specific framework that, among other things, encourages the phase-out of obsolete technologies. The IISI has invited governments to support the steel industry's long-term

research initiatives for radical new technology solutions by encouraging demonstrations, and to engage with industry to develop reporting procedures (Jitsuvara, 2007). According to Baron et al. (2007: 60), under the APP and with the bilateral support of China in particular, steel companies have launched a data-gathering exercise to establish indicators for the two main production routes. At the European level, the **European Confederation of Iron and Steel Industries (EUROFER)** has developed a methodology to calculate a 'CO₂ footprint' on a life-cycle basis for relevant products, including all by-products (i.e. by including all indirect emissions), that are associated with steel production. While the explicit objective of the proposal is to establish a global steel credit-and-baseline trading scheme, the methodology, if accepted and used by all producers, would allow identification of the industry's CO₂ footprint. This in turn could be used for allocation in trading schemes or as a basis for domestic policies and measures worldwide (see EUROFER, 2007; Debruxelles, 2007).

4. The most comprehensive initiative is the **Asia-Pacific Partnership on Clean Development and Climate (APP)**, formally launched in January 2006. It consists of seven partner countries – Australia, Canada, China, India, Japan, Republic of Korea and the United States. The initial six partner countries, i.e. excluding Canada, account for 45% of global GDP, 50% of GHG emissions and 48% of global energy use (Government of Australia, 2007), and produce about 65% of the world's coal, 48% of the world's steel, 37% of the world's aluminium and 61% of the world's cement. As a multilateral and regional public-private partnership between industry and governments, the APP focuses on industry sector cooperation across countries to develop and deploy advanced technologies, and on regulatory reform to remove identified barriers to technology development and deployment. Its backbone is comprised of sectoral task forces where business, government and scientific researchers cooperate. The APP covers data-gathering and benchmarking exercises for three energy supply sectors (cleaner fossil energy, renewable energy and distributed generation, power generation and transmission) and five energy-intensive sectors (steel, aluminium, cement, coal mining, buildings and appliances). Participation is voluntary. As a 'bottom-up' action-based approach, there are no 'top-down' targets associated with the scheme (e.g. Fujiwara, 2007; APP, 2007).

3.2 Other schemes

Moreover, other initiatives exist, for example, within the IEA, the power sector, and regarding standard-setting; these are related to but not yet as advanced or defined as the initiatives under the previous category.

1. Elements of sectoral approaches are also contained in the **International Energy Agency (IEA) benchmarking exercise** in the context of the implementation of the Gleneagles Plan of Action (GPOA). The IEA has been tasked by the Gleneagles G8 summit to identify best practices and indicate the potential for improvements in energy efficiency in buildings, appliances, transport and industry. As a result, the IEA has embarked on an in-depth analysis of indicators to provide ‘state-of-the-art’ data and analysis on energy use, efficiency developments and good policy practices. For industry, the IEA develops an authoritative, comprehensive overview of existing and potential efficiency performance indicators and to identify areas where extra efforts could add value in both industrialised and developing countries. For construction, it establishes the world’s leading database on efficiency codes and standards for buildings, appliances and surface transport, and pinpoints lessons learned and best practices for different circumstances and climates (IEA, 2005). As work regarding the GPOA comes to a close, it is not yet certain what follow-up will take place.
2. In the **power sector** some stakeholders are exploring the potential for a coordinated sectoral approach to mitigate GHG emissions. An IEA (2006) workshop identified three vectors for sectoral approaches in this sector: a) a tool to help developing, especially emerging, economies and developed countries to set targets, assure fairness, and to take into account competition/competitiveness problems and energy security issues; b) international collaboration on end-use (e.g. an international framework to foster energy efficiency); and c) international collaboration among stakeholders to foster technology progress (e.g. carbon capture and storage, nuclear, renewable or energy efficiency improvements). The workshop also recognised the need for “dedicated government resources in developing countries...to connect the international carbon market with actual changes of behaviour and investment at country level” (IEA, 2006: 2). Work undertaken by the Japanese power industry (Tachibana, 2007) focuses on maintaining the energy efficiency of existing plants;

deploying the best available technology in new power plants; and accelerating research, development and deployment. A collaborative project by a number of electricity utilities within the WBCSD has identified the potentials for different technologies in the power sector and end-use efficiency (WBCSD, 2006).

3. A different model aims at setting global standards of specific products such as appliances, insulation or cars (e.g. CO₂ or fuel efficiency). Such approaches are usually grouped under ‘technology mandates’, or ‘**Technology-Oriented Agreements (TOAs)**’. TOAs are expected to address important failures in the market in technological innovation. As emissions-reduction policies spur the uptake of new technologies and increase the profitability of innovation, TOAs stimulate additional innovation to lower the costs of mitigation and improve the social and political acceptability of emissions targets. Examples are renewable energy quotas or feed-in tariffs but also EU or global energy efficiency or car efficiency standards. TOAs could be negotiated separately, linked or incorporated into the climate policy framework through a policies and measures approach, hence also through a sectoral approach (see De Coninck et al., 2007; Fischer et al., 2008; Egenhofer et al., 2007). To date, TOAs are top-down approaches, i.e. government-led standard-setting, principally used at national or regional levels. The concept could, however, be expanded towards a private-public partnership applied at global level, but in a first stage one would need to define the sectors to cover, i.e. an ‘installation’, a ‘product’ or ‘use’ (as transport or buildings), etc.

3.3 Additional concepts

In addition to existing or emerging initiatives, discussions about global sectoral industry approaches have been fuelled by a number of concepts involving elements of general sectoral approaches.

1. One model is the ‘**no-lose**’ target concept developed by the Center for Clean Air Policy (e.g. Schmidt et al., 2006). It describes a bottom-up method for encouraging sector-wide actions in developing countries, mainly those with emerging economies. For example, developing countries voluntarily accept a reduction target expressed in absolute or relative terms. If they beat the target, they will receive credits for the additional – i.e. beyond the target – reductions by selling into an emissions trading scheme or by government funding. The incentive

for reducing GHG emissions is the potential reward in the form of credits. A CCAP (2006) study identified what it claimed were cost-effective emissions reductions for Brazil, China and India for electricity, cement, transport, paper and steel industries: 17-29% below business-as-usual levels in 2020.

2. Another strand of discussion focuses on incentives for developing countries – emerging economies and others – to take on a unilateral commitment. Incentives could stem from the Clean Development Mechanism (CDM), especially if extended to a **sectoral CDM**. One could think of the bundling of projects, the definition of a sectoral benchmark, which allows crediting of all projects below the benchmark or crediting for policies that reduce emissions, such as a congestion charge or refurbishing of houses. Theoretically, a **programmatic CDM** could allow for programmatic crediting, i.e. several projects undertaken and submitted to the CDM Executive Board by intermediaries. Closely related to this is **sectoral crediting**, which has been explored in-depth by the OECD/IEA (e.g. Baron and Ellis, 2006). This approach foresees that certified emissions reductions can be sold into a carbon market such as the EU Emissions Trading Scheme. Such emissions reduction credits can be policy-based (e.g. a modal shift in transport), rate-based or set at an absolute target. A different set of incentives could be **technical assistance and additional financial assistance**. Governments of developing countries might see benefits in a sustainable development policy, to reap co-benefits.
3. The Washington-based PEW Center on Global Climate Change has explored a concept, which focuses on linking voluntary ‘bottom-up’ commitments to a common global framework. Such **International Sectoral Agreements in a post 2012 Climate Framework** foresee multilateral agreements in which governments commit to actions intended to moderate or reduce GHG-emissions from a given sector via a) one or several stand-alone sectoral agreements; b) a series of agreements linked under a common framework (although each with different country participation); or c) sectoral commitments as a complement to a comprehensive global climate change agreement (see Bodansky, 2007). This concept necessarily remains less concrete, as we neither know the shape of the potential global framework nor the exact content of a possible sectoral commitment.

4. Yet another different model is the idea of an **integrated approach for transport** (e.g. WEC, 2007). This approach acknowledges all actors in producing GHG emissions in transport and places technologies and policy measures into a practical context by assessing the potential contribution to reduction that each actor can make, through fuel and vehicle technologies, driver behaviour, transport infrastructure, etc. Policy measures are formulated to implement the most effective combination of measures to reduce emissions overall. The concept for the integrated approach is being developed by European automotive stakeholders – policy-makers, industry, NGOs – in the programme on Competitive Automotive Regulatory Systems for the 21st Century (CARS21). The underlying concept is cost-effectiveness. Globally, there are many integrated approaches possible in different regions as a result of different conditions, and therefore different solutions are available at different relative costs. But they all have in common the overall concept of involving all relevant stakeholders and distributing the burden with respect to cost-effectiveness. Best practices can be shared between regions. See also WBCSD (2004).
5. Other schemes aim at developing international cooperation on the special transport modes of] **aviation** and **maritime transport**, sectors that have been excluded from the Kyoto Protocol (e.g. WBCSD, 2004; Åhman, 2008; Zetterberg, 2008). Discussions are ongoing in various fora including the UNFCCC negotiations, the respective international sector organisations such as the International Civil Aviation Organisation (ICAO) and the International Maritime Organisation (IMO), and in regional organisations.

3.4 Sectoral industry approaches beyond climate policy

There are two successful examples of sectoral approaches in a non-climate policy area: a global initiative and an EU initiative. Both clearly illustrate the potential of sectoral approaches.

1. The Montreal Protocol on Substances that Deplete the Ozone Layer under the auspices of the United Nations Environment Programme (UNEP) has developed a **mandatory sector-led approach for the phase-out of CFCs and HCFCs**. Technical Options Committees (TOCs) for different sectors (e.g. refrigeration and air-conditioning, foam, medical aerosols, methyl bromide, etc.), comprising members from the business community, government and academia, report on

the availability of alternatives to CFCs and HCFCs as well as the status of transition within the different sectors. Based upon these reports, the Parties to the Montreal Protocol determine the timetable for the phase-out of production and consumption. Implementation of the Multilateral Fund, which funds the incremental costs of the transition from ozone-depletion substances to alternatives whilst starting with a project-based approach, has since moved to a sector-based approach to complete the CFC phase-out process.

2. Within the EU, a **sector-based phase-down schedule for HCFCs** was implemented under Directive EC 2037/2000. As a sector, the fluorocarbon production industry developed both a voluntary data reporting initiative (through the Fluorocarbon Programme Panel (FPP) and, subsequently, the Alternative Fluorocarbons Environmental Assessment Study (AFEAS) as well as an initiative to jointly evaluate the environmental and toxicological aspects of alternatives to CFCs.

3.5 Unifying elements of all sectoral approaches

The previous sections have revealed that many different models, both of sectoral approaches in general and of global sectoral industry approaches, exist. They could be grouped into three distinct models:

- *sector-wide transnational* approaches, e.g. transnational industry-led approaches that aim to engage a sector on a broad international basis;
- bottom-up *country commitments*, possibly combined with no-lose targets;
- top-down *sectoral crediting* as an incentive mechanism, e.g. sectoral Clean Development Mechanism (CDM).

