TESTING GLOBAL SECTORAL INDUSTRY APPROACHES TO ADDRESS CLIMATE CHANGE

INTERIM REPORT OF A CEPS TASK FORCE

For presentation at a Side Event at the UNFCCC COP/MOP, Bali, Indonesia on Friday, 7 December 2007 from 18:00 to 19:30 (Venue: Tidal).

DECEMBER 2007

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This Interim Report is based on the results of ongoing work within 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. Membership in the Task Force comprises 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 discuss with officials from the EU institutions, international organisations and non-EU governments. Although there have been intensive consultations during two Task Force meetings and consultation via written comments on this Interim Report, the Report note is the responsibility of the Task Force Chairman and the authors and should not be seen as an agreed text by the Task Force. Nevertheless, we trust that this text represents a balanced account of the views of the Task Force.

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

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Key Messages

1. Some industrial sectors are concentrated to such a degree that even a small number of companies represent a significant share of emissions – both world market and global GHG emissions. This makes these sectors a 'natural' focus for climate change policy. Successful global sectoral industry approaches could become an effective means to broadening the range of contributions by all parties to greenhouse gas reductions, and to addressing competitiveness concerns in trade-exposed industries. This Interim Report puts these two hypotheses to the test and identifies the key requirements for global sectoral industry approaches to work. The full analysis will be published in the Final Report due in spring 2008.
2. The rationale for advancing industry-wide, e.g. global sectoral industry approaches is the expectation that they can lead to emissions reductions beyond business-as-usual right now, while in the longer-term becoming an element of a post-2012 settlement. Nevertheless, global sectoral industry approaches are seen by many as a 'second best' solution, compared to a macro-approach to a comprehensive global climate change agreement. There is, however, a certain optimism that global sectoral industry approaches could positively affect the depth, speed and direction of the post-2012 discussions, especially with regard to the energy-intensive industries facing global competition.
3. Various industry sectors are now developing models with different design features. The projects that such sectors are planning or implementing in various sectors and regions focus on the numerous practicalities that need to be addressed to further global sectoral industry approaches, such as data collection, monitoring, reporting and verification, definition of industry boundaries, intellectual property issues, confidentiality, identification of best-practices and long-term investment planning. In some cases, including the Asia-Pacific Partnership, governments in member countries have agreed to develop a framework to mobilise industry sectors to finance low-carbon investments on a project basis. In other cases, such as the European steel industry, governments are not (yet) involved, or are so only marginally. In the latter case, the success of sectoral approaches would largely depend on the ability of a sector to develop agreed benchmarks and guidelines for monitoring and reporting. In return for the industry sectors' initiatives, governments might step in and consider their own active role in guiding specific actions around a sector.
4. Regardless of the ways in which various initiatives will develop, how governments will engage and whether or not they will be able to agree on (absolute or relative) GHG emissions targets, global sectoral industry approaches contribute to:
   - engaging emerging economies and potentially providing incentives for them (governments and industries) to reduce emissions beyond business-as-usual, by for example access to technology, best-practice or sectoral crediting,

- transparent collection of information about the state of the sector e.g. (actual and projected) emissions, applied technologies, technology benchmarks and best-practice,
- the spread of best-practice,
- the development and diffusion of technology, and
- allowing governments a better understanding of the way in which industrial sectors operate and the economic environments they find themselves in.

5. Governments can act as important catalysts by promoting administrative capacity-building in developing countries, providing appropriate (regulatory) frameworks and incentives for emerging economies via, for example, crediting mechanisms or financial support. *Pilot projects* in different countries or regions can be an important tool to put the different concepts to the test in practice and to increase the administrative capacity of governments at all levels.
6. The more sectors (and governments) join in, develop such concepts, and prove the ability of these concepts to be operational, the more likely global sectoral industry approaches will be recognised as a suitable tool to reduce GHG emissions and become a potential element of the post-2012 climate change regime. A precondition for global sectoral industry approaches to succeed, will need to:
    - Address *governance* challenges for developing countries, the UNFCCC secretariat and industry;
    - Create real *incentives* for developing countries to participate such as crediting, technology co-operation, best-practice;
    - Tackle the many *practicalities* such as data collection, monitoring, reporting and verification, definition of industry boundaries, intellectual property rights issues, confidentiality, identification of best-practices and long-term investment planning; and
    - Ensure that sectoral approaches can help governments implement existing national policies and facilitate international negotiations.

