

## Chapter 2

# **Sectoral Approaches: Prospects and Challenges in Asia**

# Sectoral Approaches: Prospects and Challenges in Asia

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## 2.1 Introduction

*Sectoral approaches are receiving considerable international attention as an alternative way to economy-wide emission reductions and to broaden participation of countries in the future climate regime.*

Sectoral approaches are receiving considerable international attention as a new and alternative way to economy-wide reductions in greenhouse gas (GHG) emissions, which have been the main focus of the United Nations Framework Convention on Climate Change (UNFCCC) and its Kyoto Protocol. They are also seen as a way to broaden participation in the future climate regime, expand the coverage of flexibility mechanisms of the Kyoto Protocol from a project basis to a sector level, and address concerns of competitiveness, especially in energy and emission-intensive, trade-exposed industries. Thus sectoral approaches, including sectoral Clean Development Mechanism (CDM) and Sustainable Development Policies and Measures (SD-PAMs) (Winkler et al. 2002, Government of South Africa 2006), are now recognised as a potentially effective GHG mitigation strategy (UNFCCC 2007a).

Discussions on sectoral approaches at the international level were initiated at the 10th Conference of the Parties (COP10) in 2004 (Buenos Aires, Argentina), and were included in the Chair's report of the Ad Hoc Working Group (AWG) on Further Commitments for Annex I Parties under the Kyoto Protocol in 2006. The recent decision on the "Bali Action Plan" adopted at COP13 in December 2007 also notes that the newly established AWG on long term cooperative action under the UNFCCC address, among others, "cooperative sectoral approaches and sector-specific activities." Sectoral approaches received much attention in non-UNFCCC forums as well. The G8 summit held in Heiligendamm in June 2007, and the "Major Emitters" meeting held in Hawaii in January 2008 recognised the potential of sectoral approaches for GHG mitigation. The voluntary agreement on technology transfer through eight task forces of the Asia-Pacific Partnership on Clean Development and Climate (APP), the voluntary agreement of the European Commission with car manufacturing associations with targets on CO<sub>2</sub> emissions per kilometer for new cars, the set-up of regional/national intensity targets among major steel manufacturers (International Iron and Steel Institute [IISI] 2007), and the sectoral target setting on energy conservation by 2009 by ASEAN+6 are some of the non-UNFCCC initiatives along the lines of sectoral approaches.

While the idea of mitigating GHG emissions on a sectoral basis is not new, the proposal that attracted considerable attention in our consultations was presented by the Center for Clean Air Policy (CCAP), based on a three and a half year dialogue with senior climate negotiators from 15 developed (Annex I) and 15 developing (non-Annex I) countries, and selected company representatives (CCAP 2006). The CCAP proposal involves six steps: – agreement on participation of specific countries; definition of benchmarks for energy efficiency in a given sector; negotiations on GHG intensity target levels for new and existing facilities in each sector; linking the programme to the technology finance package; linking to the Annex I target setting process; and agreement on the structure of trading including links to CDM. Implementation of each step will require considerable negotiation, political will and reconciliation. It is expected that implementation of

such approaches can promote the use of best practices in internationally competitive industries.

Baron (2007) grouped sectoral approaches into four types: a) a global action, i.e. a unilateral move by industry to foster GHG improvement worldwide (e.g. World Business Council on Sustainable Development (WBCSD)'s Cement Sustainability Initiative (CSI), the voluntary targets of the members of the International Aluminium Institute, the CO<sub>2</sub> breakthrough project of IISI); b) a global agreement between industry and Parties to the UNFCCC; c) a series of national policies targeting a sector, with some intergovernmental coordination (similar to SD-PAMs); and d) a sectoral crediting mechanism whereby reductions recorded at the sector level are eligible for emission credits.

Another grouping includes quantitative emissions reduction targets and sectoral crediting mechanisms. Quantitative emissions reduction targets may include national targets (e.g. Triptych, multi-sector convergence), national sectoral targets (e.g. fixed, dynamic or intensity targets<sup>1</sup>), and trans-national sectoral targets (e.g. uniform base-level intensity, identical or non-identical percentage cuts over current emission levels) (e.g. Siikavirta 2006, Baron et al. 2007, Bodansky 2007). National sectoral targets may be commitments for emissions reductions in selected sectors at the national level (White House Council on Environmental Quality 2007, ASEAN+6 2007), while trans-national sectoral targets are internationally negotiated emissions reduction targets that are applied to specific sectors on a global basis (e.g. Ecofys and GtripleC 2007, Regeringskansliet 2007).

Sectoral crediting mechanisms are mainly applicable for non-Annex I countries and may be envisaged as (a) expansion of current CDM from a project level to programme (programmatic CDM) or sector (sectoral CDM – Saminiego and Figueres 2002, Cosby et al. 2005, Baron and Ellis 2006, Sterk and Wittneben 2005) or policy based CDM (Ofosu-Ahenkorah 2005); (b) creation of a new mechanism to credit emission reductions beyond no-lose sectoral targets (CCAP 2006), countrywide policies and measures (Michaelowa et al. 2003) or policy-based commitments (Lewis and Diringer 2007), and (c) indexed crediting, where GHG emissions below a certain intensity level would generate emission credits (Bosi and Ellis 2005). The sectoral crediting approach would mean that all facilities in a given sector would be included in the system, as against only a limited number of facilities in the current CDM.

For simplicity, the proposals on sectoral approaches are divided here into three groups (Table 1). The first group consists of sectoral approaches that would complement the Kyoto Protocol and require developed countries to take on absolute emission targets. The second group consists of approaches that do not require developed countries to take on absolute emission targets and may be seen as a substitute for the Kyoto Protocol. The third group focuses exclusively on the forestry sector.

1. Dynamic targets are targets linked to GDP growth intensity targets are targets linked to a sector's operations (e.g. emissions per unit of output, like kWh or tonne of steel)

*Proposals are divided into three groups: 1) approaches that would complement the Kyoto Protocol and require developed countries to take binding absolute emission target; 2) sectoral approaches as a complement to the Kyoto Protocol; 3) sectoral approaches focusing on the forestry sector.*