Without a doubt, the different models will evolve and develop as work on sectoral approaches within sectors and governments progresses. Irrespective of which model is preferred, there are a number of central elements that unify all sectoral approaches to date.

- Transparency, i.e. respect of confidentiality, collection of information about the status of a sector, e.g. benchmarking in different forms, such as: i) setting the sector boundaries; ii) documenting current industry performance on agreed simple metrics or key performance indicators; iii) identifying best practices, i.e. comparing performance of equipment, plants or countries to the best practice, which in the

longer-term could help identify common medium-term goals. Without such data, collected bottom-up by industry and verified by an independent third party, there is no justification for sectoral approaches. Only verified data can ensure that industry commitments, whether voluntary, unilateral or negotiated with government, lead to 'real' and 'measurable' reductions beyond a business-as-usual scenario.

- This is very closely linked to a second principal element that appears in all sectoral approaches: sharing and diffusing best practices within companies to increase operational efficiency, including diffusion of technology within the sector, typically to improve the performance of the least efficient installations.
- Another key element of all sectoral approaches is their attempt to engage governments and large installations of major industries in emerging economies, which is where most emissions growth and reduction potential lies. As sectoral approaches are mainly voluntary, companies will only participate if there are incentives to do so or governments see good reasons to undertake voluntary commitments. Incentives to major industries can take many different forms. They can include, for example, technical assistance to improve operational efficiency or carbon management to exploit no-regret options, access to improved technology by accelerating technology diffusion (of on-the-shelf technology/know-how) and/or developing sector-based GHG credits, e.g. through sectoral crediting or sector-based (CDM) crediting. They could also consist of threats of regulation.

There are potential and actual additional benefits from sectoral approaches, although they do not apply to all initiatives and models.

- Sharing of best practices of governments in order to remove regulatory and other barriers to rational energy use and technology diffusion. By definition this element is limited to initiatives that involve governments in some form. This element is most prominent in the APP.
- Joint learning between governments and business to better understand each other and jointly solve the problem of climate change.
- In some cases, sectoral approaches include cooperation in the development of new breakthrough technology. This is the case, for

example, in the CO₂ Breakthrough Programme to which the steel industry, through the International Iron and Steel Institute (IISI), has agreed upon. Development of breakthrough technology is limited to industry that uses proprietary technology, which is typically the case for aluminium, steel or chemicals.

4. MAIN CHALLENGES TO SUCCESSFUL GLOBAL SECTORAL INDUSTRY APPROACHES

We are now returning to the specific concept of global sectoral industry approaches, the focus of this report. To recap, the previous chapter revealed that global sectoral industry approaches are generally associated with numerous potential benefits such as improving operational efficiency, accelerating technology development and diffusion, estimating the abatement potential⁸ or supporting the development of the global carbon market. The primary motivation for sectoral approaches, however, is to:

- enhance the scope of greenhouse gas mitigation if a sector is progressively moving from no-regulation to regulation; and
- address or moderate competitiveness concerns in trade-exposed industries.

As a side-effect, sectoral approaches could add a rational element for definition of national goals and commitments, cap-setting and allocation in case free allocation is chosen as an allocation methodology. Data definition and collection from sectoral approaches will provide governments a more thorough base for abatement potentials in a given sector to allow them to set targets in a potentially more equitable way while ensuring that targets

⁸ Many of these issues are also discussed and elaborated upon in other fora such as, for example, the Ad-Hoc Working Group on Future Commitments for Annex I parties under the Kyoto Protocol (e.g. Macey, 2008), the G8+5 process (e.g. Hoehne, et al., 2008) and the APP (e.g. Fujiwara, 2007).

are achievable. This should also increase political acceptability. Thus sectoral approaches will increase the understanding by governments of the global economic environment of the sectors, such as the technological potential for improvement but also trade and investment patterns and corporate strategies.

However, in order to meet expectations, sectoral approaches will need to pass a number of tests. This report has identified four crucial challenges that global sectoral industry approaches will need to meet in order to advance: 1) issues related to data definition and collection and 2) risks of anti-competitive behaviour, both of which must be addressed by industry itself; 3) workable incentives for developing countries to engage in sectoral approaches, which is a task for both industry and governments; and 4) finding a suitable governance structure, which remains largely a matter for governments.

4.1 Data definition, collection and use

The backbone of global sectoral industry approaches are performance indicators, often expressed through industry performance benchmarks backed up by credible monitoring and verification. Benchmarks are tools to evaluate margins of improvement for existing plants, based on international or regional comparison. They allow industry to compare the performance of their installations. Therefore, benchmarked installations can identify the current best level of performance they can theoretically achieve. They also help policy-makers obtain a better overview of margins for improvements in sectors and thus of abatement potentials and associated costs for industrial sectors with current technology.

As a micro-level analysis, benchmarking is very data-intensive. There is a rich history of data collection and use within existing global sectoral industry approaches, such as those under the auspices of the WBCSD CSI, IAI, IISI and APP. The CSI, for example, has begun a data-gathering exercise called 'Getting the Numbers Right'. As a start, participating companies will need to provide data for all their plants for the years 1990, 2000 and 2005. Publication of the CSI effort is expected by 2008 (see Appendix 4). In tandem, the APP Task Force on cement is also collecting energy and CO₂ data in partner countries (see also Box 4.1). Both initiatives use the WBCSD Cement CO₂ protocol. Similar initiatives are undertaken by the IAI and IISI (see Appendices 5 and 6 for further details).

Box 4.1 Status of the work of APP Task Forces

The Steel Task Force has developed the State-of-the-Art Clean Technology Handbook, which lists 101 advanced technologies. In addition, it conducted a survey for selected representative technologies from that list to identify their diffusion rate, thereby evaluating the potential for CO₂ emissions reduction for each selected technology. An agreed upon methodology estimated the (input) energy reduction potential to be 130 million tonnes/year (CO₂: 127 mt, SO_x: 0.65 mt, NO_x: 0.29 t) for the original six APP member countries. The next steps are to evaluate the emissions potential for each partner country, and to discuss how to develop energy efficiency indicators and address reduction targets. As a measure to increase technical cooperation, the 'Performance Diagnosis' project was initiated, in which a team of Japanese energy-saving experts assessed three iron and steel plants in China in December 2007.

The Cement Task Force concentrates on data collection using common boundaries, indicators and investigation methods, having reached a consensus on a benchmark for CO₂ intensity. The total emissions reduction potential among the six partner countries is expected to be presented by May 2008. The Cement Task Force is also implementing a 'Performance Diagnosis'. Furthermore, the Center of Excellence is implementing capacity-building programmes in China.

The Aluminium Task Force is developing a procedure and indices for benchmarking and measuring aluminium sustainability in order to provide baseline knowledge to facilitate data collection in the 'measuring and benchmarking project'. These indices are to be used in concert with other project plans that support perfluorocarbon emissions management, fluoride emissions management and recycling, providing an essential foundation for future projects. See <http://www.asiapacificpartnership.org/APPProjects/Aluminium/ATF-06-01.pdf>.

The Buildings and Appliances Task Force concentrates on harmonisation of test procedures in order to eliminate a major barrier to developing standards and labelling programmes, such as common methods of testing and gauging the energy performance of selected appliances. See <http://www.asiapacificpartnership.org/APPProjects/BATF/BATF-06-01-PR.pdf>.

Source: Based on contributions by Task Force members.

In this way, governments and international organisations can compare data from two different sources: data collected from sectors within the context of sectoral approaches, and data collected and provided by governments, for example, based on IPCC guidelines. Should differences

exist, governments and the sector would be able to reconcile the two sets, thereby ultimately providing a more robust data set.

The literature, e.g. Baron et al. (2007), and Bradley et al. (2007), and CEPS Task Force discussions have identified a number of issues in this area.

- A critical element for the success of performance benchmarks is effective monitoring, reporting and verification. As the first year EU ETS experience has shown, setting up effective systems can take time and requires significant capacity both by the industry and governments. As IEA analysis on sectoral crediting has revealed, such capacity does not always exist in developing countries.
- As data-intensive activity, benchmarking is time-consuming and potentially costly, especially in the global context with different boundary conditions. There is the risk of an inflation of the number of benchmarks, which increases the costs and makes comparison more difficult. Firms and plant managers will argue special circumstances that all require exceptional treatment. This risk has been documented by National Allocation Plans of the EU ETS and the EU benchmarking exercise in the context of the EU Integrated Prevention and Pollution Control (IPPC) directive to minimise industry pollution. Safeguards are needed to keep the number of benchmarks manageable.
- There is no uniform definition of what constitutes a sector, especially its boundaries. Definitions, e.g. by IPCC, have been designed for another purpose, i.e. emissions reporting. Allocation under the first and second phase of the EU ETS has laid bare some of the difficulties of defining a combustion installation in a concrete way. If sector boundaries are not crystal clear, installations could simply not report emissions from those parts that might or might not be within the boundaries.
- Benchmarking can require the disclosing of data that companies judge proprietary or of strategic importance. This can be addressed by a careful choice of performance indicators used in the benchmark, but also by subcontracting data collection to an independent third party, as has been the case for the CSI and in the IAI approach, de-identification by the statistical team. Participants would then only see aggregated data that they can compare with their own information. Also, it can be done by an association officer, bound by a

confidentiality contract through which, in the case of the IAI, compliance is audited by an external auditor. A precondition is that data is verified, as in the case of the CSI.

- Benchmarks are snapshots of actual technologies but provide little guidance on what future level of mitigation can be achieved. The challenge is to adapt benchmarking into a forward-looking method, although this is not necessarily applicable in cases where multiple technologies are used in one industry.
- The use of a benchmark as a reference to allocate effort will create ‘winners’ and ‘losers’. This makes agreement on an industry benchmark difficult. Industry attempts to use benchmarks for the first and second phase allocation plans of the EU ETS have partly failed for this reason. This might be addressed by establishing the benchmark as a future target, thereby allowing more leeway for balancing the interests of winners and losers, or by having governments impose it.
- The well-established asymmetry of information between an industry and a government may lead to an understating of an industry’s ability to adjust processes and to invest in new technologies to reduce greenhouse gas emissions. There must be valid reasons for an industrial sector to reveal the full extent of its mitigation potential and its real cost.

Additional lessons have emerged from APP work in the context of sectoral task forces. First is the importance of harmonisation of data formats. Such harmonisation can be lengthy and costly, as shown by the experience of the statistical offices in EU member states. Over time, the data formats of different databases, such as those used by the APP, IEA and industry-led approaches, could be harmonised. The APP has also shown that important data gaps exist (depending on sector structure); that capacity-building with both industry and governments in developing countries should be made a priority; and that participation in data collection by developing countries will most likely require some incentive mechanism, such as the development of local language training manuals or software.