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1. Introduction

Since 2005, there has been increasing interest in 'global sectoral approaches' to address climate change. Key developments have been the OECD high-level roundtable on transnational sectoral agreements for climate policy (2005), the G8 Gleneagles Plan of Action (July 2005) and the sectoral task forces under the Asia-Pacific Partnership on Clean development and Climate. There have been calls for the analysis of sectoral dimensions, including 'competitiveness' issues and sectoral approaches as a 'complement' to country-wide commitments.

Within the EU, the communication on climate change prepared by the European Commission (2007) for the March European Council made explicit reference to "sectoral approaches" albeit within the context of "action in developing countries". The European Commission's High-Level Group on Competitiveness, Energy and the Environment discussed this topic at its fifth meeting and in the associated report, and calls for a "roadmap … to set out the route to operationalise sectoral approaches". The OECD/IEA (International Energy Agency), 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 extending its focus to sectoral industry approaches. A new IEA Information Paper of November this year explores the issues for heavy industry (Baron, 2007).

Sectoral approaches mean different things to different people, however. This report focuses on global sectoral industry approaches – the most challenging option – which in this paper means sector-wide transnational approaches that aim to engage a sector on a broad international basis. It includes purely industry-based initiatives, public-private partnerships and technology-oriented approaches.

2. Why sectoral approaches?

The starting point of sectoral approaches for industry is to target the potential to reduce GHG emissions from big emitters. At first glance, candidates for sectoral approaches are aluminium, cement, steel, float glass, a few heavy chemical industries and electricity producers (see Box 1). However, international aviation and international maritime transport could equally be suitable for sectoral approaches because the very nature of these sectors is to provide their services globally or at least internationally, while both remain outside the Kyoto Protocol framework.

Box 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

In addition to these 'obvious' industries, other industries could also be considered for the application of sectoral approaches. Examples are float glass, a few heavy chemical industries, possibly paper and pulp and other energy-intensive industries. Aviation or maritime transport could also be considered due to the global nature of business.

Source: Vieillefosse (2007), Baron (2007).

While there may be other benefits to be expected from sectoral approaches, such as accelerating technology development and diffusion, estimating the abatement potential or supporting the development of the global carbon market, the principal motivation for 'sectoral approaches for industry' consists of the following two elements:

- UNFCCC Parties seek further ways to contribute to greenhouse gas reductions;[1] and
- The need to address competitiveness in trade-exposed industries.

It is well-known that more stringent commitments by developed countries are often curbed by competitiveness concerns that may affect trade-exposed industries. In addition, there is an urgent need to engage fast-growing emerging economies. This is best illustrated by the high growth rates of China in almost all heavy industries, which are a multiple of comparable rates for North America or the EU. The IEA also assumes that potential for savings in industrial energy demand in non-OECD countries is over two-and-a-half times greater than in OECD countries, even without counting the cost of carbon (Baron, 2007). The added-value of sectoral approaches depends to a large extent on engaging the fast-growing emerging economies as active participants.

3. Typology

There are different sectoral approach models. Baron (2007; chapter 2) distinguishes four different categories:

[1] The background: i) many countries have not yet accepted country-wide targets or hard constraints for the post-2012 period; most GHG emissions growth is outside Annex I countries, from which a firm commitment may still take years; ii) more focus on sectors could reveal win-win opportunities by improving technology and operational efficiency; and iii) other Parties see sector-based commitments, especially for emerging economies, as a pillar of the post-2012 architecture.