**Table 2.1 Main features and incentive mechanisms of selected proposals on sectoral approaches**

Proposal/ initiative	Main features	Incentive mechanisms
<b>I. Proposals that require absolute GHG emission reduction targets from developed countries</b>		
Sectoral No-lose target (CCAP 2006)	<ul style="list-style-type: none"> <li>• Key developing countries pledge to achieve voluntary no-lose GHG intensity targets in major industrial sectors (e.g. electricity, cement, iron &amp; steel, aluminium, oil refining, cement, lime, pulp/paper, etc) based on negotiation with developed countries and a bottom up expert assessment of energy intensity benchmarks. Other sectors (e.g. transportation, residential &amp; commercial) are eligible for project- or sector-based CDM.</li> <li>• Emissions reductions achieved beyond the voluntary pledge would be eligible for sale as Emission Reduction Credits (ERCs) to Annex I countries. Failure to meet the voluntary pledges would not involve penalties or requirement to purchase ERCs from other countries.</li> <li>• The targets for developed countries would be hard, aggregate, economy-wide targets built upon the sectoral approach.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Finance &amp; Technology:</b> Developed nations and international financial institutions provide developing countries with Technology Finance and Assistance Package to support commitments for the deployment of advanced technologies, development of small and medium-sized enterprises to assist in technology implementation, capacity building and support for pilot and demonstration projects.</li> <li>• <b>Crediting:</b> ERCs are fully fungible with the Kyoto credits. Current CDM and sectoral approaches co-exist, but sectoral approach is preferred to CDM. Developing countries not participating in the no-lose sectoral approach could still carry out CDM projects, utilising energy intensity target as CDM baseline.</li> </ul>
Sao Paulo Proposal (BASIC 2006)	<ul style="list-style-type: none"> <li>• Annex I Parties negotiate absolute annual emission limits between 2013 and 2018. Each Party expresses its commitment as a combination of the following: an absolute emissions limit (tCO<sub>2</sub>e/year); emissions intensity limit (tCO<sub>2</sub>e/unit GDP); new and additional funding (USD/year) to a maximum of 10% of its commitment (based on international carbon price). After 2018, commitments are automatically extended yearly.</li> <li>• Non-Annex I Parties choose from CDM, SD-PAMs, sectoral approach (excluding Land-Use, Land-Use Change and Forestry [LULUCF]), and national no-lose target. National no-lose target is decided after review by CDM Executive Board (CDM-EB) and more than three-fourths majority approval by COP/MOP. Credits earned from meeting no-lose targets in developing countries can be sold in the market up to some extent. Developing countries are expected to adopt more stringent commitments, once their limit of Certified Emission Reductions (CER)/ Voluntary Emission Reduction (VERs) exceeds 20 billion tCO<sub>2</sub>e after 16-40 years.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Finance &amp; Technology:</b> Technology funding mechanism is supported by 2% share of proceeds from Joint Implementation (JI) and international emissions trading scheme.</li> <li>• <b>Crediting:</b> Developing countries receive VERs (Voluntary Emission Reduction) equivalent/ fungible with CER based upon the target. For crediting, CDM is preferred to sectoral approach.</li> </ul>
Sectoral Crediting Mechanism (Bosi and Ellis 2005)	<ul style="list-style-type: none"> <li>• Three types of sectoral crediting mechanisms: 1) policy-based crediting (emissions reduction in specific sectors); 2) rate-based/indexed crediting (intensity improvement by sector or companies), and 3) fixed sectoral emission limits. The proposals are divided into trans-national (e.g. multi-national corporations) or national (e.g. transport) sectoral mechanism, and binding or voluntary.</li> <li>• <b>Participants:</b> 1) policy-based: governments 2) rate-based/indexed: governments alone or with representatives of industrial groups; 3) fixed emission limits: governments alone or governments and industry.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Finance &amp; Technology:</b> Companies cover the necessary cost of finance and technology.</li> <li>• <b>Crediting:</b> Within a sector, CDM projects are preferred to sectoral approach for crediting.</li> </ul>
Sectoral Approach (Baron and Ellis 2006)	<ul style="list-style-type: none"> <li>• Four types of sectoral crediting mechanisms: 1) global action (pledge and review by the industry without government's role); 2) global agreement between industries and Parties; 3) agreement between sectors and governments; 4) sectoral crediting mechanism in non-Annex I countries. Sectors agree on specific benchmarks, technologies, energy efficiency targets or GHG intensity targets.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Crediting:</b> Applies only to sectoral crediting mechanism in non-Annex 1 countries. Discounting may be applied in case of oversupply of credits.</li> </ul>
<b>II. Proposals that do not necessarily require emission reduction targets from developed countries</b>		
Sectoral Proposal Templates (Ecofys and GtripleC 2007, Höhne 2006)	<ul style="list-style-type: none"> <li>• Developing countries pledge no-lose GHG voluntary intensity targets (alternative to national binding absolute targets) for certain sectors (e.g. cement, iron and steel, pulp and paper, refineries, electricity, transport), and UNFCCC issues credits if the intensity is below the pledged target based upon the agreement by the COP/MOP or the appropriate body.</li> <li>• To assist developing country pledges, templates were prepared for steel, cement and transport sectors.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Crediting:</b> Issued credits can be sold in the international market.</li> </ul>
Policy-based commitment (Lewis and Diringer 2007)	<ul style="list-style-type: none"> <li>• Countries undertake national policies to reduce emissions but they are not bound by economy-wide targets. Commitments may be voluntary or binding.</li> <li>• Policies vary widely in scope and form, from economy-wide energy efficiency goals to sector-specific standards and reforms.</li> <li>• Governments are required to report periodically on the implementation of their policies, subject to some form of review or enforcement.</li> </ul>	<ul style="list-style-type: none"> <li>• <b>Finance &amp; Technology:</b> Policy commitments provide a basis for support through crediting, private investment, or direct assistance. Financial incentives (e.g. up-front grants) or new mechanisms (e.g. long term concessionary loans, tax incentives) could be offered for adoption and implementation of policy commitments to deploy low-carbon technologies.</li> <li>• <b>Crediting:</b> Policy-based crediting serves as an incentive.</li> </ul>

**Table 2.1 (continued)**

Proposal/ initiative	Main features	Incentive mechanisms
<b>II. Proposals that do not necessarily require emission reduction commitments for developed countries (continued)</b>		
Sectoral approach (IISD 2005)	<ul style="list-style-type: none"> <li>Approaches include: 1) sectoral policy-based crediting (credits for adopting and implementing climate friendly policies in a sector); 2) country-specific dynamic sectoral crediting baseline (focus on key sectors e.g. electricity, transport); 3) trans-national sectoral targets (for energy-intensive industries subject to international competition e.g. aluminium, aviation, maritime).</li> </ul>	<ul style="list-style-type: none"> <li><b>Finance &amp; Technology:</b> Country-specific crediting scheme addresses financing and transfer of technology.</li> <li><b>Crediting:</b> Sectoral policy includes crediting mechanism. CDM is preferred to sectoral approach.</li> </ul>
International Agreements on Energy Efficiency (Ninomiya 2003)	<ul style="list-style-type: none"> <li>Selected countries negotiate an international agreement on energy efficiency addressing the production process in major emitting industries (iron and steel, petrochemicals, paper and pulp, non-ferrous metals, and non metallic minerals) under UNFCCC or separately, and develop energy efficiency standards for major appliances in the residential and transportation sectors.</li> </ul>	<ul style="list-style-type: none"> <li><b>Finance &amp; Technology:</b> Establishment of a global research and development fund.</li> </ul>
Multilateral agreements (Bodansky 2007)	<ul style="list-style-type: none"> <li>Multilateral agreements in which governments commit to emissions reduction from a given sector.</li> </ul>	<ul style="list-style-type: none"> <li><b>Finance &amp; Technology:</b> Critical technology and finance issues within a sector can be addressed when they are considered most urgent.</li> </ul>
Nationally defined sector-based approaches (White House Council on Environmental Quality 2007)	<ul style="list-style-type: none"> <li>Nationally defined sector-based approaches in sectors such as power generation (e.g. clean coal, nuclear, renewable energy), transportation, land use, energy efficiency and adaptation to be agreed upon by the end of 2008 among major economies including developing countries (e.g. Brazil, China, India, Republic of Korea, Mexico, Indonesia, South Africa).</li> </ul>	<ul style="list-style-type: none"> <li><b>Finance &amp; Technology:</b> Provided</li> </ul>
METI 2004	<ul style="list-style-type: none"> <li>Developed and developing countries set trans-national sectoral intensity target such as energy efficiency target and achieve the target through deployment and transfer of existing technology. Some precedent cases include semiconductor and aluminium industries.</li> </ul>	<ul style="list-style-type: none"> <li><b>Technology:</b> Technology deployment and transfer is a tool to achieve the intensity target.</li> </ul>
Sectoral approach (Keidanren 2007)	<ul style="list-style-type: none"> <li>Expansion of the Asia Pacific Partnership (APP) to replace the Kyoto Protocol.</li> </ul>	<ul style="list-style-type: none"> <li><b>Technology:</b> Technology cooperation is the basis of agreements.</li> </ul>
Global sectoral approach for steel (IISI 2007)	<ul style="list-style-type: none"> <li>Replaces cap-and-trade schemes with national/regional sector-specific voluntary targets (CO<sub>2</sub> emissions reduction per ton of crude steel) that involve all the major steel producing countries after 2012.</li> <li>IISI covers 180 steel producers and produces 75% of the world's steel (outside China).</li> </ul>	<ul style="list-style-type: none"> <li>No special incentives are announced but it is likely to involve technology cooperation in some form.</li> </ul>
Asia-Pacific Partnership on Clean Development and Climate (APP)	<ul style="list-style-type: none"> <li>Partnership among USA, Australia, Japan, Republic of Korea, China, India and Canada (covering around 60% of the world energy consumption and CO<sub>2</sub> emissions); Established eight sector-specific task forces in cooperation with individual companies; Partnership complementary to the Kyoto Protocol, based on benchmarking and energy efficiency. For example, the task force on steel sector identified key energy efficiency technologies and estimated CO<sub>2</sub> emission reduction potential as 127 Mt/CO<sub>2</sub> (METI 2007).</li> <li>Partnership in implementation. Technical and financial cooperation is in progress between the task forces and five international financial institutions (Global Environment Facility [GEF], World Bank, International Finance Corporation [IFC], Asian Development Bank [ADB], Japan Bank for International Cooperation [JBIC]) and International Energy Agency (IEA) (for benchmarking).</li> </ul>	<ul style="list-style-type: none"> <li><b>Finance &amp; Technology:</b> Task forces in eight sectors promote technology cooperation. IPRs are treated on a case-by-case basis. Funding pledges for technology transfer include USD 51 million from US and 127 million from Australia.</li> </ul>
<b>III. Proposals focusing on the forestry sector</b>		
Dual markets approach (CCAP 2007)	<ul style="list-style-type: none"> <li>Creation of a separate market for reducing emissions from deforestation and degradation (REDD), in which Annex 1 countries may invest in developing countries in order to achieve the portion of their post-2012 emission reduction target, which is decided by COP. By 2020, COP would determine if the REDD market is stable and mature enough to link with post-2012 carbon market based on the Kyoto Protocol.</li> </ul>	<ul style="list-style-type: none"> <li><b>Finance:</b> Developed countries commit to financing the creation of emission inventories and baselines in developing countries as a way to reduce the deforestation rate. In addition, investments to achieve partial targets will continue.</li> </ul>
Nested Approach (Pedroni 2007)	<ul style="list-style-type: none"> <li>An integrated approach to grant tradable emission credits to participate in REDD activities, operating at national and project levels. REDD credits shall be issued for any voluntary emission reduction below the agreed national reference emission level. Such credits would be <i>permanent and fungible</i> with any other emission allowances.</li> <li>A <i>mandatory reserve account</i> of XX% of the REDD credits issued from a country would guarantee the permanence of the emission reductions traded in the carbon market.</li> </ul>	<ul style="list-style-type: none"> <li><b>Finance:</b> A fund to create enabling conditions and pilot experiences in non-Annex I countries complementing the market based mechanisms.</li> <li><b>Crediting:</b> REDD credits are permanent and are fungible with other allowances/credits.</li> </ul>
REDD (Coalition for Rainforest Nations 2007)	<ul style="list-style-type: none"> <li>Establishment of a process for individual countries to voluntarily put forward policies to reduce deforestation and qualify for financial incentives under the climate framework.</li> </ul>	<ul style="list-style-type: none"> <li><b>Finance:</b> Basket of instruments for finance and capacity building.</li> <li><b>Crediting:</b> Credits for early action to be fully fungible.</li> </ul>
Deforestation & financial incentives (Brazil 2007)	<ul style="list-style-type: none"> <li>Voluntary domestic actions to reduce emissions from deforestation linked to financial incentives or credits under UNFCCC, but does not envisage any mechanism that could be used by Annex I countries to meet the target.</li> </ul>	<ul style="list-style-type: none"> <li><b>Finance:</b> New and additional finance (contribution from multilateral financial institutions and Annex I countries) for technology transfer and capacity building.</li> </ul>
Forest Retention Incentive Scheme (Tuvalu 2007)	<ul style="list-style-type: none"> <li>Support to projects implemented by local communities that wish to set aside forest areas or manage them on a sustainable basis.</li> </ul>	<ul style="list-style-type: none"> <li>Financial support from the UNFCCC</li> </ul>