Finally, data collection is very costly and its use politically sensitive. Industry *per se* does not have an unfettered interest in fully revealing its abatement potential and costs, as this could make it ‘vulnerable’ to government action. Therefore, data definition and collection can only be

expected to continue if there is an incentive for industry to do so. Generally, industry pursues sectoral approaches and associated data-gathering because its members believe industries from rapidly growing developing countries will more fully engage in addressing climate change and undertake actions themselves than if they are merely told to do so by governments. This is where governments will need to participate, however, by recognising the value of sectoral approaches and also by accepting that *global sectoral agreements* can constitute an important complement, if not an alternative, to the Kyoto Protocol architecture.

4.2 Risk of anti-competitive behaviour

Global sectoral industry approaches almost by definition represent a form of sector-wide coordinated activity. This potentially expanded role of industry groupings or associations may in turn raise anti-trust concerns in different national or regional jurisdictions, not only because they represent a sizable part of the global market but also because the cooperation is more intimately tied to issues that relate to how the market functions.

A sectoral approach requires cooperation within and between sectors and governments, triggering concerns about information exchange between potential competitors. For example, in the EU, Article 81 (1) of the European Communities (EC) Treaty prohibits all agreements, decisions and practices that might affect trade between member states and that have as their object or effect the prevention, restriction or distortion of competition within the internal market. When applying Article 81 or an equivalent provision, governments the world over have always been suspicious of information exchange between competitors.

Whether the sharing of information between competitors violates Article 81 (1) EC depends on whether that information would normally be regarded as a business secret. The European Commission is concerned about 'artificial market transparency' and considers the protection of 'hidden competition' an important goal of its competition law enforcement. The following two factors are of particular importance for the analysis of any exchange of information:

- the structure of the relevant market(s); and
- the nature of the information exchanged.

In general, the higher the market concentration and the more homogenous the product concerned, the more critically the exchange of

information will be viewed. In the *UK Tractor* case, for instance, the European Commission objected to an information exchange agreement in which it found that four firms held approximately 80% of the total market concerned. In *Wirtschaftsvereinigung Stahl*, the European Commission also characterised the market share of the four leading producers, who accounted for more than half of total production, as too highly concentrated. The European Commission considered that exchange of information in relation to these ‘highly concentrated markets’ was unlawful.

However, in the European Commission’s view, even in concentrated markets, exchanges of individual information at least one year old, or more recent aggregated data, between more than two companies, which do not allow the identification of individual company figures of the undertakings in question, are generally unobjectionable. In other words, any exchange of individualised data will only be accepted by the European Commission if it is more than 12 months old and therefore sufficiently historic to not have any impact on the future behaviour of the companies having access to the data. It should also be noted that the European Commission (supported by the European Courts) does not see the absence of any anti-competitive intention (e.g. information exchange/gathering/pooling for a good cause such as public policy goals) or actual anti-competitive effect as a mitigating factor. It is sufficient for a violation of Article 81 (1) EC if the agreement has *potential* anti-competitive effects. Thus negotiating and reaching successful sectoral agreements may require the use of independent third parties to protect confidentiality of participant information.

4.3 Incentives for emerging economies

A precondition for global sectoral industry approaches to achieve one of its two main objectives, namely enhancing the scope of greenhouse gas mitigation, is the participation of major companies in key energy-intensive industries in emerging economies, where most of the additional emissions will come from. In essence, this points to the need of incentives that could convince industries and/or governments of developing countries to participate in a global sectoral approach. Developing country involvement will also be important to render an authoritative assessment of abatement potential. However, developing country governments may see sectoral approaches as a means to push them into binding commitments.

4.3.1 Incentives, their limitations and possible solutions

The following section will examine a number of incentives that could potentially persuade emerging economies or their companies, or ideally both, to participate in a global sectoral industry approach. A first cluster of incentives revolves around sectoral crediting and no-lose targets. A second focuses on capacity-building, access to data and best practice. While the former most likely will need the cooperation of countries, the latter could at least theoretically proceed as soon as companies are interested.

Sectoral crediting or no-lose targets

As has been described in greater length, the initial concept of sectoral approaches is closely linked to sectoral crediting, which in turn has its roots in the discussion on developing a sectoral CDM. The motivation of the CDM was to provide incentives for industries in developing countries to start reducing GHG emissions beyond business-as-usual level and to thereby deepen the engagement of developing countries in post-2012 discussions. Sectoral crediting can be seen as the next step, after the existing, project-by-project-based CDM, thereby gradually moving towards country-wide caps that have been introduced internationally for Annex-I countries by the Kyoto Protocol. Crediting could be based on sectoral baselines, probably country or region-specific, or on pre-agreed policies and a quantification of their contribution to GHG abatement, over and above a business-as-usual trend. This is in contrast to the CDM, where only plants or a single project at a time is credited. Entering into a sectoral approach could also be linked to access to technology, e.g. through a multilateral fund.

The so-called ‘no-lose’ target takes this concept further and foresees that developing country governments make voluntarily reduction emissions commitments at the sectoral level. If they reduce more than their commitment, they will be able to sell emissions reduction credits – if verified – into an emissions trading scheme or receive some other form of funding. There is no penalty foreseen if the voluntary self-commitment is not met.

We have identified at least five areas that are critical for incentives to work.

- Data availability and collection, especially for the initial baseline data, is a precondition. In many cases such data do not exist, nor does the

capacity of companies or governments to collect it.. This is typically an area addressed by the APP's sectoral task forces.

- A second concern is developing country governments' capacity to deal with the complexities of crediting. Already the CDM tested the capacity of some developing country governments. Sectoral crediting would be even more challenging. Establishing a proper methodology can be technically tedious and politically contentious. Baron et al. (2007), assume that because of diversity among countries and sectors and complexity, sector-wide crediting will require a political 'deal' at country, i.e. party, level to establish the methodology based on which credits would accrue. Such a deal could be made within or outside the UNFCCC framework.
- Supply of credits would need to be matched by demand, which will mainly have to come from more stringent developed countries' commitments. Whether such commitments are possible without a global agreement is an open question. 'Sectoral credits' most likely will have to be fungible with other carbon market instruments such as CDM, Joint Implementation (JI) or the EU ETS in order to avoid 'sectoral havens'.
- Crediting would reinforce the competitive advantageous position of big companies of emerging economies vis-à-vis companies in Annex I. Many industry sectors in developed economies regard 'massive' crediting as a subsidy to their competitors in emerging economies and thereby may reinforce rather than reduce competitiveness impacts on their business. Bodansky (2007) shows that in order for international sectoral agreements – a more formalised model – to “diffuse competitiveness concerns”, a delicate political balance would need to be struck between efforts requested by sectors in developing and developed countries, respectively. It is likely that sectoral crediting may need to be matched by additional public funding from climate change funds or International Finance Institutions.
- Another and less well-researched item is impacts of sectoral crediting on competition in developing countries, notably in emerging economies. There is a risk that credits would most likely end up with already dominant companies in emerging economies, because of, for example, their size, technical and/or political savvy, access to resources and management and sheer economic weight. This could undermine competition in these economies, thereby creating barriers

to entry and, more generally, worsening the investment climate. This risk is even greater if companies continue to be state-owned or close to the government.

There are possible solutions to address the challenges that sectoral crediting poses.

- The first two challenges, *data availability and use* and *government capacity* will most likely differ for each sector and country. This calls for a ‘case-by-case’ approach, whereby for each country and/or sector specific barriers will be identified and possible solutions tested. Ideally, solutions for some countries or sectors will be of value to others and can therefore be generalised and applied on a broader scale. This will not only apply to data collection and use or governance, but also to thorny issues such as intellectual property rights. Suitable fora for this kind of work are the APP sectoral task forces, the forthcoming pilot project(s) of the European Commission, led by DG Enterprise, and the various industry initiatives, such as those under the auspices of the WBCSD/CSI, IAI and IISI. They all attempt, *inter alia*, to test whether in key countries and sectors challenges associated with global sectoral industry approaches can be solved pragmatically.
- The third challenge, i.e. *ensuring sufficient demand from developed countries*, essentially remains a politically hot topic. However, after the agreement during COP13 in December 2007 on the Bali Action Plan and a negotiation timetable, it can be hoped that there will finally be real progress on the side of developed countries towards “measurable, reportable and verifiable mitigation *commitments*”, i.e. deep cuts. There are numerous signs of this. The Bali Action Plan refers to “deep cuts”, albeit in global emissions, but also to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change. At the same time, the Bali Action Plan has to some extent cleared the way for some developed countries that have been insisting that developing countries commit to “measurable, reportable and verifiable mitigation actions”. Moreover, governments increasingly recognise the need for unilateral commitments. The EU has already agreed on a unilateral self-commitment. Similar discussions are underway in US states, such as California and in the north-east under the RGGI emissions trading scheme, and Japan.

- An even trickier issue is to *avoiding already competitive firms in developing countries benefiting from additional revenues through sectoral crediting*, i.e. the fourth challenge. Revenues from a crediting scheme will be a subsidy to industries from emerging economies, even more so if many of the options under a no-lose target are cost-effective or even at a negative cost as CCAP (2006) suggests.

A proposed solution to this dilemma is to focus on the size of this subsidy. Practically, this would mean departing from 'pure' crediting by setting more ambitious baselines (e.g. beyond business-as-usual), inserting a sunset clause or developing a graduation threshold for developing countries beyond which they cannot claim credit for undercutting business-as-usual emissions. This, however, reduces the incentives for emerging economies, both companies and governments. In such a strategy a possible obstacle to engaging firms both in emerging economies and economies in transition are CDM and JI. However, it can be expected that the CDM will be revised with more stringent baselines and, more generally, different eligibility criteria. One could also think of border measures.

- Solutions to the fifth challenge, i.e. avoiding adverse effects on competition within developing countries, are mainly a question of how the scheme is designed. It cannot be in the interest of developed countries to propose measures that could undermine competition or erect barriers to entry. As situations will differ country by country, the issue could be further explored in the European Commission's and other pilot cases in key countries and sectors.

Beyond sectoral crediting and no-lose targets

Additional incentives beyond sectoral crediting exist. They include 1) sharing of best practices, 2) access to data and information, e.g. to improve carbon management or baseline setting, 3) access to technology or technology cooperation and transfer, and 4) government funding for technology development and diffusion or technical assistance. There is growing experience within the APP, which could over time inform discussions.

It is unlikely that such a package of incentives on its own would suffice. Nevertheless, if properly designed, it could become a powerful complementary element of an 'incentive package' that could tip the balance in favour of developing countries' industries and governments embracing

sectoral approaches. Perhaps the incentive package could contain additional elements that have been proposed in the debate on technology cooperation and climate change, such as the establishment of a Multilateral Technology Acquisition Fund to buy out intellectual property rights (IPRs) and make privately-owned climate-friendly technologies available for deployment in developing countries, or the removal of barriers in both developing and developed countries that constrain exports of 'greenhouse gas intensity reducing technologies'. It has also been suggested that governments should only procure from companies that attain a minimum level of energy efficiency. This could be done via, for instance, a code of conduct.