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 commitment;
4. Technology-oriented approaches ranging from pooled or co-ordinated R&D to diffusion of low-carbon technologies and best-practice.

Existing global sectoral industry approaches – the focus of this report – include several examples such as the WBCSD Cement Sustainability Initiative (CSI), International Aluminium Institute sustainability goals and the International Iron and Steel Institute CO_2 breakthrough programme to date.

Global sectoral industry approaches tend to use some or all of the following methods:

- Incentives for emerging economies to reduce emissions beyond business-as-usual, typically by exploiting no-regret potentials by speeding up 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
- Transparent collection of information about the status of a sector, e.g. benchmarking in different forms such as i) documenting current industry performance on agreed simple metrics or key performance indicators, ii) identifying best-practice, iii) comparing performance of plants or countries to this best practice, which in the longer-term could help identify common medium-term goals
- Sharing and spreading of best practice in order to allow companies to increase operational efficiency and governments to focus on removing regulatory barriers to ration energy use and thus lower emissions
- Diffusion and developing of technology, e.g. spreading of best-practice in many cases focuses on technology co-operation; the steel industry within the context of the International Iron and Steel Institute (IISI) has agreed on a CO_2 breakthrough programme.

As a result, sectoral approaches can increase the understanding by governments of the global economic environment of the sectors, e.g. trade, investment patterns and corporate strategies, for example.

Appendix 1 provides a non-exhaustive overview on various 'sectoral approaches' and groups them under different categories.

4. Requirements for sectoral approaches to work

The design of global sectoral approaches for industry cannot start from scratch. Rather they will need to fit into existing national, regional/EU or policies and practices. Generally speaking, sectoral approaches are viewed by many as second-best policies to global and macro approaches. Such approaches will be most relevant to the energy intensive industries facing global competition.

In order to live up to expectations, sectoral approaches will need to meet a number of requirements in the areas of governance, incentives, practicalities and compatibility with existing national, regional or international climate change frameworks and policies.

4.1 Governance

Sectoral industry approaches face various governance challenges, notably 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. To agree on the type of targets (relative, absolute), the level of ambition ('stringency') or the allocation of scarcity are but a few. Irrespective of whether commitments are voluntary (i.e. self-commitment), negotiated or government-imposed, baseline setting, definition of sector boundaries, monitoring and reporting are all crucial. All this raises a number of governance issues, e.g. how targets are set for industries, who enforces them, who negotiates with whom, how governments co-operate to set cross-border (i.e. multi-jurisdiction) targets and how they can obtain a legally binding character. In addition, global industry approaches will need to accommodate different national regulatory traditions and preferences. Finally, sectoral approaches raise concerns about confidentiality, potential collusion and anti-competitive behaviour.

(2) Another critical issue is the administrative capacity of developing countries, i.e. how 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 of sectoral crediting. As IEA work has shown (e.g. Ellis and Baron, 2005; Baron and Ellis, 2006), sectoral crediting requires considerable capacity in emerging economies (or developing countries) in order to monitor emissions *and* output. Crediting will require accurate data on emissions reductions against a baseline on a plant-by-plant level. If sectoral industry approaches are combined with no-lose targets (e. g. Schmidt et al., 2006), there will need to be a mechanism to allocate credits from countries to companies.

(3) As for governments, sectoral approaches are likely to go beyond the current technical capacity of the UNFCCC secretariat, raising questions about the suitability of sectoral approaches as part of the post-2012 architecture. The credibility of sectoral approaches will also depend on transparency and stakeholder involvement on the one hand and confidentiality on the other.

4.2 Incentives to emerging economies

While sectoral crediting can create incentives for emerging economies, there will, however, be two major difficulties. The industry sector in developed economies would regard massive crediting as a subsidy to their competitors in emerging economies and thereby may reinforce rather than reduce competitiveness impacts on their business. The second is that this eventual supply of credits needs to be matched by demand, which will mainly have to come from more stringent Annex I commitments countries. This might reinforce the advantageous position of emerging economies vis-à-vis Annex I companies.