*The stringency and legal character of the sector-based target are especially important for ensuring environmental integrity of sectoral approaches.*

## 2.2 Basic Principles and Defining Characteristics

In order to assess how Asian countries may benefit from sectoral approaches and how the future climate regime discussions can facilitate such approaches, basic principles and characteristics of sectoral approaches are considered briefly in this section.

Bodansky (2007) and the International Energy Agency (IEA) (2005) identified several key variables to be considered for effective implementation of sectoral approaches. These include: participation of countries or sectors; methods to steer private sector behaviour (e.g. targets, harmonised policies, uniform standards, menu approach); degree of international cooperation; cost of implementation; substantive content (e.g. long-term target [e.g. 50% GHG reduction in steel industry by 2040], emission targets and trading, performance standards [e.g. emissions reduction by a certain percentage per year, fuel economy standards for automobiles], taxes, technology/specification standards [e.g. renewable portfolio standards in an electricity agreement], technology research, development and diffusion); crediting or no crediting and avoidance of double counting, and stringency of the target (e.g. binding or non-binding target/baselines, best-available technology, cost-effectiveness, cost-benefit, balancing, parity). The stringency and legal character of the sectoral target are especially important for ensuring environmental integrity (Regeringskansliet 2007).

A preliminary assessment of proposals suggested that there are at least five important design features in sectoral approaches.

### 2.2.1 Legally binding or voluntary

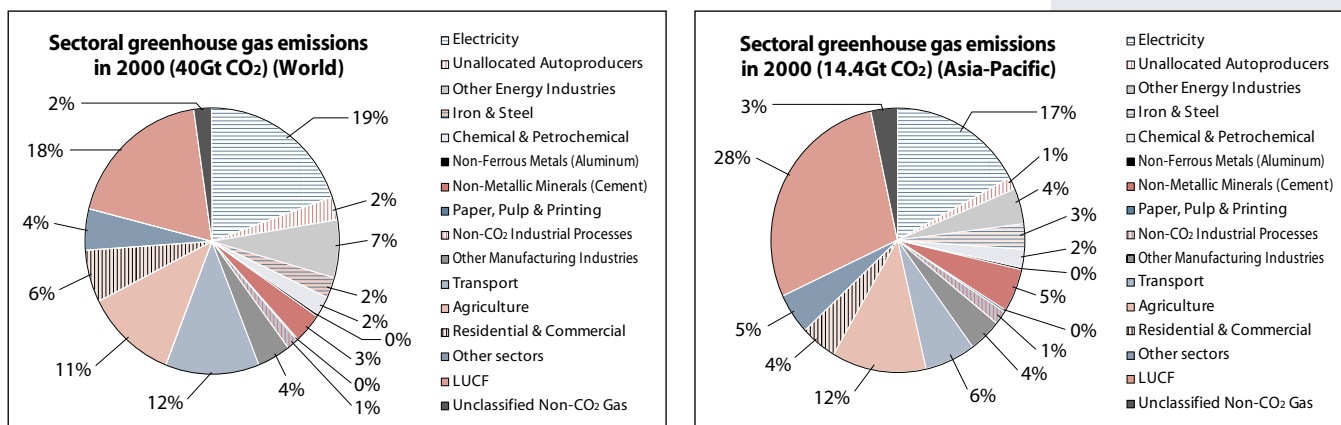
Sectoral approaches can be binding or voluntary (Philibert and Pershing 2001, Watson et al. 2005). As it is unlikely that developing countries would take on binding sectoral targets at this stage (Lewis and Diringier 2007), it may be useful to consider how developing countries responded to proposals on voluntary non-binding commitments in recent negotiations. For instance, at COP/MOP2, the Russian Federation proposed that the UN provide technological and financial incentives to encourage non-Annex I countries to take voluntary commitments or targets to reduce emissions under the UNFCCC (Russian Federation 2007). Discussions on this proposal were continued in 2007. While many Annex 1 countries expressed their support for the Russian proposal many developing countries (including China) opposed the idea. Yet other countries such as South Africa offered support but qualified it with reservations on the details of voluntary commitments. A similar response was evident at COP4 when Argentina floated a voluntary commitment proposal that was eventually taken off the table as developing countries complained of a lack of clear procedures for adopting non-binding commitments (Bouille and Osvaldo 2002). Therefore, even for voluntary sectoral proposals, clear rules will be a necessary element.