However, any such incentive package will most likely reach major companies in developing countries and not the least efficient, which constitute the biggest problem. We should also expect that within a few years technology in many developing country companies will be state of the art as a result of new investment.

4.4 Governance

All sectoral approaches reviewed here could theoretically be conceived either as a separate, i.e. standalone, pillar in an overall global policy framework, e.g. sectoral industry agreements as part of the post-2012 framework, or as a complementary, perhaps cross-cutting element of national, regional or international policies and frameworks. Ultimately, the two may even converge. A third possibility is to regard sectoral approaches as an intermediate step between now and the agreement of a comprehensive global agreement. Given that sectoral approaches are very data-intensive and complex, it is unlikely that government and stakeholders will engage in such a time-consuming exercise during a transition period.

4.4.1 Challenges

Sectoral industry approaches face various governance challenges, especially at the level of industry itself, in developing countries/emerging economies and within the UNFCCC secretariat.

1. The management/governance of global sectoral approaches poses challenges to the industries involved. First and foremost, sectoral approaches can only work if companies do not 'free-ride'. Due to

their voluntary nature, purely industry-led initiatives are most likely not able to ensure that all or at least the majority of companies are covered by an agreement, unless of course the sectoral approach is a win-win situation. The kind of reduction targets that are needed to avoid climate change almost certainly rules this out. Industry associations, even if organised at the national level, typically seldom have the right to impose or enforce majority decisions. Closely related is the issue of formulating a target and then enforcing commitment to it. Again, industry almost certainly would have to look to governments.

2. Another critical issue is the administrative capacity of developing countries, i.e. how governments in emerging economies and developing countries in general can implement not only monitoring, reporting and verification but also baseline-setting and enforcement. This is especially true for crediting mechanisms. If, for example, sectoral industry approaches are combined with no-lose targets, there has to be a mechanism to allocate credits from countries to companies. If credits go to small companies, there are no additional competitiveness concerns.
3. A precondition for governance challenges to be met is that the UNFCCC secretariat, or another organisation that is tasked as secretariat for a global climate change agreement, will be able to handle the technical complexities surrounding sectoral approaches. Negotiations under the UNFCCC to date are political negotiations, where negotiations on technical issues tend to be delegated. Many existing non-Annex I delegations might find it difficult to handle the technical complexities that a sectoral approach for cement, aluminium or steel involves (e.g. Baron et al., 2007).

4.4.2 Options

Given that the different industry initiatives, i.e. global sectoral industry approaches, already differ considerably and are likely to evolve, it is next to impossible to identify a governance option at this stage. This situation is aggravated by the fact that the shape of the future climate change agreement is unknown. However, Bradley et al. (2007: 9) have identified five possible governance models that, depending on the circumstances, could be applied. Note that these governance models relate to general

sectoral approaches and not to global sectoral industry approaches that this report focuses on.

- Sector-only, i.e. negotiations of multiple sector agreements, which would be the principle if not only regulation covering GHG emissions.
- Addition, i.e. a progressive expansion of a climate change regime on a sectoral basis.
- Complementary, i.e. certain sectors might be covered by two distinct agreements simultaneously but in a complementary manner, e.g. a technology standard combined with economy-wide policies.
- Carve-out, i.e. the global agreement would exclude certain sectors that are covered by a sectoral agreement.
- Integration, i.e. special provisions could be integrated within an otherwise comprehensive agreement, which is already the case for the Kyoto Protocol and Land Use Change and Forestry (LUCF).⁹

Many of these themes return in the analysis of the IEA (i.e. Baron, 2006; Baron et al. 2007: 39). This analysis has established three possible governance options, which are broadly related to the four sectoral approach models that the IEA has identified. Hence, they also extend beyond global sectoral industry approaches:

- a unilateral move by industry to foster GHG improvements, i.e. Global Action (GAn);
 - a Global Agreement between industry and Parties to the UNFCCC, i.e. GAt;
 - a series of National Policies targeting a sector with some Intergovernmental Coordination (NPIC).
- a) The *Global Action (GAn)* option describes a scenario where an industry-led initiative adopts a GHG or other goal, or agrees on principles to move towards lower GHG emissions, such as to achieve a certain benchmark or performance standard. GAns are a

⁹ Emissions and absorptions from this sector are neither carved out of the agreement nor subject to a different agreement. Instead, they are subject to special rules under the Kyoto Protocol (see Bradley et al., 2007: 11).

coordination forum for companies' mitigation efforts with neither governments nor global institutions being involved. Governance issues are essentially internal to industry and it is up to participating industries to establish a governance structure appropriate to the pledge.

- b) A firmer commitment is a *Global Agreement (GAt)*, whereby an industry negotiates a globally applicable agreement with governments to achieve certain GHG objectives. Examples of such an approach at the national level would be the voluntary agreement between German industry and its government prior to the EU emissions trading scheme, or the Japan Keidanren voluntary agreement. In addition to the governance challenges within industry, the Global Agreement will require formal recognition of industry efforts by governments. Such recognition could theoretically also be provided by an international institution, which, however, raises issues of capacity of international organisations. For those countries/parties where there are no or less stringent policies in place, GAts could become a means to engage their industries towards lower emissions. This brings us back to incentives that we have discussed in the previous section. There may be an interest of industry as a whole to attain a more homogeneous set of climate policies globally, at least in the medium- and long-term. However, this calls for an effective system to avoid the free-riding of a few companies.

In those countries/parties where policies are already in place, the GAt would either need to be more stringent than existing policies – which would work against the objective of engaging industry in countries with no policies – or at least compatible with domestic policies. This topic will be addressed in chapter 5. A precondition is that participating countries will need to put into place credible and effective monitoring and compliance regimes to avoid industry free-riding.

According to Baron et al. (2007), ongoing activities that have the potential – over time – to lead to a voluntary GAt are those of the sectoral task forces under the APP. These include data-gathering to establish sectoral benchmarks, information-sharing on technologies, implementation of projects to enhance energy efficiency and environmental performance and to share experience on regulatory

issues. Baron et al. (2007: 41), argue that although the APP to date does not set targets, goals that could be proposed could bring the APP closer to the ‘pledge-and-review’ category, and possibly even nearer to a negotiated agreement than a unilateral industry action.

- c) A third option would be intergovernmental coordination of national sectoral approaches (or as the IEA calls it, “national policies with intergovernmental coordination”, or NPIC). Sectors would agree on sectoral commitments with their national governments. In tandem, some international framework, agreed to by UNFCCC parties or at least a majority, would establish a broad framework within sectoral approaches, addressing, e.g. issues related to benchmarks, how to address free-riding, incentives or rights and obligations of parties with regard to competitiveness.

4.4.3 Sectoral approaches under the UNFCCC or a global agreement

To date global sectoral industry approaches have mainly been bottom-up approaches that attempt to formulate sector-wide commitments. They are only starting to deal with the thorny issue of how to make them fit into a global climate change agreement.

Therefore, global sectoral industry approaches have the potential to put both national policies and measures and international negotiations on a firmer footing. This can take various forms, e.g. 1) identifying win-win mitigation options, 2) interpreting ‘common but differentiated responsibilities’, 3) discovering abatement potentials that could neutralise the reluctance of some negotiation partners, 4) realising cost-effective solutions based on industry understanding, or 5) making efforts comparable. Data definition and collection will provide additional information to governments and negotiators when discussing national goals and commitments.

Global sectoral industry approaches could also become a tool for the development and deployment of technologies that are considered by many to be a key component of future global agreements. The IISI CO₂ Breakthrough Programme is the most well-known example of such an approach. This could also include the development of a joint protocol to be approved by the UNFCCC, as has been the case with the aluminium protocol.

Any link of sectoral approaches to a global agreement will most likely need to rely on a high degree of both intergovernmental and industry

cooperation with enforcement ensured by national governments. This could either be done within a 'pledge-and-review' model or possibly even combined with some sort of intergovernmental cooperation framework that we have discussed under the NPIC governance option. Such a cooperation framework, however, will depend on the 'good will' of parties, i.e. some sort of political deal. It is important to note that not necessarily all governments will need to be involved. One could further develop sectoral approaches step-by-step, e.g. in the context of the MEM or G8+5, or their possible successors.

5. COMBINING SECTORAL APPROACHES WITH NATIONAL AND UN CLIMATE CHANGE POLICY PRIORITIES

The design of global sectoral approaches for industry has already begun. Now they will need to fit into existing national or regional policies and practices. Governments have developed a policy framework to deal with climate change policy and have invested significant time and effort. Moreover, such policies represent a consensus that in many cases was difficult to achieve. A new consensus will need to find a new balance between different – conflicting – interests. Hence, a new element such as sectoral approaches will most likely need to be a complement rather than a replacement, at least in the initial phase. At this stage it is realistic to believe that it is up to industry to make the case for sectoral approaches and, in particular, identify their value.

Given the complexity of global negotiations and an extremely tight negotiations schedule with a 2009 deadline for a post-2012 framework, support for sectoral approaches will depend on whether they are seen as facilitating rather than complicating the negotiations. Therefore, unless global sectoral industry approaches can provide satisfying answers to the question of how they could fit into a post-2012 regime, they might be ignored.

A third issue, which has been explored in greater depth by the OECD/IEA, is the risk of creating sectoral ‘CO₂ havens’. One of the fundamental principles of global climate change policy is to ensure equal costs on different emitting activities. Different marginal abatement costs between sectors increase the overall economy-wide costs in achieving a given climate change target. A solution will need to be elaborated in the

POLICY PRIORITIES

way sectoral industry approaches are linked to GHG emissions trading schemes or, more generally, the global carbon market.

Finally, the IEA points out that sectoral industry approaches risk to suffer from asymmetry of information between industry and governments, i.e. the regulator. This concept of asymmetry of information is well established and has been documented within the National Allocation Plans for the ETS but also in a number of voluntary or negotiated agreements, which have been criticised by merely aiming at business-as-usual reductions. This risk reinforces the need for sound and verifiable data at firm and sector levels.

5.1 How can sectoral approaches fit in with EU priorities?

The potentially strongest link between sectoral approaches and EU policies are with the EU ETS and the global carbon market. Benchmarks could play a useful role for cap-setting (i.e. agreeing overall target) and/or allocation, i.e. distribution of the allowances among installations, for the development of global carbon markets and finally as a means to engage developing countries.