Possible solutions to these dilemmas are to depart from 'pure' crediting by setting more ambitious baselines (e.g. beyond business-as-usual) or to set a sunset clause or develop 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. Additional incentives beyond sectoral crediting may also exist. They include i) sharing of best-practice, ii) access to data and information e.g. to improve carbon management

or baseline setting, iii) access to technology or technology cooperation and transfer or iv) government funding in technology development and diffusion or technical assistance.

4.3 Practicalities

A considerable number of practicalities need to be addressed before sectoral approaches can become operational. The list includes issues on data collection, monitoring, reporting and verification, definition of industry boundaries, protection of confidentiality, intellectual property rights, identification of best-practices and long-term investment planning. Other issues besides those of a technical nature are: risk of anti-competitive behaviour, the relation between benchmarks and emissions trading and, more generally, the difficulties in agreeing on a global sector benchmark. Many of the sectoral approaches that are being developed devote considerable time to these subjects. Some progress is being made, as is evidenced in the discussions in the CEPS Task Force.[2] An important forum where many of these issues are well advanced is the Asia Pacific Partnership (see e.g. Fujiwara, 2007).

4.4 Supporting rather than hindering existing policies and negotiations

Like all other climate policies, sectoral approaches will be assessed against a set of environmental, economic and political criteria, such as: i) environmental effectiveness, (e.g. leading to a meaningful environmental outcome), ii) fairness (i.e. addressing the competitiveness concern) and iii) cost-effectiveness, e.g. avoiding large differences in marginal costs of avoidance of CO_2 ('CO_2 havens').

In an ideal policy environment, sector approaches would be implemented in one go at global level with the agreement of all governments concerned. Whether this will happen remains uncertain and if it does, it will take time. Global sectoral industry approaches will need to fit into national, regional/EU policies that have been designed and implemented to achieve the ultimate goal of the UNFCCC. For example, in the EU context, global industry approaches will need to fit into the EU energy and climate change package.

5. Conclusion

Since the CEPS Task Force is largely EU-based, the focus has been on how sectoral approaches can help governments to implement existing EU policies and facilitate international negotiations. From an EU perspective, sectoral approaches will need to support rather than hamper the emergence of a global carbon signal by avoiding a set of sectoral niches. A preliminary assessment seems to suggest that sectoral approaches have potential merits in two key areas of the global negotiations, they could assist i) in bringing about further fair and effective contributions to the mitigation of climate change by all countries, ii) in increasing cooperation on technology, research, development, diffusion, deployment and transfer. Whether such potential advantages will actually be realised will depend on the details of design and implementation.

Global sectoral industry approaches could become a valuable approach for global climate change policy by engaging emerging economies and other developing countries, creating more equitable conditions in which businesses can operate, and helping to develop and spread new technologies and best-practice. In order to do that, however, sectoral approaches will need to meet the tests we have outlined above in terms of governance, incentives, practicalities and

[2] See the presentations of the second Task Force meeting on 23 October (http://www.ceps.be/Article.php?article_id=565).

compatibility with existing national, regional or international climate change policies. Pilot projects in different countries or regions could become important tools to test the different concepts in practice and to increase the administrative capacity of governments at all levels. If, ultimately, these issues have been successfully addressed, then global sectoral industry approaches may not only positively affect the depth, speed and direction of post-2012 discussions but could also become an element of the post-2012 architecture. Sectoral 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 speed up the diffusion of existing technology and the development of new technology. Equally important, they could lead to real GHG emission reductions, which is the ultimate objective of climate change policy and may thus represent a win-win solution.

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Appendix 1. Overview of 'sectoral approaches' grouped by type

'Sectoral approaches' can mean different things to different people. A first – tentative – overview of different approaches reveals diverse concepts. We group them in accordance to the IEA typology (Baron, 2007).