### 2.2.2 Target countries/sectors

As industrial sectors in only a few non-Annex I countries account for large proportion of developing country emissions, sectoral approaches could be limited to those countries. For example, the inclusion of the top ten largest GHG emitting developing countries in sectors such as power, iron and steel, chemicals, aluminium, cement and limestone, paper,

pulp and printing would insure coverage of 80-90% of developing country emissions in those sectors (CCAP 2006). Covered sectors, however, will tend to vary widely across countries, reflecting the fact that some countries have larger concentrations of internationally competitive sectors (e.g. steel), energy intensive sectors (e.g. cement, aluminium, marine, aviation), domestically targeted sectors (e.g. electricity) and sectors not covered by the Kyoto Protocol (e.g. deforestation avoidance). Of the above sectors, the potential emissions saving is typically the greatest in the industrial sector (estimated to be 3.3 GtCO<sub>2</sub>) and, among industrial sectors, the most marked improvements are likely to come from cement, chemicals/petrochemicals, iron and steel (IEA 2007a). In the Asia-Pacific region, industrial sectors such as power generation, cement, iron and steel, and land use sectors such as forestry and agriculture, hold promise to adopt sectoral approaches (Figure 2.1). Beyond which countries and sectors would be covered, leakages between sectors (Watson et al. 2005), eligibility and system boundaries (Ellis and Baron 2005) are additional factors that need to be considered when designing sectoral approaches.

**Figure 2.1 Share of global GHG emissions by major sectors in 2000 in the world and the Asia-Pacific region**



Source: CCAP 2006

### 2.2.3 Baselines

Baselines, the projected level of emissions under a business-as-usual scenario, will determine the amount of credits awarded. How baselines are developed is therefore important to the design of a sectoral approach. Some argue that the establishment of sectoral baselines using particular technologies could prove less cumbersome than baseline setting for project-based CDM (Watson et al. 2005), while others take the opposite view, pointing out that it is difficult to gather the needed data and run the necessary projections across what may be multiple projects and regions falling under a single sector (Baron and Ellis 2006). In some cases, the baseline used for sectoral approaches can also be utilised as a baseline of a project-based CDM (CCAP 2006, Baron and Ellis 2006). However, in the case of a no-lose target—a non-binding target that reward countries that went below the target but does not penalise countries for going above the target—the sectoral crediting baseline should be set at a conservative level so that developing countries will have a greater incentive to make reductions and earn emission reduction credits (Ecofys and GtripleC 2007).

*Some argue that the establishment of sectoral baselines using particular technologies could prove less cumbersome than baseline setting for project-based CDM, while others point out that it is difficult to gather the needed data and run the necessary projections across what may be multiple projects and regions falling under a single sector.*

*In case of crediting sectoral approaches, the kind of credits issued, fungibility of sectoral credits with the Kyoto credits and discounting to avoid inflation of credits should be duly considered.*

#### **2.2.4 Relation with CDM**

If sectoral crediting baselines are included in the future climate regime, an important consideration is whether the CDM should be continued in those sectors where such baselines are developed (IISD 2005). If a no-lose sectoral target for the cement sector is agreed upon internationally, for example, only those CDM projects in the cement sector that were already registered prior to acceptance of sectoral targets would be continued. Otherwise, to avoid double counting of emission reductions, existing CDM projects would have to be included in the sectoral crediting baseline. On the other hand, it is possible to envision a scenario where CDM can co-exist with sectoral approaches (Ecofys and GtripleC 2007). If this was the case, proposals would be divided into two types, depending on whether the sectoral approaches were instituted prior to or after the registration of a CDM project.

#### **2.2.5 Incentive mechanisms**

Incentives for developing countries such as a crediting mechanism, technology transfer and financing are also key components of a sectoral approach. In the case of crediting, the kind of credits issued, fungibility of sectoral credits with the Kyoto credits and discounting to avoid inflation of credits merit consideration. Some sector-based proposals suggest issuing CER, while some others suggest issuing different form of credits that are not fungible with CER. The first group of proposals that require developed countries to take on absolute targets (Table 2.1) include a crediting mechanism, while voluntary sectoral approaches rely mainly on the transfer of finance and technology as the primary incentive for developing countries. Forestry-related sectoral proposals focus on capacity building and financial assistance.

### **2.3 Merits and Demerits of Sectoral Approaches in Asian Context**

Sectoral approaches offer a potentially good opportunity to reconcile national developmental priorities in Asian countries and global climate interests. Implementation of such approaches may provide several advantages to developing Asia, some of which are discussed below.

#### **2.3.1 Alignment with sustainable development goals**

Sectoral approaches are usually consistent with sector-based development plans and national resource endowments in developing countries, hence they can maximise developmental co-benefits (Watson et al. 2005). They can also improve the data accumulation capacity of different sectors (Sterk and Wittneben 2005) and promote information sharing on good practices between countries. In some countries, necessary data for sectoral approaches are already available, which enable the development of a sectoral emissions monitoring and reporting system (IISD 2005). A sectoral approach can also enable developing Asia to focus on specific sectors where inward investment is needed and which serve the dual purpose of sustainable development and GHG emission reductions.



### **2.3.2 Ease of administration and simplification of negotiations**

Focusing on a few selected sectors with high emissions growth will enable Asian governments and businesses to take strong mitigation policies and measures compared to economy-wide approaches (Watson et al. 2005, IISD 2005, CCAP 2006). Likewise, negotiations among the Parties can be simplified if discussions are focused on a few sectors in a few countries.

### **2.3.3 Wider coverage of sectors**

The Kyoto Protocol does not currently cover sectors such as bunker fuels (aviation, maritime), deforestation avoidance and soil management, which are of increasing importance in Asia. Likewise, sectors such as transportation are unable to benefit from current CDM due to several barriers. Adoption of sectoral approaches in the future climate regime enables the inclusion of such sectors (IISD 2005, IEA 2007a).

### **2.3.4 Reduction of transaction costs**

Transaction costs of GHG reduction would be much less with sectoral approaches as compared to project-based approaches (Saminiago and Figueres 2002) or economy-wide approaches (Bosi and Ellis 2005), thereby making the whole process of GHG mitigation economically more efficient. High transaction cost in the current CDM were often cited as the main reason for limited participation of some Asian countries. The reduced transaction costs through sectoral approaches may enable their more effective participation and improved geographic equity in the future climate regime.

### **2.3.5 Recognition and rewarding of developing country efforts**

Developing countries in Asia implemented several voluntary domestic emission reduction measures in specific sectors (e.g. cement, power, transportation, forestry), but they are not yet recognised at the international level (Chandler et al. 2002). Adoption of sectoral approaches in the future climate regime can create a mechanism for explicit recognition and rewarding of such efforts (CCAP 2006), which in turn may encourage other developing countries to take similar efforts in priority sectors.

### **2.3.6 Acceleration of deployment of low carbon technologies**

Sectoral approaches can make it easier to deploy low carbon technologies in specific sectors in developing countries through mobilising new public resources and scaling up private investment (Watson et al. 2005). For example, the “technology finance and assistance package” proposed through CCAP’s sectoral approach can promote technological innovation (CCAP 2006). Recognising that the project-based approach alone cannot bring in enough investment to achieve technological innovation and sharp emission reductions, the World Bank recently decided to set up a Carbon Partnership Facility (CPF) to scale up the current project-based CDM to sectors covering several cities or regions and create a new demand for credits from the voluntary carbon market as well as post-2012 CER. The CPF is expected to be used in areas such as power sector development, energy efficiency, gas flaring, transport, and urban development, including integrated waste management systems.