- If sectoral benchmarks – understood as a rate of CO₂ emissions per unit of intake – production or activity are based on ‘best practice’ or best available technology in a sector, they can be used for setting the cap. In order to do so, however, benchmarking would require a ‘model’ that adequately links ‘practice’ to CO₂ emissions based on a few performance and operational parameters to avoid that the model is too approximate, which risks introducing distortions between market participants.
- A second possible application of sectoral benchmarks is for allocation, provided that free allocation continues. While initial free allocation of the EU ETS Directive has been based on grandfathering (i.e. based on historic emissions), the draft Directive foresees the use of benchmarks, if applied in a harmonised way throughout the EU. Global benchmarks would do away with EU efforts to develop them.
- A third potential application of benchmarks relates to ‘linked carbon markets’. For the period 2013-20, before a single global carbon market is expected to be in place, the EU foresees the development of a global carbon market by linking the EU ETS with other domestic emissions

trading schemes. Linking, however, may require adjustment in design options between different schemes. It may be facilitated and accelerated insofar as central design options such as MRV,¹⁰ cap-setting and (free) allocation are converging. Sectoral approaches, including benchmarks, can facilitate such harmonisation.

- While developed countries in the Bali Action Plan have accepted 'commitments', developing countries have signed up to undertake 'measurable, reportable and verifiable *actions*', provided that developed countries assist with financing and technology. It is now up to the negotiators, until the end of 2009 for COP 15, to define what such 'actions' mean. Data collection would seem to be almost a precondition to ensure measurability, accurate reporting and verification. Experiences from data collection exercises under sectoral approaches would almost be the natural starting point to set up effective monitoring, reporting and verification systems. Similarly, the effects of 'actions' will need to be compared with a benchmark. Industry-led sectoral approaches or the APP would appear to be the most suitable fora for developing global performance benchmarks against which actions can be assessed. Such benchmarks could be extended, for example, to a sectoral CDM. As a result the work undertaken in sectoral approaches could become the basis for engaging developing countries at the sectoral level. In short, developed countries could make their 'measurable and verifiable' assistance in financing and technology transfer to developing countries – a commitment since the UNFCCC – dependent on developing countries, notably emerging economies, using globally agreed sectoral performance benchmarks.

¹⁰ Monitoring, Reporting and Verification of emissions.

6. THE WAY FORWARD

Global sectoral industry approaches have potential. This has been demonstrated above. 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.

Global sectoral industry approaches are complex. Governments, negotiators and other stakeholders struggle to understand them. Partly, this is a result of global sectoral industry approaches being genuinely bottom-up. Sector specifics or political dynamics within such approaches differ, and as a result models vary as well, even with regard to focus and priorities. It is therefore up to industries to explain their respective approaches and indicate potential merits while developing the approaches further. Given that Copenhagen in December 2009 will be a critical junction of global climate change policy, industry will need to show immediate progress towards developing global sectoral industry approaches. We should expect that there is a time window from now to around mid-2009, when government preparations will most likely be concluded and final negotiations begin. We can also see this time window as a formative period during which sectoral approaches will have to find their place on the evolving 2009 negotiation agenda. While one must not rely on COP 15 in Copenhagen to take firm decisions on the shape of sectoral approaches, it will nevertheless establish the future direction.

Whether the concept of global sectoral industry approaches will gain further traction will depend on whether industry initiatives will be able to engage sectors from rapidly growing developing countries such as China, India, Brazil, South Africa, South Korea and Mexico, and developed countries such as the US and South Korea. Global sectoral industry approaches by definition will only work if there is global or near-global coverage.

Irrespective of whether global sectoral industry approaches as we know them to date will successfully address the challenges that have been identified in this report, their bottom-up and cooperative nature and data-gathering have already positively influenced the depth, speed and direction of post-2012 discussions in at least two major ways. First, global sectoral industry approaches have the merit of not only improving hard data on emissions, abatement potentials and costs, but also of illustrating successful ways to increase energy efficiency and accelerate the diffusion of existing technology and the development of new technology. Therefore, they are likely to lead to real GHG emissions reductions. Second, and perhaps even more important, is that global sectoral industry approaches represent a cooperative approach to a thorny global long-term problem. Many people maintain that cooperative approaches to a politically difficult and technically complex long-term issue such as climate change is more appropriate than the traditional adversarial approach that is dominant, at least in the Western world. Sectoral approaches offer perhaps the ideal way to develop a cooperative approach to climate change mitigation. It is increasingly clear that governments alone will not be able to achieve climate change objectives. Government efforts need to be combined with efforts by other stakeholders, notably industry and, increasingly, financial institutions. The European Commission High-Level Group on Competitiveness, Energy and Environment, which completed its work in late 2007, has been a good example of such a cooperative approach. Similar platforms could be created based on international for a, such as the MEM, G8+5 and their successors or the APP.

In order to accelerate the development of global sectoral industry approaches, we propose the following concrete steps.

1. 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 four challenges can be solved pragmatically.

2. Developed country governments, in partnerships with industry and international bodies, should pursue activities to build the capacity of companies and developing country governments to measure and report emissions sector by sector.
3. Governments should support the development of global sectoral industry approaches by engaging with industry sectors and possibly review their activities, possibly in the context of the IEA benchmarking exercise.
4. Industry should reinforce its efforts to develop practical performance benchmarks that are acceptable in sectors across a range of developed and developing economies.
5. 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 recently launched WBCSD working group on sectoral approaches is an example.
6. Industry sectors should gather the results of already successful efforts on 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 that is undertaken under the auspices of the IEA, national and international industrial associations, the APP and EU ETS allocation methodologies.
7. Industry and governments should harmonise data formats of different databases, such as those used by the APP, IEA and industry-led approaches.
8. Those advocating sectoral approaches should identify what COP 15, 2009 in Copenhagen will need to decide to maintain or even accelerate the momentum of sectoral approaches.
9. Industry must provide guidance on it wants to see in a global agreement, e.g. recognition of sectoral approaches, model(s), absolute or intensity targets, the role of sectoral crediting or even the beginning of sectoral level negotiations.

REFERENCES

- Åhman, M. (2008), “Why International Transport Needs a Sectoral Approach”, in C. Egenhofer (ed.), *Beyond Bali: Strategic Issues for the Post-2012 Climate Change Regime*, CEPS, Brussels, April, pp. 146-154.
- APP (2007), “Asia-Pacific Partnership on Clean Development and Climate – Action Plans” (retrieved from <http://www.asia-pacificpartnership.org>).
- Baron, R. (2006), *Sectoral Approaches to GHG Mitigation: Scenarios for Integration*, OECD/IEA Information Paper, Paris.
- Baron, R., J. Reinaud, M. Genasci and C. Philibert (2007), *Sectoral Approaches to Greenhouse Gas Mitigation – Exploring Issues for Heavy Industry*, OECD/IEA Information Paper, Paris.
- Baron, R. and J. Ellis (2006), “Sectoral crediting mechanisms for greenhouse gas mitigation: institutional and operational issues”, COM/ENV/EPOC/IEA/SLT (2006)4, OECD/IEA Information Paper, Paris.
- Bodansky, D. (2007), *International Sectoral Agreements in a Post-2012 Climate Framework*, Working Paper, PEW Center on Global Climate Change, Washington, D.C.
- Bosi, M. and J. Ellis (2005), *Exploring Options for “Sectoral Crediting Mechanisms”*, COM/ENV/EPOC/IEA/SLT(2005)1, OECD/IEA Information Paper, Paris.
- 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*, WRI Report, World Resource Institute, Washington, D.C.
- CCAP (2006), *Greenhouse Gas Mitigation in Brazil, China and India: Scenarios and Opportunities through 2025: Conclusions and Recommendations*, Center for Clean Air Policy (CCAP), Washington, D.C., November.

- Debruxelles, Jean-Pierre (2007), "Climate change and the steel industry: a proposal for a sector approach", presentation at the fourth meeting of the CEPS Task Force on EU climate change strategy and the Gleneagles Plan of Action: The G8+5 Climate Change Dialogue, CEPS, Brussels, 10 May (retrieved from http://www.ceps.eu/files/TF/Baseline_final_19_May_2007.pdf).
- De Coninck, H., C. Fischer, R.G. Newell and T. Ueno (2007), *International Technology-Oriented Agreements to Address Climate Change*, RFF Discussion Paper 06-50, Resources for the Future, Washington, D.C.
- Egenhofer, C., N. Fujiwara and B. Stigson (2007), *Testing Global Sectoral Industry Approaches to Address Climate Change*, Interim Report of a CEPS Task Force, presented at the COP13, Bali, Indonesia on 7 December 2007, CEPS, Brussels.
- Egenhofer, C., L. Milford, N. Fujiwara, T. Brewer and M. Alessi (2007), *Low-carbon Technologies in the Post-Bali Period: Accelerating their Development and Deployment*, ECP Report No. 4, presented at COP/MOP, Bali, Indonesia on 7 December 2007, European Climate Platform (ECP), Brussels.
- Ellis, J. and R. Baron (2005), *Sectoral Crediting Mechanisms: An Initial Assessment of Implementation Issues in the Electricity and Aluminium Sectors*, OECD/IEA Information Paper, Paris.
- EUROFER (2007), *Combating Climate Change*, EUROFER Publication (retrieved from <http://www.eurofer.org/publications/pdf/2007-ClimateChange.pdf>).
- European Commission (2007a), *Limiting Global Climate Change to 2 Degrees Celsius: The Way Ahead for 2020 and Beyond*, COM(2007), 2 final, Brussels, 10.01.2007.
- European Commission (2007b), *Fifth Report of the High-Level Group on Competitiveness, Energy and the Environment: Contributing to an Integrated Approach to Competitiveness, Energy and Environment Policies*, Brussels, 08.11.2007.
- European Commission (2008a), *Proposals for a Directive of the European Parliament and of the Council amending Directive 2003/87/EC so as to improve and extend the EU greenhouse gas emissions allowance trading system*, COM(2008), 16 final, 23.01.2008.
- European Council (2007), *Presidency Conclusions*, 8-9 March 2007, 7224/1/07 REV 1.