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, whereby companies or associations within a single sector agree, across countries, on pledges to achieve a reduction commitment;
4. Technology-oriented approaches ranging from pooled or co-ordinated R&D, diffusion of low-carbon technologies and best-practice.

We recognise that additional models and variations exist.

1. The best-known model of a sectoral approach by the Washington-based Center for Clean Air Policy (e.g. Schmidt et al, 2006) describes a bottom-up method for **encouraging sector-wide actions in developing countries** and for deriving economy-wide targets from aggregates of such actions in developed countries. The motivation behind the approach is to provide incentives for developing countries to start reducing GHG emissions beyond business-as-usual and to deepen engagement in post-2012 discussions. The CCAP approach is meant as one building-block towards a post-2012 regime by engaging developing countries. [Type 1: country-specific quantitative approach].
2. The potential of **sectoral crediting** has been explored by the OECD/IEA (e.g. Baron and Ellis, 2006). This approach foresees that certified emission reductions can be sold into a carbon market such as the EU Emissions Trading Scheme. Such emissions reductions can be credited, either based on the outcome of a policy (e.g. a modal shift in transport or a congestion charge), or by over-achieving an intensity or absolute target. Major issues identified by the OECD/IEA are the establishment of baseline data and data collection, governance issues (e.g. new duties to host countries) and the lack of sufficient demand. If sectoral crediting is considerable, these reductions will need matching demand, i.e. steep reductions in some parts of the world. [Type 2, country-specific quantitative, possibly combined with Type 3, transnational quantitative approach].
3. **International Sectoral Agreements in a post 2012 Climate Framework**: A particular type of sectoral approach has been explored by the PEW Center on Global Climate Change, namely multi-lateral agreements in which governments commit to actions intended to moderate or reduce GHG-emissions from a given sector via i) one or several stand-alone sectoral agreements, ii) a series of agreements linked under a common framework (although with different county participation each), or iii) sectoral commitments as a complement to a comprehensive global climate change agreement (see, Bodansky, 2007) [Could be suitable for all types but most potential for types 2, county-specific quantitative, 3, transnational quantitative and 4, technology-oriented approach].
4. The **International Iron and Steel Institute (IISI**), representing some 200 steel-producing companies, including from China, Russia and India, covering more than 70% of global steel

production, proposed to replace cap and trade emission 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 demonstration and to engage with industry to develop reporting procedures (Jitsuhara, 2007). According to Baron (2007; 60), under the APP and with bilateral supports to China in particular, steel companies have launched a data-gathering exercise to establish indicators for the two main production routes. [Type 4, technology-oriented approach].

5. The **European Confederation of Iron and Steel Industries (Eurofer)** has developed a methodology to calculate a 'CO_2 footprint' on a life-cycle basis (e.g. including all indirect emissions) for relevant products including all by-products that are associated with steel production. While the explicit objective of the proposal is to set up a global steel credit-and-baseline trading scheme, the methodology, if agreed and used by all producers, would allow identification of the CO_2 footprint of the industry. This in turn could be used for allocation in trading schemes or as a basis for domestic policies and measures worldwide (see Debruxelles, 2007). [Type 3 and 4, transnational quantitative and technology-oriented approach].

6. In the **aluminium** sector, participants in the sectoral approach of 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, already, the IAI is considering setting further stretch targets for 2020. Discussions are being pursued within the industry on the potential applicability of a global sector crediting, no-lose model.[3] [Type 3 and 4, transnational quantitative and technology-oriented approach].