*Developing countries can benefit from sectoral approaches in terms of aligning their GHG mitigation plans with sustainable development goals, wider coverage of sectors, reduction of transaction costs, and accelerated deployment of low-carbon technologies.*

*For developed countries, sectoral approaches offer advantages such as reflecting their interests, addressing concerns over competitiveness and fairness, and broadening the involvement of countries in mitigation efforts.*

### **2.3.7 Advantages from the perspective of developed countries**

For developed countries too, sectoral approaches offer many advantages, including reflecting their national interests, addressing concerns over competitiveness and fairness, and broadening the involvement of countries in mitigation efforts. It is now widely agreed that emission reduction by developed countries alone will not be adequate to stabilise atmospheric GHG concentrations. Indeed recent IPCC reports suggested that emissions should peak within the next decade, with significant reductions (<50% of 1990 levels) by the middle of this century (IPCC 2007). Employment of sectoral approaches worldwide, on the other hand, may lead to huge emission reductions. As the coverage of emission caps under the Kyoto Protocol is unlikely to be extended beyond current participants in the near future, sectoral approaches provide another means of involving countries that do not have emissions targets such as the United States and China to reduce emissions (Watson et al. 2005). The assumption here is that sectoral approaches might enable the transfer of best practices in countries where industrial planners have not considered large-scale mitigation efforts or where policy signals do not exist to encourage the uptake of such a comprehensive approach. Currently industrial sectors in developed countries with economy-wide targets fear that they might lose competitiveness in some sectors as against countries without such targets. Adoption of sectoral approaches may remove such concerns as it would allow governments to shield particular sectors, thereby granting them advantages over their competitors in other countries that do not follow suit (Cosbey et al. 2005, Bodansky 2007).

### **2.3.8 Limitations of sectoral approaches**

Implementation of sectoral approaches poses several institutional and technical hurdles, however, especially if crediting is necessary. Since there is no universally acceptable definition of a sector, defining the boundaries of a sectoral crediting mechanism is one of the most challenging tasks. For instance, the wide variations in GHG intensities among facilities within a sector may require setting up multiple baselines, which in turn may prove burdensome to negotiate at the international level. Further, many developing countries in Asia do not have the institutional capacity or data to set up multiple baselines. Indeed, recent experiences from the IEA, the APP and the CSI suggest the lack of sound data at the level of individual sectors on an international basis (Baron et al. 2007). Even within the same sector, interests are often different between the big and small industries (Ellis and Baron 2005).

Negotiating country-specific baselines for internationally traded commodities and awarding credits without penalising underperformance may run against international trade rules and it may be difficult to reach international consensus (Baron and Ellis 2006). Further, adoption of sectoral approaches alone does not necessarily lead to a reduction of total emissions in growing economies (CCAP 2006). Therefore, Bodansky (2007) reported that sectoral approaches may be the second-best option for global climate regime, and that the post-2012 climate regime should have absolute emission reduction targets for developed countries.

In terms of international competitiveness, sectoral approaches may create winners and losers depending on which sectors are covered, and may lead to undesirable competitiveness impacts between countries in whose economies the covered sectors

feature more or less strongly (Cosbey et al. 2005). There are also concerns such as free riders (Bosi and Ellis 2005, Watson et al. 2005), leakage for non-participants (Colonbier and Neuhoﬀ 2007) and antitrust law issues (Baron et al. 2007). Another major concern associated with sectoral approaches is related to oversupply of credits (Lewis and Diring 2007). Baron and Ellis (2006) estimated that the power sector of developing countries alone could generate two billion credits per year in 2030, provided all GHG reduction policies involved are deemed additional by the authority governing the sectoral crediting mechanism, as compared with less than 40 million credits per year through CDM (Ellis and Levina 2005).

Other concerns include that many small developing countries may be bypassed in this process and may not benefit from sectoral approaches, as the focus might be mainly on industrial sectors in large developing countries. There is also a concern that sectoral approaches will increase the complexity of international negotiations, as sectoral details with the exception of LULUCF are rarely discussed under UNFCCC and the Kyoto Protocol. Sectoral approaches, if not implemented carefully, may also lead to higher costs of abatement (Baron et al. 2007).

*Many small developing countries may be bypassed and may not benefit from sectoral approaches, as the focus might be mainly on industrial sectors in large developing countries.*

## 2.4 Perspectives on Sectoral Approaches

### 2.4.1 Developing Asia

Participants in IGES stakeholder consultations showed a keen interest in sectoral approaches. However, discussions with individual stakeholders revealed wide variation in understanding of such approaches and preferences for sectors to be included. Perhaps such variation in understanding may become a major barrier in achieving consensus at the international level. This is ironic because one of the listed advantages of sectoral approaches was its ability to align diverse interests and needs of different countries. Representatives from Asian developing countries stressed that flexibility and diversity are required in choosing the sectors, and that sectoral approaches should complement economy-wide emission reduction efforts in developed countries.

In our earlier consultations, many participants from China and India stressed the need for widening the scope of CDM from a project-based approach to sectoral or policy-based CDM, even though their understanding of institutional and operational issues of sector-CDM varied widely. Participants from India, for instance, pointed out that expanding the scope of CDM on a sectoral basis would enable Annex I Parties to adopt deeper emission reductions at the same cost; allow equitable burden-sharing among Annex I Parties; and enable more effective participation by developing countries. Participants from China stressed that sectoral approach to CDM can reduce transaction costs and simplify the current complex procedure of project-based CDM, and that it could benefit the Asia-Pacific region, especially in sectors that are not yet covered by the Kyoto Protocol (e.g. deforestation avoidance, bunker fuels and household sectors) (Kimura et al. 2006). Some participants suggested that different sectors might need different approaches and that emission-intensive sectors, such as iron and steel, cement, electric power or sectors with homogeneous products, should be the first choice. Participants from the Republic of Korea emphasised that sectoral approaches should be designed carefully to address industrial competitiveness in internationally energy intensive sectors. However, participants from Least Developed Countries (LDCs) and Small Island Developing States

***Sectoral approaches, in whatever form, should not compromise the principles enshrined in the UNFCCC and that environmental integrity should be the main consideration.***

***Major developed countries including Japan, EU, and US, and research institutions are all positive about sectoral approaches, although their preferences for design and sectors vary widely.***

(SIDS) expressed concerns about sacrificing the environmental integrity of the Protocol through the expansion of CDM to include whole sectors. Countries with large forest cover such as Indonesia insisted on making deforestation avoidance and a wider use of LULUCF eligible for a sectoral approach (Kimura et al. 2006).

A few participants from China expressed strong concern that the lack of clarity on operational issues including potential crediting mechanisms, and technical difficulties (data availability, verification, etc.) would be major stumbling blocks to adopt sectoral approaches. They mentioned that sectoral approaches, in whatever form, should not compromise the principles enshrined in the UNFCCC and that environmental integrity, not economic reasons, should be the main consideration. They also noted that adoption of sectoral approaches would not necessarily assure the participation of large developing countries in the future climate regime as several concerns of developing countries are not addressed automatically. They suggested that crediting for sectoral approaches might be an economic incentive for small developing countries but not necessarily for large developing countries. Therefore, they suggested that careful design, including the involvement of competent international as well as local technical organisations, would be crucial to implement sectoral approaches.

#### **2.4.2 Japan and other developed countries**

The Japanese government is strongly in favour of adopting sectoral approaches in the future climate regime. At the World Economic Forum in January 2008, Prime Minister Fukuda proposed that bottom-up sectoral approaches based on energy efficiency indicators should be used in setting quantified national emission reduction targets in the future climate regime (MOFA 2008). The Ministry of Economy, Trade and Industry (METI) also proposed trans-national sectoral energy efficiency standards for both developed and developing countries (METI 2004). Interviews with industrial stakeholders revealed, however, that there were wide differences in views on the implementation of sectoral approaches in the future climate regime. Some representatives of Keidanren, the biggest industrial group comprising many energy-intensive industries, supported sectoral approaches as an alternative to Kyoto-style absolute emission reduction caps for developed countries. They suggested that Keidanren would support efforts of IEA to set up energy efficiency indicators and of APP to extend technology cooperation to additional sectors. Keidanren emphasised that through sectoral approaches developed countries should pledge development of innovative technologies, provide technology assistance to developing countries, and improve energy efficiency of products, and that developing countries should implement projects based on technological assistance from developed countries and pledge energy efficiency improvement in their domestic industries (Keidanren 2007). On the other hand, representatives of the second industrial group in Japan comprising small and medium scale industries, Keizai-Doyu-Kai, insisted on complementing sectoral approaches with the Kyoto-style targets. They preferred absolute targets for developed countries, energy intensity targets for newly industrialised countries, and voluntary targets for other developing countries (Keizai-Doyu-Kai 2007).