- Fischer, C., C. Egenhofer and M. Alessi (2008), "The critical role of technology for international climate change policy", in C. Egenhofer (ed.), *Beyond Bali: Strategic Issues for the Post-2012 Climate Change Regime*, CEPS, Brussels, April, pp. 118-133
- Fujiwara, N. (2007), *The Asia-Pacific Partnership on Clean Development and Climate: What it is and what it is not*, CEPS Policy Brief No. 144, CEPS, Brussels.
- Government of Australia (2007), *Asia-Pacific Partnership on Clean Development and Climate: Partnership for Action*, second edition, Government Brochure.
- Hoehne, N., F. Yamin and E. Haitis (2008), "History and status of the international negotiations on a future climate agreement", in C. Egenhofer (ed.), *Beyond Bali: Strategic Issues for the Post-2012 Climate Change Regime*, CEPS, Brussels, April, pp.13-35
- IEA (2005), *Climate change, clean energy and sustainable development: IEA's G8 Gleneagles programme*, IEA: Paris.
- IEA (2006), *Sectoral Approaches for Greenhouse Gas Mitigation in the Power Sector*, Summary of IEA-ENEL Workshop on Sectoral Approaches for Greenhouse Gas Mitigation in the Power Sector, Rome 30-31 October 2006, IEA, Paris.
- IEA (2007), *World Energy Outlook 2007*, IEA: Paris.
- Jitsuhara, I. (2007), "Sectoral approach for climate change in the world steel industry", presentation at the first meeting of the CEPS Task Force on sectoral industry approaches to address climate change, CEPS, Brussels, 18 September.
- Macey, A. (2008), "Getting Serious about Mitigation Potential: The Work of the ad hoc Working Group on Future Commitments for Annex I Parties under the Kyoto Protocol", in C. Egenhofer (ed.), *Beyond Bali: Strategic Issues for the Post-2012 Climate Change Regime*, CEPS, Brussels, April, pp. 36-45.
- Pizer, W. (2007), *Practical Global Climate Policy*, Belfer Center for Science and International Affairs, John F Kennedy School of Government, Harvard University, Policy Brief, 5 September.
- Porteous, H. (2007), "Alcan's view on a global sectoral approach", presentation at the CEPS workshop on sectoral approaches, CEPS, Brussels, 18 September.

- Schmidt, J. et al. (2006), *Sector-based approach to the post-2012 climate change policy architecture*, Center for Clean Air Policy, Washington, D.C.
- Tachibana, Y. (2007), “Sectoral Approach in Power Sector”, presentation at the Side Event of Japan during COP13 in Bali, Indonesia, 10 December.
- Vanderborght, B. (2007), “Holcim reflections for sectoral approaches for post-2012”, presentation at the second CEPS Task Force meeting on sectoral approaches, 23 October.
- Vieillefosse, A. (2007), *Des accords sectoriels dans les engagements Post 2012 ?*, D4E, Ministère de l’Ecologie et du Développement Durable, Paris.
- WBCSD (2004), *Mobility 2030: Meeting the challenges to sustainability*, World Business Council for Sustainable Development, Geneva.
- WBCSD (2006), *Powering a sustainable future: an agenda for concerted action*, World Business Council for Sustainable Development, Geneva.
- WEC (2007), *Transport and Technologies and Policy Scenarios to 2050*, Executive Summary, World Energy Council (WEC), London.
- Zetterberg, L. (2008), “How to Integrate International Aviation and Shipping into a Global Emissions Trading System”, in C. Egenhofer (ed.), *Beyond Bali: Strategic Issues for the Post-2012 Climate Change Regime*, CEPS, Brussels, April, pp. 156-162.

APPENDIX 1. CEMENT SUSTAINABILITY INITIATIVE (CSI) SECTORAL APPROACH TO MANAGING CO₂ EMISSIONS

1. About the CSI

The CSI is an initiative, launched in 2000 by the World Business Council for Sustainable Development, to promote sustainable practices in the cement sector. The CSI now has 18 major international companies as members, who manufacture cement in more than 70 countries. CSI companies and their affiliates represent 60% of global cement manufacturing outside of China.

Over the last five years, CSI companies have made major efforts to identify and reduce CO₂ emissions within their sector, via a series of initiatives culminating in the development of a global database of CO₂ emissions from cement plants as a function of fuel, location, technology and other critical parameters. Called 'Getting the Numbers Right', this effort is based on a substantial protocol for monitoring, reporting and verifying CO₂ emissions, which can now form the sound numerical basis for the CSI sectoral approach initiative.

2. CSI Sectoral Approach (SA) Initiative

The CSI SA initiative has as its main objective to monitor, report, verify and mitigate CO₂ emissions from the global cement sector in a consistent and fair way, which can contribute to global efforts in UNFCCC to respond to the challenge of climate change.

An important part of the SA is helping to build capacity in emerging economies to deal with CO₂ management, as these economies will account for nearly 80% of the cement sector's emissions in the near future. Such sectoral initiatives should help pave the way for a broader global framework by providing transparency of emissions, tools for implementation and consistency for mitigation opportunities. CSI companies are building their SA based on the following principles and elements:

Principles

- A flexible and inclusive approach allowing for integration into national and regional regimes.
- A focus on improving process efficiency, based on ambitious emissions mitigation.
- Being open to market approaches with inefficiencies minimised by fully fungible credits.
- Promoting a level playing field for the global cement sector.

Key Elements

- Production-based efficiency benchmarks for authorities to set targets and incentives.
- Simple metric of t CO₂/t cement for proposing consistent but differentiated targets.
- Market credits to reward improved efficiency, and promoting waste fuel/blended cement.
- Support R&D to develop technology, and build capacity through public-private partnerships.

3. Principal Challenges

- The continuing increase in the demand for cement, especially in emerging economies, to construct direly needed housing and infrastructure.
- Attracting developing countries to participate in a sectoral approach.
- Crediting mechanisms that hinder a level playing field by subsidising competitors.
- Integrating SA into existing and developing national and regional regimes, like the EU ETS.

4. CSI SA Status

- Developing a benchmark proposal based on a simple metric of process efficiency.
- Being ready to advocate SA consistently in UNFCCC and towards G8+5 and APP groups.

APPENDIX 2. THE ALUMINIUM INDUSTRY'S GLOBAL SECTORAL APPROACH TO CLIMATE CHANGE

Objectives

- An 80% reduction in perfluorocarbon (PFC) greenhouse gas emissions per tonne of aluminium produced for the industry as a whole by 2010 versus 1990.
 - PFCs are potent and long-lasting greenhouse gases, produced during brief upset conditions in the aluminium smelting process, known as 'anode effects'.
- A 10% reduction in average smelting energy usage by IAI member companies per tonne of aluminium produced by 2010 versus 1990.
- IAI member companies will seek to reduce GHG emissions from the production of alumina per tonne of alumina produced.
- The industry will monitor aluminium shipments annually for use in transport in order to track aluminium's contribution through light-weighting to reducing greenhouse gas (GHG) emissions from road, rail and sea transport.
- The IAI has developed a mass flow model to identify future recycling flows and estimate future greenhouse gas emissions. The industry will report regularly on its global recycling performance.

Focus

- Quantification of all greenhouse gas emissions from aluminium production processes and assessment of full life cycle emissions and emissions savings from the production, use and recycling of aluminium products.
- Development and employment of standardised greenhouse gas measurement and calculation methodologies.
- Comprehensive annual data collection on anode effect performance (PFC emissions), alumina refining and aluminium smelting energy consumption, anode consumption, lime production and soda use.

- Elimination of anode effects during normal operating conditions through:
 - sharing of best practices;
 - benchmarking of performance by technology;
 - investment by member companies in control technologies.
- Encourage facility specific measurement of PFC emissions by:
 - providing access to experts, training and equipment;
 - striving for greater accuracy in facility, national and global industry GHG inventories.
- Encourage greater energy efficiency throughout the production phase.
- Encourage further increase in the collection of post-consumer scrap for recycling.

Members

The IAI has 26 member companies worldwide, which are responsible for more than 70% of world primary aluminium production and a significant proportion of the world's recycling production. The IAI Board of Directors comprises the chief executive officers or managing directors of each member company. All IAI member companies have agreed on the sectoral approach to climate change as part of the industry's Aluminium for Future Generations sustainability initiative and all submit data to the IAI. A number of non-member companies also submit annual GHG-related data.

Status

- PFC emissions have been reduced by 83% per tonne of product between 1990 and 2006.
 - This equates to a reduction of over 65% in total global annual PFC emissions to the atmosphere.
 - The IAI is currently developing a further PFC objective.
- The energy efficiency of the electrolytic process has improved by 5% between 1990 and 2005.
 - Through energy efficiency improvements, the industry has reduced indirect emissions from electricity production by 8% per tonne of aluminium produced between 2000 and 2005.
 - The IAI is currently developing an objective for energy efficiency in alumina refining.

- Latest life cycle inventory data from 2005 show that there has been a **14% reduction in total direct greenhouse gas emissions** from the production processes of primary aluminium, including bauxite mining, alumina refining, anode production, aluminium smelting and casting, between 2000 and 2005, **despite a 20% increase in primary aluminium production** over the same period.
 - This has been driven primarily by the impressive reduction in perfluorocarbons, combined with a 12% reduction in other direct emissions.
- Overall, reductions of direct and indirect greenhouse gas 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.
- The production of aluminium from recycled products worldwide rose from 13 to 15 million tonnes per year between 2000 and 2005.

Major future challenges

- 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.

Future Global Sector Agreement

- The European Aluminium Association members are promoting discussions, within the global industry, on the environmental potential for a crediting, no-lose agreement.
- Such an agreement, connected to the Clean Development Mechanism, would credit industry, in non-annex countries, for direct emissions reductions beyond business-as-usual.
- Benchmarks, developed from existing IAI data, would be used to construct crediting baselines.
- Such an agreement would encourage developing country industry to implement rigorous data-monitoring and verification and to reduce emissions even sooner than may be the case now.

APPENDIX 3. PROPOSAL FOR A GLOBAL SECTORAL APPROACH TO CLIMATE FOR THE STEEL INDUSTRY

The International Iron and Steel Institute (IISI) proposes a global sectoral approach to climate change. The IISI represents approximately 180 steel producers (including 19 of the world's 20 largest steel companies), national and regional steel industry associations, and steel research institutes. IISI members produce around 75% of the world's steel (excluding China). The increasing number of IISI members in China already cover 20% of Chinese production.

Background

Over 90% of steel industry emissions come from iron production in nine countries or regions: Brazil, China, the EU, India, Japan, Korea, Russia, Ukraine and the US.

Technological advancements over the past 25 years have enabled substantial reductions in CO₂ emissions from steel production. These advancements include:

1. enhanced energy efficiency in the steel-making process;
2. improved recycling of steel products, currently in excess of 60% in developed countries;
3. improved use of by-products from steel-making;
4. better environmental protection techniques.

In the future, steel will play a critical role in addressing climate change in at least three areas.

1. Products. Across many fields, new and technologically advanced applications of steel are available. Steel is indispensable to renewable energy industries, for example, in wind turbines and solar power structures. Steel is also a key part of the future construction of carbon-neutral housing and in a new generation of lightweight yet fuel-efficient vehicles.
2. Technology transfer. The greatest potential for medium-term improvement lies in technology improvements in developing

countries and the Economies in Transition. The steel industry is involved in programmes to accelerate the replacement of outdated steel plants. The IISI is a source of technology transfer information; for example, through special projects and working groups, members regularly exchange information.

3. Long-term breakthrough technology. Today's steel-making processes have optimised energy use. To make a significant further reduction in CO₂ emissions, fundamentally new processes are required. The IISI and its members have launched the IISI CO₂ Breakthrough Programme, which is a long-term research project investigating new processes for steel production that will substantially decrease CO₂ emissions.

