Clipore

A MISTRA-FUNDED
CLIMATE POLICY RESEARCH PROGRAM

Annual Report 2008

CLIPORE

Mistra's Climate Policy Research Program

contents

foreword

Ever since the program started, Clipore research has made its way to the climate change policy process through different paths. The organization of high-level seminars, workshops, conferences, and side-events at UNFCCC meetings has proven to be of value to influence the process. Now, with the international climate negotiations entering a crucial phase eight months ahead of the fifteenth Conference of the Parties meeting in Copenhagen (COP15) in December, where the expectations of reaching a new climate agreement succeeding the Kyoto Protocol are extremely high, the demand for policy research input is greater than ever. Before and during the COP15, the need for a strong connection between policy research and policy itself will be essential for the success of the meeting.

But the climate issue does not end with an agreement in Copenhagen, and neither does the need for climate policy research. In the agreeing parties' strive for reaching the goals set by the agreement, numerous policy issues will have to be addressed and examined. When it comes to for example emissions reductions, one foreseeable difficulty would be that the more you have cut your emissions the more sophisticated ways you need to cut your emissions even further to reach the goals. This is where policy research comes into the picture. The necessary policy instruments and measures needed to facilitate emissions reductions have to be developed and thoroughly analyzed. Research and development of new ideas are highly important to the policy process.

With regards to the short time frame and the increased tempo in the negotiation process leading up to the Copenhagen meeting, this puts even higher pressure on the research community to be flexible and act rapidly. The European Union has a fairly clear view of how it would like to see the development of the climate negotiations, but the fact that the United States, with a new President and administration, is in on the negotiations might require swift regrouping in certain issues. If, or when, this happens, it is of great importance that research, such as that conducted in Clipore, can change its short-term agenda to support the negotiators with accurate and up-to-date policy analyses and new concepts. In order to reach an agreement that is as wide and including as possible, the EU has to be flexible and willing to compromise. The possibility of including China is depending on the possibility of including the United States, and the two major economies are accountable for around 45 per cent of the global emissions.

The trickiest issue to resolve is that of effort sharing. A number of countries have for several reasons difficulties in managing domestic emissions reductions in short to mid term target, and to reach the emissions targets, they have to look for options for mitigation measures in other countries. Financing climate measures in developing countries is one hot issue that there hopefully will be some kind of a fair agreement on in Copenhagen from the developing countries point of view. A difficulty to overcome in the future is how to view the difference among population groups in some developing countries with regard to economic development, that is a large share living in poverty but an increasing part developing rapidly.

In the climate negotiations, the issue of financing climate measures in developing countries is currently the issue most heavily debated. It is important that the negotiations do not lose focus on the core issue – to enable emissions reductions to save the climate. With the 2°C target, it might be possible to stabilize the climate changes. However, it would still require measures to help developing countries, which will be affected even at this target level.

Still, the core issue of saving the climate can only be solved by resolving a number of policy issues connected to it, such as financial mechanisms. Some proposals in the negotiation process are regarded unacceptable by the developing countries and some by the developed countries. The task for Clipore is to review the policy proposals made, continuously analyze the outcome of the negotiations, bring new concepts and ideas to the table, and disseminate the research results. Policy research plays a profound role in the development of international climate change policy and negotiations, and the need for scientific input will remain crucial for a long time.

Lars-Erik Liljelund
Chairman of the Board

The prospects for US and EU climate change leadership in Copenhagen

a new beginning?

According to the IPCC, if the world is to avert the worst impacts from climate change, global warming must be limited to less than 2°C above the pre-industrial temperature. To make this goal a real possibility the countries of the world will need to come together and forge a new global climate change agreement in Copenhagen in December – a task that could become an even greater challenge under the current global economic crisis.

The advocates of immediate and far-reaching measures to address the threat of climate change all emphasize the importance of leadership. The most likely candidates to step up and take on the leadership role on this issue are the United States (US) and the European Union (EU). The question, then, is whether the US or the EU by themselves or acting in tandem can provide the leadership required for effectively confronting the complex challenge of climate change?

On 20 January 2009 Barack H. Obama was sworn in as the 44th president of the United States. While campaigning for the presidency Obama promised US leadership in tackling climate change and expressed willingness to work together with the international community in devising strategies to do so. Six days after Obama's inauguration, the EU's Commissioner of the Environment, Stavros Dimas, wrote the new president an open letter inviting the US to join the EU "shoulder to shoulder in the battle against climate change." The world now waits to see exactly what course the new Obama administration will chart and how the EU and other important actors such as China will respond. Will the US emerge as a climate change leader, a constructive partner, or will it continue its role as a laggard? During the eight years of the George W. Bush administration the US and the EU frequently were at loggerheads over the climate issue. However, the conditions are now ripe for a major change of direction. In the US momentum from below, increasing congressional support for action, and the new president's stated commitment that climate change will be a priority issue under his administration presage the potential for substantial action on the problem of climate change.