7. 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 data base for best available technologies in the sector and a benchmarking system. According to Baron (2007; 55) the CSI has also moved towards policy proposals and intends to establish country baselines, negotiated with governments to form the basis of intensity-based objectives and a baseline-and-crediting system. Developing countries could come into the system by no-lose targets. [Type 3 and 4, transnational quantitative and technology-oriented approach]

8. Formally launched in January 2006, the **Asia-Pacific Partnership on Clean Development and Climate** is both a multilateral partnership involving seven countries (Australia, Canada, China, India, Japan and the US) and a public-private partnership on a regional scale. It combines sectoral cooperation across countries on the development and deployment of technologies with sectoral reforms in selected countries to remove barriers and achieve full reduction of GHG emissions and energy efficiency improvements. In essence it can be characterised as a voluntary sectoral approach, combining cooperation on the development and deployment of technologies via enhanced cooperation to meet both their increased energy needs and associated challenges, including those related to air pollution, energy security and GHG intensities. The backbone is sectoral task forces where business, government and researchers work together (e.g. Fujiwara, 2007; APP, 2007) [Type 4 technology-oriented approach].

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[3] E.g. Hugh Porteous (2007), "Alcan's view on a global sectoral approach", presentation at the CEPS workshop on sectoral approaches, Centre for European Policy Studies, Brussels, 18 September.

9. Sectoral approaches generally play a less prominent role when it comes to the **power sector**. Nevertheless, some stakeholders have proposed a number of different options available to the power sector if it seeks to promote a coordinated sectoral approach to mitigate GHG emissions. These include: voluntary actions aimed at an international/national benchmark in a given timeframe, various types of GHG targets (absolute or per kWh of output), the adoption of low and no-GHG technologies, with targets and timetables (e.g. a rate of diffusion of specific technologies by a given date). Further, existing policy instruments like the Clean Development Mechanism could be broadened to incorporate sectors as a whole, a step up from the existing project-based approach. (Source: IEA workshop IEA-ENEL workshop on Sectoral Approaches for Greenhouse Gas Mitigation in the Power Sector, Rome 30/31 October 2006). [Could be suitable for all types but most potential for types 2, county-specific quantitative, 3, transnational quantitative and 4, technology-oriented approach].
10. Integrated approach for **cars and trucks** in the EU: a concept of an integrated approach for cars and trucks is currently being developed by the European car industry and the European Commission. It acknowledges the complexity of the transport value chain, consisting of different components including engine and vehicle technologies, fuels, infrastructure and drivers' behaviour, and tries to take an integrated approach to all the different components of the transport chain. This integrated approach is essentially a variation of a 'bottom-up approach' aggregating individual deliverables from installations, firms, sectors, or larger units. Yet its departure from the standard 'bottom-up' is that it acknowledges the effect of interaction between these sectors. The main challenges are to strike a balance between the contributions of the various components of the transport value chain and to enforce the responsibility of these different components. The failure of one component, for example infrastructure or fuel quality, may have a knock-on effect, leading to underperformance in the whole transport sector. [Currently developed at the EU, i.e. regional level and therefore not meeting the requirements of global or transnational approaches].
11. A different model aims at setting **global standards of specific products such as appliances and possibly cars (e.g. CO_2 or fuel efficiency).** There is an attempt to reach a global agreement on energy efficiency standards for appliances and to ensure implementation and continuation via a global energy efficiency platform. [Most suitable for type 4, technology-oriented approach].
12. Other initiatives aim at developing international cooperation on **aviation** or **maritime transport**, sectors that have been excluded from the Kyoto Protocol. Discussions are ongoing in various fora including the UNFCCC negotiations, the respective international sector organisations such as the International Civil Aviation Organisation (ICAO) or the World Maritime Organisation (WMO) and in regional organisations. (Could be suitable to all types but most potential for type 3 and 4, transnational quantitative and technology-oriented approach).

Appendix 2. Cement Sustainability Initiative (CSI) Sectoral Approach to Managing CO_2 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. CSI now has 18 major international companies as members, manufacturing cement in more than 70 countries. CSI companies and their affiliates represent 60% of global cement manufacturing outside of China.