The European Union (EU) reported that sectoral approaches might be acceptable to many Parties and that the post-2012 agreement should include flexible and fair commitments from developing countries to reduce emissions intensity (UNFCCC 2007c). However, EU preferences for coverage of sectors under such approaches varied from

those of other developed countries. For example, EU preferred to include aviation and maritime emissions under EU ETS and under sectoral approaches at the international level in a global climate change agreement after 2012 (EEA 2007). However, the US was not optimistic about including those sectors. On the other hand, EU opposes the inclusion of LULUCF under EU-ETS or sectoral approaches, but the US supports the inclusion of LULUCF. According to the US Undersecretary of State, developing countries and the US are more likely to take on emissions reduction targets after 2012 if forestry and land use are considered eligible for emission credits (Point Carbon 2006). Indeed, the US expressed its interest in reaching an agreement on a post-2012 framework that could include a long-term global goal, mid-term goals and strategies, and nationally defined sector-based approaches for power generation (e.g. clean coal, nuclear, renewable energy), transportation, land use, energy efficiency, and adaptation by the end of 2008 among major economies including some developing countries (e.g. Brazil, China, India, Indonesia, Mexico, Republic of Korea, South Africa) (White House Council on Environmental Quality 2007).

Research institutions and think tanks also share positive views of including the sectoral approaches in the post-2012 regime. For example, CCAP (2006) suggested that the future framework should have absolute targets for developed countries plus no-lose intensity sectoral targets for developing countries. Pew Center (2007) considered that sectoral approaches might be a good alternative to economy-wide approaches and that such approaches should initially be explored in aluminium, cement, power and transportation sectors (Lewis and Diring 2007). Ecofys proposed no-lose sectoral targets for developing countries and developed sectoral templates for industries such as cement (GtripleC and Ecofys 2007).

## 2.5 Relevance of and Barriers to Sectoral Approaches in Asia

Based on a preliminary review of emissions data from IEA in various sectors and an assessment of the overall feasibility for implementation of sectoral approaches, we consider that coal-fired power generation, iron and steel, cement and forest conservation sectors might be candidate sectors for consideration in Asia.

### 2.5.1 Coal-fired power generation

Many countries in developing Asia rely on coal as a major source of power. For example, coal accounts for more than 50% power generation in both China and India. IEA projections show that Asia will continue to depend on coal in the foreseeable future and that China and India will account for 44% of global coal-based electricity generation by 2030 with nearly USD one trillion investments (Watson et al. 2005). As Asian countries vary widely in plant efficiencies in terms of CO<sub>2</sub> intensity because of differences in coal endowments, reaching an agreement on a uniform CO<sub>2</sub> intensity target for the sector across the region or worldwide is difficult. For example, India has abundant sources of poor quality coal with high sulphur and ash contents, and obviously plant efficiencies are lower than in other countries. Further, in many Asian countries, such as China and Indonesia, the phase-out of less efficient coal-based power plants to achieve higher levels of sector-wide efficiency is slowed by a lack of alternative energy sources. In Indonesia and Viet Nam, for example, recently there has been a reversal from dependence on oil to coal, with increased oil prices and surging demand for oil by industrial and residential

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sectors. Moreover, electricity is largely a good consumed domestically and any extra cost for this sector would be a burden on the domestic market. Therefore, aiming at uniform and gradual percent improvements on current intensity levels (e.g. 5-10%) may be more practical. However, even such a target may not be acceptable to countries such as Japan or Republic of Korea, which have already achieved high levels of efficiency. In view of this, sectoral approaches in the power sector should propose only realistic targets after seriously considering national circumstances and priorities.

### 2.5.2 Iron and steel

*If synergies can be built with initiatives such as APP, which focus on deployment of new technologies, sectoral approaches in the steel industry hold promise. Likewise, if IISI can work with Asian governments in facilitating the phase-out of obsolete technologies, and if CDM can be restructured to provide adequate financial incentives, at least major steel firms in China and India may adopt sectoral approaches.*

The iron and steel industry is the largest energy consuming manufacturing sector. China, the world's largest steel producer and consumer, accounts for 31% of global production. The demand for steel production is expected to grow considerably as many Asian countries are building new infrastructure. Lower fossil fuel use in the steel sector is associated with new technologies, high operating efficiencies, superior plant maintenance and larger plants with greater economies of scale (Watson et al. 2005). In terms of technologies, coke dry quenching is known to improve plant efficiency and lower emissions but the penetration of such technologies is very low in developing Asia (Table 2.2). Likewise, carbon capture and storage may be potentially useful but it would require significant investments in infrastructure. If synergies can be built with initiatives such as APP, which focus on deployment of new technologies, sectoral approaches in the steel industry hold promise. Integrated steelmaking process, which has much high emissions intensity than the electric furnace steelmaking, is common in several Asian countries. If a switch in the production process from integrated steelmaking to electric furnace steelmaking is supported by sectoral CDM or other incentive mechanisms, there is considerable scope to reduce emissions in the steel sector. However, cost implications must be carefully examined, especially if such a process switch is attempted in small steel plants. Furthermore, in most Asian countries, the steel industry is fairly fragmented with a large number of small producers. Emission intensity data in several Asian countries is unreliable, hence initial efforts must be focused on improving data quality. For example, the Chinese Iron and Steel Association does not report CO<sub>2</sub> emissions from steel making, and many Indian firms also do not collect such data. Recently, the IISI launched a task force to develop a global sector-specific approach for CO<sub>2</sub> reduction in the post-2012 regime (IISI 2007). If IISI can work with Asian governments in facilitating the phase-out of obsolete technologies through its CO<sub>2</sub> Breakthrough Programme, and if CDM can be restructured to provide adequate financial incentives for sectoral approaches in the post-2012 regime, at least major steel firms in China and India may adopt sectoral approaches.

**Table 2.2 Diffusion rate of Coke Dry Quenching (CDQ) technology in China**

Steel production per installation (Mt)	Number of companies	Total steel production in 2004 (Mt/year)	Estimated coke consumption (Mt/year)	Estimated CDQ treatment (Mt/year)	Estimated CDQ penetration rate (%)
>10	2	33	13	9.8	76
5-10	13	90	35	12	35
<5	NA	150	69	2.2	3
Total	NA	273	117	24.3	21

NA: Not available

Source: Jusen, unpublished, based on original data from China Steel Industry 2005 and Statistics of the China Steel Industry 2004

### 2.5.3 Cement

The potential for reducing GHG emissions from cement sector in developing Asia is extremely high in view of highly inefficient calcination process (conversion of limestone to lime to produce clinker). Indeed, 60% of CO<sub>2</sub> emissions are from the decarbonisation of limestone rather than the use of energy. Like the steel sector, however, the cement sector in developing Asia is characterised by a vast number of very small firms, mostly with energy intensive small-scale vertical kilns. For example, vertical kilns account for 75% of cement production in China, which is by far the largest cement producer in the world. The low density of cement demand in China's inner regions makes vertical kilns more attractive. Recently, however, the Chinese government has set an ambitious goal of replacing about 400 Mt of capacity currently based on vertical shaft kilns with dry kilns. If such goals can be supported through appropriate incentives, adoption of sectoral approaches in this sector holds great potential. Another characteristic of cement firms in Asia is that they use coal for burning in kilns. In India, for example, use of poor quality coal and wet rotary kilns are two main reasons for high CO<sub>2</sub> intensity (0.92 t CO<sub>2</sub> per ton of cement produced), as against Japan's best performance (0.73 t CO<sub>2</sub> per ton of cement produced) due to its exclusive use of dry kilns and very high operating efficiency (CCAP 2006).