The global steel sector approach

The IISI is proposing a global steel sector approach that is intensity based, verifiable and technology-driven. The IISI proposes that:

- any emissions regulatory regimes support the expansion of efficient steel companies and penalise inefficient companies;
- governments work closely with the steel industry on a global approach by adopting a sector-specific framework that involves all major steel-producing countries;
- governments work with the IISI to adopt and support a new methodology that will measure and analyse emissions data from its member companies' plants in all major steel-producing countries;
- governments work with the steel industry to invest in the next generation of breakthrough technology CO₂ programmes, to bring about the next major advancement in steel-making.

Source: International Iron and Steel Institute (IISI).

APPENDIX 4. CEMENT SUSTAINABILITY INITIATIVE (CSI) “GETTING THE NUMBERS RIGHT” PROJECT

1. About the Project

The Cement Sustainability Initiative (CSI) launched its “Getting the Numbers Right” (GNR) project to obtain current and robust data for CO₂ and energy performance of clinker and cement production at regional and global levels across cement companies worldwide. There is clear consensus among CSI members of the need to bring up to date currently available industry data in order to paint an accurate picture of CO₂ emissions levels and energy efficiency in the cement industry, to aid decision-making by both policy-makers and industry.

2. Objective

The objective of the GNR project is to develop representative statistical information on the CO₂ and energy performance of clinker and cement production regionally and worldwide in order to serve the needs of internal and external stakeholders.

3. Data Reporting

Data is reported by participants based on the “CO₂ Accounting and Reporting Standard for the Cement Industry”, a CO₂ reporting protocol developed by the CSI in line with the Greenhouse Gas Protocol developed by the World Business Council for Sustainable Development (WBCSD) and the World Resources Institute (WRI) in 2001. The CO₂ reporting protocol is voluntarily used by CSI member companies worldwide, providing specific guidelines for measuring and reporting CO₂ emissions from the cement manufacturing process. This is the first time an industry initiative has adopted a voluntary, independently audited emissions protocol. An updated second edition of the protocol was published in 2005.

4. Data Confidentiality

To ensure the confidentiality of the GNR database and of individual datasets submitted by participants, PricewaterhouseCoopers (PwC) was selected to manage the database as a third party, external and independent of participants. PwC develops the database system, collates the reported data, analyses the results of various statistical queries, and produces consolidated data and reports. As the independent manager of the GNR database, PwC is responsible for ensuring that all data that can be traced back to individual companies or plants will remain strictly undisclosed, nor will it be accessible to any unauthorised internal or external stakeholder. PwC also provides a guarantee of non-disclosure of confidential information and compliance with competition law.

A Project Management Committee (PMC) was established to serve as the single contact point for all communications between participants in the GNR project and PwC. The PMC develops the schedule for companies' data submittal to PwC, and receives and deliberates on stakeholder requests for data.

5. Data Collection

In the first cycle of data collection, companies submitted data for the years 1990, 2000 and 2005.

CO₂ and energy performance data was collected on:

- specific gross and net CO₂ emissions per tonne clinker, cement and cement product;
- absolute gross and net CO₂ emissions;
- thermal energy consumption per tonne clinker;
- electric energy consumption per tonne cement;
- fuel mix (fossil fuel/fossil alternative fuels and raw materials (AFR)/biomass);
- clinker to cement ratio.

To enable calculation of the percentiles, trend lines and correlations, company facilities were also required to provide:

- clinker and cement production volumes;
- differentiation by grey and white clinker;
- type of installation;
- nominal capacity;
- year of construction.

6. Scope of Data Collection

The scope of the data collection covers all countries and regions where participants have clinker, cement and grinding operations. The geographical scope is expected to expand as additional parties join the project.

Seventeen out of 18 CSI member companies participated in the first cycle of data collection, in which over 700 operating sites submitted the requested data. The project participants comprised 28% of global cement production¹¹ in 2005, with high data coverage for Europe (73%), North America (75%), Latin America (65%) and India (57%), but low for Asia (11%) and China (5%).

7. Applications

The intention of building a globally representative database of CO₂ emissions and energy performance information for the cement industry is to help the industry and policy-makers alike to better assess the influence of kiln technology, fuel selection, plant location and other variables on global and regional plant performance and emissions management.

Using a common protocol for measuring and reporting and a common methodology for data analysis ensures consistency in both data input and analysis, and hence reliable and broadly applicable output.

A current, representative and robust GNR database would be fundamental in providing the foundation for any future assessment of performance-based benchmarks in the cement industry; for instance, for assessing and setting intensity-based benchmarked targets in a potential global sectoral agreement for the cement industry.

8. Next Steps

The second cycle of data collection has commenced, and collection of 2006 data is currently in progress. In subsequent phases the project may include data and information on technology diffusion.

¹¹ Source: USGS (Hydraulic cement, World production by country), see <http://minerals.usgs.gov/minerals/pubs/commodity/cement/>.

To date, the GNR project is the initiative with the widest coverage of the cement industry globally, but it could be better represented in Asia, particularly in China. The CSI is actively encouraging other cement companies and federations worldwide to participate, so as to build a more complete foundation for policy analysis and action. Most recently, CEMBUREAU (European Cement Association) joined us in this effort.

Source: Cement Sustainability Initiative (CSI).

APPENDIX 5. THE INTERNATIONAL ALUMINIUM INSTITUTE'S GLOBAL PERFORMANCE DATA

Since its incorporation, in 1972, one of the core tasks of the International Aluminium Institute (IAI) has been the collection and publication of global industry data. Initially, this process centered around production, capacity, inventory and energy consumption data for aluminium and alumina – basic information about the global industry, which is still collected and published to this day (www.world-aluminium.org/statistics). Progressively, data on safety performance, occupational health management systems, greenhouse gas emissions, waste streams and the sustainable use and recycling of aluminium products has been added to the Institute's programme.

The scope of the Institute's statistics has grown in the last 25 years from the production process of primary aluminium to the full life cycle of aluminium products, through production, use, reuse and recycling.

The Systematic Data Collection Process

The IAI's data collection system has as its cornerstone the confidentiality of company and facility data. Such confidentiality builds trust among reporting companies, avoids issues associated with competition law and allows a more complete dataset to be made available to stakeholders and the public. The IAI's confidential statistical team de-identifies all data received from reporting companies prior to analysis. All information is collated by region or as global metrics to disguise facility or company specific numbers. The unit of reporting is generally at the facility level. Some data – for instance, shipments of aluminium to specific markets or recycling of used products – is provided on a national or regional basis by the various aluminium associations worldwide, which operate as a well connected global network.

Data is collected from IAI member companies and non-members to ensure as complete a set of data as possible. It is submitted to the IAI via an online data entry system and emailed or faxed return forms: an approach that allows reporters to choose the most efficient route for their data.

Defining Performance Indicators

The process of defining performance indicators that are relevant, measurable and comparable is well developed. Advisory committees, made up of sustainability, Health Safety and Environment management and statistical experts from member companies, collaboratively shape these indicators based on their systematic measurement and quantification. These committees report to the IAI Board of Directors – Chief Executives of the Institute’s member companies representing over 70% of global bauxite, alumina and primary aluminium production and a substantial percentage of recycled metal production.

Using the Data

The IAI employs its data in a number of different ways.

1. Quantitative voluntary objectives

The ‘Aluminium For Future Generations’ sustainability programme is built on quantitative voluntary objectives. The programme’s goal is the continuous improvement of the industry’s environmental, social and economic performance. In order to set such demanding objectives and to measure annual performance against them, it is necessary to collect accurate data from industry facilities. In the case of PFCs, such data is also used to estimate emissions from non-reporting sections of the industry, through the latest IPCC calculation methodologies.

2. Benchmarking

For a number of key indicators (safety, energy use, GHG gas emissions), the performance of all reporting facilities is plotted against the performance of all other (de-identified) facilities in the same class. In this way, facilities can see the current best level of performance that they could achieve. Thus the industry improves its collective performance through the sharing of information among peers, while maintaining the confidentiality of facility data.

3. Modelling

The IAI’s Global Mass Flow Model employs current and past production, market supply, emissions and recycling data, along with predictions of market growth, to develop scenarios of the potential environmental implications of the worldwide aluminium industry, to 2030. The IAI’s Transport Life Cycle Model, developed in cooperation with the European

Aluminium Association (EAA) and the Aluminium Association (AA), focuses on the environmental aspects of light-weighting in transport and the resulting savings of fuel and electricity. The model is based on the ISO 14044 life cycle assessment methodology and covers the whole life cycle of a vehicle including production, use and end-of-life (collection, recovery and recycling). It can be used to assess future scenarios and applications.

Industry data and expertise is also being shared with the International Energy Agency (IEA) as it develops future energy and climate change scenarios, as part of the IEA's advisory role to the G8 Gleneagles Dialogue.

Reporting Results, Improving Accuracy and Verifying Performance

A key challenge is to find a balance between maintenance of a credible and verifiable industry database and the confidentiality of the data. All data undergoes a quality checking process by the statistical team at the point of reporting and is further verified at the point of collation and analysis. Global sustainability metrics are published regularly (usually on an annual basis) on the IAI website (www.world-aluminium.org) and in written reports. For GHG data, a number of facilities undertake measurement of their PFC emissions, which allows for more accurate calculation of inventories. Such data is also reported to the IAI and informs the revision of Tier 2 calculations according to IPCC methodologies, thus reducing uncertainty in the global database.

Source: International Aluminium Institute.

APPENDIX 6. THE INTERNATIONAL IRON AND STEEL INDUSTRY (IISI) GLOBAL CO₂ DATA COLLECTION METHODOLOGY

Global CO₂ data collection methodology

The position of the International Iron and Steel Institute (IISI) is that global emissions reductions are best achieved through a global steel sector approach. As a result, the IISI announced its new global steel sector approach at the annual IISI conference in Berlin in October 2007.

At the core of the new steel sector approach is the collection and reporting of CO₂ emissions data by steel plants in all the major steel-producing countries. The information collection will lead to benchmarking improvements based on actual performance data and then reporting and setting of commitments on a national or regional basis for implementation during the post-Kyoto period. The key advantage of the IISI approach is that it is supported by its members in both developed and developing countries – including China, which accounts for approximately 50% of total steel-making CO₂ emissions.

The IISI uses an intensity-based approach to measurement of CO₂ emissions, taking into account the CO₂ produced per tonne of steel rather than the total CO₂ emissions within a country or region. This globally consistent calculation methodology will allow production normalised CO₂ emissions comparisons between regions that are not possible today.

The IISI has put in place an expert group to oversee the collection of emissions data. This task force has now developed a reporting methodology and specific approaches to reduce the steel industry's global CO₂ emissions. The methodology will be disseminated in the first half of 2008 for testing amongst IISI members and non-members.

One of the most important but difficult assignments has been setting the common boundary for credible and comparable CO₂ emissions data, as there are a variety of steel-making processes and material flows.