Over the last 5 years, CSI companies have made major efforts to identify and reduce CO_2 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 CO_2 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 CO_2 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 SA effort is to help build capacity in emerging economies to deal with CO_2 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 to 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
- Focus on improving process efficiency, based on ambitious emissions mitigation
- Be open to market approaches with inefficiencies minimised by fully fungible credits
- Promote a level playing field for the global cement sector.

Key Elements:

- Production-based efficiency benchmarks for authorities to set targets & incentives
- Simple metric of t CO_2/t cement for proposing consistent but differentiated targets
- Market credits to reward improved efficiency; promote waste fuel/blended cement
- Support R&D to develop technology, build capacity through public-private partnerships.

3. Principal Challenges

- Continuing growth in consumption of cement demand, especially in emerging economies, to construct badly needed housing and infrastructure
- Attracting developing countries to participate in a sectoral approach
- Crediting mechanisms may 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 UNFCC and towards G8+5 and APP groups.

Appendix 3. 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 emission 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 practice
    - Benchmarking of performance by technology
    - Investment by member companies in control technologies
- Encourage facility specific measurement of PFC emissions
    - Provide access to experts, training and equipment
    - 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, 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 shows 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% growth 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 CO_2 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 CO_2 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 falls. 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 in 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 electrolytic process to produce more metal from existing capacity to 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 emission reductions beyond Business As Usual.
- Benchmarks, developed from existing IAI data, would be used to construct crediting baselines.
- Such an agreement would encourage developing countries' industry to implement rigorous data monitoring and verification and to reduce emissions even sooner than may be the case now.

Appendix 4. A performance-based methodology as a basis for a steel sector approach

1. About the EUROFER proposal

EUROFER (European Confederation of Iron and Steel Industries) has developed a methodology to calculate a 'CO_2 footprint' on a life-cycle basis (e.g. including all direct and indirect emissions) of relevant products, as well as all by-products associated with steel production. The methodology is seen as a contribution towards a world-wide steel sectoral approach. It is important to take into account upstream, indirect CO_2 emissions and differences in production by including all CO_2 intensive activities (e.g. incorporating finished or semi-finished products). By adopting a commonly agreed methodology, the CO_2 footprint of steel production will be calculated on the same basis.

2. Objective

The objective is to avoid potential distortions to competition in the global steel market as a result of different national or regional climate change policies while improving CO_2 performance (e.g. by rewarding early action) and energy efficiency. It attempts to reward global CO_2 efficiency, including early action, and to penalise CO_2 inefficiency.

Calculating a comparable CO_2 footprint for all relevant products or by-products will allow us to identify a unique climate impact for all products (e.g. pig iron, pellets, primary or secondary steels), which could be used as:

- an allocation method in the context of setting an emissions trading scheme, ideally at world level,
- a measure for the average performance of the sector; or
- as a basis for the evolving baseline as industry performance increases, i.e. sector CO_2 intensity cap.

The methodology is seen as the basis for a market-based mechanism such as an emissions trading scheme (baseline & credit scheme).

3. Status of the proposal

The proposal is supported by all European steel producers, among which are also certain global producers such as ArcelorMittal, Corus and Thyssenkrupp. It has been presented to various stakeholders within the EU including the European Commission and many member states as well as to non-EU stakeholders. It has also been presented to the International Iron and Steel Institute (IISI), representing some 200 steel-producing companies including from China, Russia and India, where it is currently being discussed.

4. Main challenges and next steps

One of the main challenges is the participation of a sufficient number of partners, in addition to the actual issues of monitoring, reporting, verification and data gathering.

In line with the principle of common but differentiated responsibilities and respective capabilities, EUOFER has developed a so-called "multiple CO_2 footprint mechanism", which could accommodate the interests of developing countries where the CO_2 performance might be lower than in parts of Annex I countries. The principle of the proposed mechanism is to determine the distance of the region that might join the scheme from the baseline that is applied to those companies that form the existing trading club and, if it is above a certain threshold, to grant a decreasing credit in future years, to ultimately converge with the existing trading club (the converging baselines principle).