Sectoral agreements in the cement industry to bring about changes in the operational efficiency of clinker manufacture or use of dry kilns (which in general have high capital costs) are likely to reduce GHG emissions significantly. However, the efficiency of the dry kiln process depends on the raw material used. For example, Tanaka et al. (2005) reported that limestone in China with high moisture content hinders the use of the dry kiln process. Thus it is important to consider various national and local circumstances in designing any sectoral baselines or targets. As cement is fundamental to construction and infrastructure development, developing countries in Asia are not likely to agree upon uniform emission intensity targets unless the right incentives such as sectoral CDM and technological and financial assistance are provided. Instead, several industry sources consider that a performance-based approach could initially be tried out within a country before extending across different countries. Collaborative research agreements to find an alternative binding agent to clinker may be particularly helpful in reducing emissions from the cement industry in Asia. The CSI of WBCSD has recently adopted the CSI CO<sub>2</sub> protocol for monitoring and reporting GHG emissions to enable the cement companies to produce consistent performance data. The CSI has three member firms from Asia (two from India and one from Thailand), and is now building the first database of CO<sub>2</sub> emissions from more than 1000 cement kilns, and key performance indicators for the cement industry. The experiences of Asian firms in providing the appropriate data to an independent third-party service provider to develop the database will go a long way in implementing sectoral approaches in Asia.

### 2.5.4 Forest conservation

Many Asian countries have a keen interest in implementing sectoral approaches in the forestry sector. Recognising the seriousness of the impact of deforestation on global GHG emissions, international organisations and UNFCCC Parties agreed to consider a series of proposals (Table 2.1) to reduce emissions from deforestation and degradation (REDD), including funding activities through the use of trading carbon credits and

*Several cement industry sources consider that a performance-based approach could initially be tried out within a country before extending across different countries. Collaborative research agreements to find an alternative binding agent to clinker may be especially helpful in reducing emissions from the cement industry in Asia.*

***Although the growing interest in UNFCCC in providing incentives for forest conservation is encouraging to many Asian countries, adoption of sectoral approaches to deforestation avoidance or forest degradation faces many technical and policy challenges.***

offsets (UNFCCC 2007b). FAO reported that the area of primary forest in Asia decreased at the rate of 1.5 million hectares per annum from 1990 to 2005 (FAO 2007). The growing interest in UNFCCC in providing incentives for forest conservation by valuing standing forests as carbon sinks is encouraging to many Asian countries, although there is wide variation in interpretation on modalities of incentive mechanisms.

Adopting a sectoral approach to the forestry sector in Asia in terms of deforestation avoidance or forest degradation faces many technical and policy challenges (e.g. whether the reference rate should be historical versus business as usual forecast, base year for deforestation monitoring, baseline methodology, market vs. non-market incentives, leakage, double counting with afforestation and reforestation CDM). In addition, adopting a uniform target for deforestation avoidance within a country or among countries is not easy because of significant differences in national circumstances, especially in terms of forest governance structures. Only when such challenges are addressed would it be feasible to implement sectoral approaches in forestry.

Other areas where a sectoral approach might be useful in Asia include sectors such as renewable energy (especially wind and solar energy), transportation (automotive sector), paper and pulp, as well as petroleum and chemicals.

All in all, several important barriers remain to be overcome to implement sectoral approaches in Asia. In the near future, uniform global/regional targets are unlikely to be accepted in any sector, due to country-specific differences in resource endowments, supply of raw materials, existing technology stock, industry structure, consumer preferences and regulations. Instead, a set percentage point reductions from current intensities within each country may be workable depending on the sector. Even in such cases, the lack of latest sector-specific data in all developing countries in general and LDCs and SIDS in particular is a major barrier. For this, capacity building to accumulate data in priority sectors is crucial. Moreover, private companies in several countries are hesitant to release commercially sensitive information. In such cases, data may need to be collected, compiled and monitored by third parties such as industrial associations, rather than governments.

Technical difficulties in baseline setting for a sector are another barrier to be overcome. Development of consolidated methodologies may be a starting point for constructing sectoral baselines (Watson et al. 2005). In case of adopting trans-national sectoral approaches, coordination with relevant organisations for each sector can be a major barrier. In such cases, UNFCCC and IEA may jointly lead such collaborative efforts. Further, as the potential generation of credits under sectoral approaches may be much higher than under CDM, it is important to ensure the viability of carbon market either by discounting of credits or by increasing the demand for credits through more stringent quantitative emission reduction targets by developed countries. IEA estimated that more than 3 GtCO<sub>2</sub>-eq of credits could be generated by the energy sector alone if policies under consideration by governments were deemed eligible for crediting (Baron and Ellis 2006). If the price of carbon credits falls well below a reasonable value, nations may show little interest in adopting sectoral approaches.



## 2.6 The Way Forward

Based on our consultations, we conclude that there are many merits to pursue sectoral approaches in Asia, as they could present good bottom-up solutions to overcome imbalances and distortions in sectors and across countries. Further, it might be possible to achieve significant GHG reductions by engaging a relatively small number of countries. However, given the heterogeneity of market players, plant efficiencies, fuel mixes and regulatory environments across Asia, the mechanisms needed to implement sectoral approaches may have to vary from one sector to another and be structured in diverse ways ranging from voluntary to regulatory approaches. The targets may also have to be different depending on agreed priorities within each sector and country, ranging from absolute reductions to efficiency goals, best available technology performance standards or percent reduction in growth of GHG emissions. Ultimately, however, any sectoral approach employed must meet the criteria of environmental effectiveness, cost-effectiveness, equity and fairness, besides aligning its objectives with domestic policy priorities of developing Asia. In order to bring necessary GHG emission reductions on a global basis by 2020, the post-2012 regime should involve both absolute emission reduction targets for industrialised countries and sectoral approaches for all Parties to the UNFCCC. In industrialised countries, sectoral benchmarks can be used as building blocks for achieving economy-wide targets.

Effective integration of sectoral approaches in a post-2012 climate regime requires considerable progress on at least three fronts; (a) step-wise institutionalisation of sectoral approaches at the national and international levels, (b) preferential support and reliable incentives for emission reductions achieved through sectoral approaches; and (c) sector-specific initiatives by multinational corporations (MNCs).

Implementation of sectoral approaches at the national level requires undertaking a series of steps that are comparable to those taken to implement CDM. As a first step, substantial efforts are needed to gather data to better understand the overall performance of each sector and its potential for improvement in each country. Secondly, the guidelines for determining emissions intensities in priority sectors (e.g. steel, cement) must be developed by IEA based on experiences from current initiatives by IEA, APP, WBCSD, IISI and others. However, while developing such guidelines, local and national circumstances must be carefully considered. For example, establishing valid data records from the energy emissions and technology standpoints is a major challenge in developing countries such as China and India, which have large number of industrial installations. Therefore, local technical institutions and independent experts in each country must be fully involved in data collection and baseline setting. Analysis of domestic institutional changes required to implement sector-specific approaches and strengthening of relevant institutional and human capacities are also crucial at the national level.

When certain countries accumulate intensity data in chosen sectors for a minimum of 2-3 years in a consistent manner, an independent international review panel may accredit data collection procedures for determining current sectoral intensity levels. Those countries wishing to benefit from the sectoral crediting mechanisms by agreeing to no-lose targets should report sectoral intensity data at sub-national levels in their national communications following an amendment to the UNFCCC Article 4.1/12. On the basis of an in-depth review of sectoral intensity data by an international committee of experts based on "Best Available

***Given the heterogeneity of market players, plant efficiencies, fuel mixes and regulatory environments across Asia, the mechanisms needed to implement sectoral approaches may have to vary from one sector to another and be structured in diverse ways ranging from voluntary to regulatory approaches.***

***As a first step for institutionalizing sectoral approaches, it is necessary to gather data to grasp the overall performance of each sector and its potential for improvement in each country. The guidelines for determining emission intensities in priority sectors must be developed by IEA based on experiences from current initiatives by IEA, APP, WBCSD, IISI and others.***

***Synergies between the UNFCCC and non-UNFCCC initiatives such as APP are crucial for data collection, establishment of sectoral benchmarks and identification of potential pilot projects.***

***We suggest two options for adoption of sectoral approaches in Asia: (a) expansion of project-based CDM to sectoral targets with partial discounting of CER, and (b) introduction of voluntary carbon market with sector-specific funds.***

Technology in the region (within the country); necessary data adjustments could be made at sub-national levels, in order to ensure that target setting leads to net emission reductions. Using such data at the sub-national level, the private sector alone or along with local and/or national governments may propose a no-lose target and policies and measures to achieve such a target. All emission reductions beyond the target level may be banked for eventual crediting. Further amendments to the UNFCCC may be necessary, if the sectoral target setting process is to be institutionalised in the above manner.