Many systems, ranging from company-wide management tools to government auditing schemes, already exist and the IISI has carefully investigated and evaluated these systems so that the steel industry-specific

recommended methodology would be measurable, verifiable and accessible, with an emphasis on the involvement of as many steel producers in the world as possible.

In defining a boundary acceptable for the world steel industry, the IISI has agreed on a demarcation based on a steel-producing site using liquid steel processing. The CO₂ emissions calculation formula includes input and output items based on raw materials and primary energy procurement. Total CO₂ emissions are calculated as a sum of direct emissions and indirect emissions (mainly electricity) with energy export deducted as credit. Items have been allocated in each category and their CO₂ emissions factors have been determined through discussions among experts based mainly on internationally or nationally authenticated values. Two major processes are classified (integrated (BF + BOF) and EAF) and CO₂ emissions are calculated respectively.

Source: International Iron and Steel Institute.

APPENDIX 7. LIST OF ACRONYMS AND TECHNICAL TERMS

AA	Aluminium Association
AFEAS	Alternative Fluorocarbon Environmental Assessment Study
AFR	Alternative Fuel and Raw Material
APP	Asia-Pacific Partnership on Clean Development and Climate
AWG	UN Ad Hoc Working Group on Future Commitments for Annex I Parties Under the Kyoto Protocol
AWGLCA	UN Ad-Hoc Working Group on Long-term Cooperative Action
BF	Blast Furnace (steel-making)
BOF	Basic Oxygen Furnace (steel-making)
CCAP	Center for Clean Air Policy – a Washington-based think tank
CDM	Clean Development Mechanism: a mechanism under Article 12 of the Kyoto Protocol
CFCs	Chlorofluorocarbons
CEMBUREAU	European Cement Association
CoP/Mop	Conference of the Parties/Meeting of the Parties
CO ₂	Carbon dioxide – a greenhouse gas
CSI	Cement Sustainability Initiative (under the auspices of the World Business Council for Sustainable Development)
EAA	European Aluminium Association
EAF	Electric Arc Furnace (steel-making)
EC	(Treaty establishing the) European Communities
ETS	Emissions Trading Scheme
EU	European Union

EU ETS	EU Emissions Trading Scheme
EUROFER	European Confederation of Iron and Steel Industries
G8	Meeting of heads of governments of seven largest developed country economies and Russia
G8+5	G8 plus five emerging economies: Brazil, China, India, Mexico and South Africa
GAn	Global Action
GAt	Global Agreement between Parties
GDP	Gross Domestic Product
GHGs	Greenhouse Gases; the six gases covered by the Kyoto Protocol: CO ₂ , CH ₄ , N ₂ O, HFCs, PFCs, SF ₆
GNR	Getting the Numbers Right – a CSI initiative
Gt	Gigatonne (= 1 billion tonnes)
GPOA	Gleneagles Plan of Action (stemming from 2005 G8 summit in Gleneagles, Scotland/UK)
HFCs	Hydrofluorcarbon
IAI	International Aluminium Institute
ICAO	International Civil Aviation Organisation
IEA	International Energy Agency
IMO	International Maritime Organisation
IPCC	Intergovernmental Panel on Climate Change
IPPC Directive	Integrated Pollution Prevention and Control Directive (controlling emissions from large stationary sources)
IPR	Intellectual Property Rights
IISI	Internal Iron and Steel Institute
ISO	International Organization for Standardization
JI	Joint Implementation under Article 6 of the Kyoto Protocol
LUCF	Land Use Change and Forestry
mtC	Million tonnes of carbon
mtCO ₂	Million tonnes of CO ₂

KP	Kyoto Protocol
MEM	Major Emitters' Meeting
MRV	Monitoring, Reporting and Verification
NGO	Non-Governmental Organisation
NPIC	National Policies with some International Coordination
OECD	Organisation for Economic Cooperation and Development
PFCs	Perfluorocarbons
PMC	Project Management Committee (of the CSI)
PwC	PricewaterhouseCoopers
R&D	Research and Development
RGGI	Regional Greenhouse Gas Initiative (Emissions trading scheme in north-east US).
SA	Sectoral approaches
TOA	Technology-oriented Agreement
TOC	Technical Operations Committee (under the Montreal Protocol)
UNEP	United Nations Environmental Programme
UNFCCC	United Nations Framework Convention on Climate Change
WBCSD	World Business Council for Sustainable Development
WRI	World Resource Institute – a Washington-based think tank

APPENDIX 8. MEMBERS OF THE CEPS TASK FORCE AND INVITED GUESTS AND SPEAKERS

Chairman: Björn Stigson,
President, World Business Council for Sustainable
Development (WBCSD)

Rapporteurs: Christian Egenhofer, Senior Fellow, CEPS
Noriko Fujiwara, Research Fellow, CEPS

Members of the CEPS Task Force

Richard Armand
Senior Advisor
Entreprises pour l'Environnement

Georg Bäuml
Environmental Strategy
Volkswagen AG

Arno Behrens
Research Fellow
CEPS

Daniele Benintendi
Senior Researcher
Fondazione Eni Enrico Mattei FEEM

Peter Botschek
Director
Energy, Health, Safety &
Environment
European Chemicals Industry
Council (CEFIC)

Frank O. Brannvoll
Head of Power Trading
European Border Markets & Oil
Trading and Portfolio Management
Electrabel Suez

Karl Buttiens
Senior Vice President
Environment Directorate
ArcelorMittal

Jean-Marie Chandelle
Chief Executive
Cembureau
The European Cement Association

Koen Coppenholle
Head European Government
Relations
ArcelorMittal

Hyung-Ja De Zeeuw
Senior Sector Analyst
ABN Amro Bank N.V.

Christine Faure-Fedigan
Director CO₂ Strategy
Gaz de France

Badreddine Filali-Baba
Senior Vice President
Holcim Group Support (Zurich)
Ltd.

Richard Folland
Senior Climate Change & Energy
Adviser
JP Morgan

Eamon Geraghty
Technical Director
CRH Europe Materials
CRH plc

Simon Godwin
Senior Manager, Automobile Issues
Daimler AG

Sandra Gröger
Assistant to the Head of the Office
Brussels Office
ThyssenKrupp AG

Markus Hagemann
Junior Consultant
ECOFYS Germany GmbH

Joachim Hein
Advisor
Bundesverband der Deutschen
Industrie (BDI)

Toni Hemminki
Vice President
Rautaruukki Oyj

Stephan Herbst
Senior Manager
Environmental Affairs Group
Toyota Motor Europe

Inge Horkeby
Director Environmental Affairs
Volvo

Elisabeth Hörnfeldt
Manager
Corporate Environmental Affairs
Scania

Yoshito Izumi
General Manager
Sustainable Development
Taiheiyō Cement Corporation

Staffan Jerneck
Director & Director of Corporate
Relations
CEPS

Helle Juhler-Verdoner
Head of Unit
Energy & Climate Change
Confederation of Danish Industries
(DI)

Kim Kärstrud
Senior Consultant
Raw Materials, By-products
SSAB

Howard Klee
Cement Sustainability Initiative
(CSI)
WBCSD

Sanjeev Kumar
ETS Coordinator
WWF European Policy Office

Bernard Küng
Area Manager Western Europe
Holcim Group Support Ltd.

Edgar Leite
Counsellor
Fortis

Pedro Linares
Professor
Universidad Pontificia Comillas
Madrid

Didier Lutsen
Manager European Union
ExxonMobil Petroleum & Chemicals

Vincent Mages
Manager
Cembureau

Giuseppe Montesano
Head of Environmental Policies
Regulatory Affairs & Corporate
Strategy
ENEL SpA

Jean-François Mottint
Head of Intelligence Unit
Cembureau

Lasse Nord
Senior Vice President
Climate and Environment
Norsk Hydro Asa

Ignacio Pérez Arriaga
Professor
Universidad Pontificia Comillas
Madrid

Brigitte Poot
Climate Change Coordinator
Total S.A.

Hugh Porteous
Vice President Government
Relations (Europe)
Rio Tinto (Alcan)

Alessandro Profili
Director European Affairs
Alcoa Europe

Alexander Röder
CEMEX

Gunnar Still
Senior Vice President
ZA Umweltschutz
ThyssenKrupp AG

Mathias Ternell
Representative of SSAB/Director
SSAB

Willy Tomboy
Director/Environment Officer
Environmental Affairs Group
Toyota Motor Europe

Bruno Vanderborght
Vice President
Corporate Industrial Ecology
Holcim Group Support (Zurich)
Ltd.

Patrick Verhagen
Senior Vice President
Corporate Industrial Ecology
Holcim Group Support (Zurich)
Ltd.

Roland Verstappen
Vice President
International & Sustainable
Development
Arcelor Mittal

Gerri Ward
Climate Strategies
CEP Imperial College

Markus Wolf
TTC-TT Technology Centre
ALSTOM Power

Mike Wriglesworth
Senior Advisor
CEPS

Roberto Zangrandi
Director
ENEL SpA

Invited Speakers and Guests

Koichi Akaishi
Executive Director
Brussels Office
Japan Machinery Center for Trade
& Investment

Jane Amilhat
Climate Strategy, International
Negotiations and Monitoring EU
Action
DG Environment
European Commission

Richard Baron
Deputy Head
Energy Efficiency & Environment
Division
IEA

Chris Bayliss
Manager
International Aluminium Institute

Julio Cardoso
Sustainable Industrial Policy
DG Enterprise
European Commission

Terry Carrington
Energy Strategy & International
Unit
Department for Business,
Enterprise & Regulatory Reform,
UK

Michel Catinat
Head of Unit
DG Enterprise
European Commission

Richard Cawley
 Head of Section
 DG Information Society and Media
 European Commission

Jos Delbeke
 Deputy Director General
 DG Environment
 European Commission

Joachim Ehrenberg
 Policy Officer – Climate Change
 DG Enterprise
 European Commission

Hubert Fallmann
 Unit C.2
 DG Environment
 European Commission

Henry Derwent
 President & CEO
 IETA (at the time of the Task Force
 with the UK Department for
 Environment, Food and Rural
 Affairs – DEFRA)

Ikuo Jitsuhara
 Director
 International Iron & Steel Institute
 (IISI)

Gert-Jan Koopman
 Director Industrial Policy &
 Economic Reforms
 DG Enterprise
 European Commission

Stephen Pathirana
 Desk Officer
 Climate Change, Competitiveness
 DG Enterprise
 European Commission

Pavel Prokes
 Administrator
 DG Enterprise
 European Commission

Klaus Radunsky
 Head of Climate Change Unit
 Austrian Environment Protection
 Agency

John Scowcroft
 Head of Unit
 Environment & Sustainability
 Eurelectric

Hanne Siikavirta
 Senior Adviser
 Ministry of Environment of Finland

Sandra Stevens
 Policy Officer Climate Change and
 Transport
 DG Energy and Transport
 European Commission

Peter Zapfel
 Coordinator Carbon Markets and
 Energy Policy
 DG Environment
 European Commission