Several participants in our consultations stressed that the UNFCCC should be the central forum to institutionalise sectoral approaches at the international level. However, some participants were concerned that the UNFCCC is not necessarily the best forum to address a range of sectors and the related technical details, given its limited sector-level expertise. Therefore, it is important first to build synergies between the UNFCCC and non-UNFCCC (e.g. IEA, International Civil Aviation Organization (ICAO), International Maritime Organization (IMO), International Tropical Timber Organization (ITTO), Food and Agriculture Organization of the United Nations (FAO), or APP, G8, Group of Twenty (G20), Organisation for Economic Co-operation and Development (OECD), Asia-Pacific Economic Cooperation (APEC), Major emitters group) initiatives to overcome this barrier, especially for data collection, establishment of sectoral benchmarks and identification of potential pilot projects. Such synergies can also be helpful in information sharing on technologies and best policy practices including regulatory issues in different sectors. The work of APP task forces could be especially useful in gathering relevant data in China, India and the Republic of Korea. For example, the action plan of the steel task force of APP aims to develop sector-relevant benchmarks and performance indicators, which could be a useful starting point for implementing sector-specific approaches under the UNFCCC. Similarly, the CSI aims to establish country baselines upon negotiation with governments to form the basis of intensity-based objectives and a baseline-and-crediting system in the cement sector (Baron et al. 2007). Both the UNFCCC and the external processes thus have a great role to play in sectoral approaches, but the greater negotiating burden on the UNFCCC may prove challenging (WRI 2007).

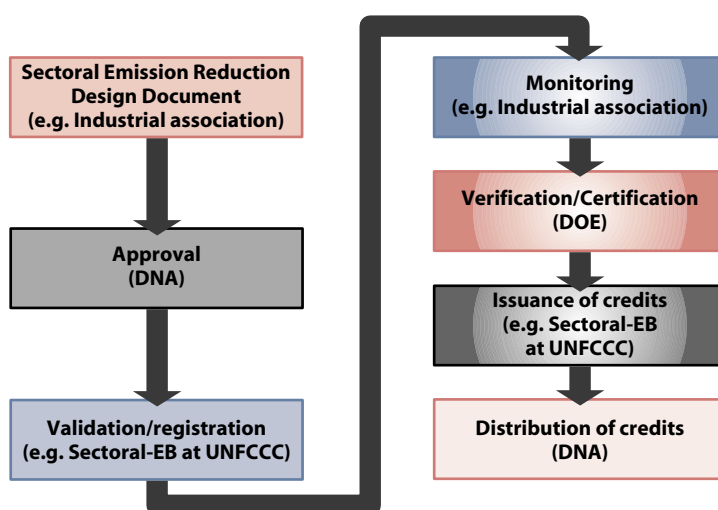
The lessons learned from the expansion of project-based CDM to programmatic CDM, which was approved at COP11 in 2005, will also be useful in structuring sectoral approaches. For example, the CDM Executive Board recently decided to credit clean coal technologies in power generation in China. Here, the number of credits would be computed as the difference in emissions between the proposed new plant and the "top 15 performing power plants that have been constructed in the previous 5 years". The experiences in data collection, baseline determination and crediting in such projects would be valuable in institutionalising sectoral approaches. Likewise, the experiences from pilot projects of the World Bank's CPF would also be relevant. Ultimately, however, some form of integration of sectoral approaches, and inter-sector coordination at the international level is necessary.

Based on consultations held in China and India, we suggest two options for adoption of sectoral approaches in Asia: (a) the expansion of project-based CDM to sectoral targets with partial discounting of CER (Yamagata 2004, Chung 2006); and (b) the introduction of a separate carbon market with "sector-specific funds". In the first option, credits from sectoral approaches could be made fully fungible with the Kyoto credits, and CDM-EB under the Kyoto Protocol would be expected to verify and issue CER, after applying

necessary discounting level. All Parties to the UNFCCC may sell such credits in the international emissions trading market under the Kyoto Protocol. However, this option may face difficulties in reaching an agreement on discounting level for credits generated from sectoral approaches.

In the second option, credits generated from sectoral approaches are not fungible with the Kyoto credits. Similar to the CDM Executive Board, another new Executive Board for management of sectoral approaches, with specific expertise on technical, institutional and political aspects of priority sectors, would need to be established in the UNFCCC to validate and issue credits generated from sectoral approaches (Figure 2.2). Sectoral credits may be sold to all parties of the UNFCCC. In addition, the specific sectors that are eligible for sectoral crediting would be made ineligible for CDM under the Kyoto Protocol in order to avoid double counting of credits. However, if some host countries decide not to avail themselves of sectoral crediting in some specific sectors, projects from those sectors and countries could continue to be eligible for CDM. Those developing countries which adopt sectoral approaches for GHG mitigation through a pledge and review system, are given additional incentives to preferentially access “sector-specific funds,” which are newly created with (a) voluntary contributions from Annex I countries, (b) a certain share of proceeds from international emissions trading employing sectoral approaches, and (c) a certain share from sector-specific funds to be established by the GEF and multilateral financial institutions such as the World Bank. The “sector-specific funds” may initially be jointly managed by the UNFCCC, World Bank and IEA until operational modalities are fully decided by the COP. In addition, an expert group on sectoral approaches may be established to help develop and review proposed sectoral approaches. The institutional arrangements for sectoral approaches may be periodically reviewed to ensure environmental integrity, cost-effectiveness, equity and fairness.

**Figure 2.2 A suggested institutional structure for implementation of sectoral approaches**



Additional sector-specific incentives in the form of finance, technology transfer and strengthening of institutional and human capacities may be provided to those countries that deliver sector-specific emission reductions in a measurable, reportable and verifiable manner. In addition, MNCs operating in developing countries may take the lead in demonstrating ways to reduce GHG emissions in specific sectors. Indeed the idea of GHG emission caps for MNCs was raised long ago in 2000 by the current UNFCCC Executive

*Additional sector-specific incentives in the form of finance, technology transfer and strengthening of institutional and human capacities may be provided to those countries that deliver sector-specific emission reductions in a measurable, reportable and verifiable manner.*

*The effective operationalisation of sectoral approaches in the future climate regime will depend greatly on the extent of reconciliation of perspectives of developed and developing countries.*

Secretary Yvo De Boer but progress has been slow, perhaps due to complexities associated with decisions on the types and stringency of targets and allocations of allowances.

Analysis of the current trends of international climate negotiations and potential barriers to adoption of sectoral approaches suggests that sectoral approaches could not fully replace existing market mechanisms, and that both sectoral approaches and economy-wide targets should co-exist and complement each other. However, in order to realise large-scale emission reductions through both sectoral approaches and economy-wide targets, it is important to provide a clear price signal on carbon emissions by creating a consistently high demand for credits, through setting deeper global GHG emission reduction targets.

The foregoing analysis of competing interpretations of sectoral approaches suggests that further work is necessary to bridge the gaps in understanding of developed and developing countries. Although a principal goal of sectoral approaches is to promote the use of best practices in internationally competitive industries, developed countries seem to be primarily interested in sectoral approaches as a way to broaden the participation in the future climate regime, while developing countries view sectoral approaches as a means to secure technology and funding for sustainable development in high priority sectors. The effective operationalisation of sectoral approaches in the future climate regime will, therefore, depend greatly on the extent of reconciliation of perspectives.

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