The best predictor of what the US will be willing to do internationally, is what it is willing to do domestically to combat climate change. The Bush administration and the US Congress refused to take meaningful domestic measures to regulate GHGs, consequently the US also refused to make any meaningful international climate commitments. In contrast, President Obama has called for tough domestic legislation that would put in place a mandatory market-based cap on GHG emissions. In response, congressional leaders have pledged to deliver a climate bill. Taking these developments into consideration we present four possible scenarios for US international climate policy. We will then consider how the EU might react.

Going forward, there are four potential scenarios:
1) the US takes the lead; **2)** the US constructively engages in the UNFCCC process; **3)** the US drags it feet and tries to push a go slow approach; **4)** the US remains largely absent and disengaged.

The global leader scenario: Under this scenario, the US uses its material resources to get way out in front of the EU and proposes climate goals that are even more ambitious than those promoted by the EU. In this scenario, the US reprises the idea-based, resource-based, and exemplative leadership roles it played in forging an arrangement to protect the Ozone. If the US puts forward very ambitious measures, it could make it difficult, considering the sometimes tenuous consensus that characterizes the support among its member states, for the EU to match the US. However, a close examination of US policy developments and trends suggests that this scenario is unlikely. A variation of this scenario is an extremely activist US in which the US takes action along multiple tracks and presents a variety of proposals both in and outside the UNFCCC process, which may not be as ambitious as what the EU wants, but are nonetheless designed to confront the climate problem.

The constructive engagement scenario: Under this scenario, the US seriously reengages in the global climate negotiations and works towards achieving an agreement in Copenhagen. The US clearly has public diplomatic incentives to pursue this path or at the very least not to take the blame for being a blocking state in the climate negotiations. Moreover, since the US plans to enact domestic measures to drastically reduce its GHG emissions it has a strong incentive to create a global system that holds the prospects of imposing future obligations on the emerging economy countries.

The go-slow scenario: Under this scenario, rather than signing off on or rejecting a comprehensive treaty, the US pursues an incremental approach and pushes for an interim agreement in Copenhagen. If this approach is selected the outcome in Copenhagen would be considered a success, from a US perspective, if it establishes the basic architecture of a post-2012 framework that puts a full and final treaty within reach but leaves several key issues open to be decided in the future. This may be attractive to the Obama administration as it would allow them to claim that progress had been made but would provide the US room for future manoeuvre and more time to work out exactly what it was willing to do domestically.

The absenteeism scenario: Under this scenario, the US once again decides to abstain from signing on to aggressive international climate protection activities. If the contours of US domestic legislation remain murky and no political consensus is in sight, the US may prove unwilling to make any meaningful commitments in Copenhagen. Fears about taking on costly obligations in the midst of a severe economic crisis could also make the US reluctant to act now. Moreover, because the proposed post-2012 climate regime is unlikely to require developing countries such as China and India to be subject to the same mandatory GHG emission reductions and time tables as the developed countries, the US could once again opt out. However, in light of the new president's desire to break with the Bush administration's policy legacy on climate issues, it is doubtful the US would choose this path.

How then might the EU, the main contender for exercising climate change leadership, respond to the actions by the US that are hypothesized under each scenario? The EU's goal is that the talks in Copenhagen produce an agreement that will be able to limit global warming to less than 2°C above the pre-industrial temperature. This means that the developed countries must take the lead and cut their collective emissions by 30% of 1990 levels by 2020.

If the US pursues a visionary global leader strategy, the EU would likely have a hard time responding. This scenario, however, is not very likely. Nonetheless, the Obama administration is likely to be far more proactive on climate issues than the Bush administration was. In addition to re-engaging with the UNFCCC effort as promised, the administration will likely pursue other initiatives as well, such as President Obama's "Global Energy Forum". Even a less ambitious but extremely proactive US climate diplomacy could prove problematic for the EU. With its 27 member-states, it would be a challenge for the EU to be nimble enough to effectively respond to an energetic active US climate diplomacy.

From the EU's point of view the constructive engagement scenario would be the best possible outcome. US plans to enact its own emissions trading system provide a possible focal point for cooperation with the EU. In fact, the EU's proposal for an OECD-wide carbon market by 2015 builds on this very idea. The EU wants to start with a EU/US working group, followed by a transatlantic carbon market in 2013. Ultimately, the market should be expanded to include major emerging economies by 2020. Common sentiments in both the EU and US in some quarters for border taxes for energy intensive imports from countries without comparable policy requirements, while controversial, might also serve as a basis for the US and the EU to combine leading by example with coercive leadership pressure tactics.

If the US pursues an incremental go slow approach this could create a dilemma for the EU. A dilemma that would be compounded if the US and China, representing nearly 50% of the world's GHG emissions, are able to reach some type of bilateral accommodation on the climate issue. Conversely, if the US and China fail to reach a mutually agreeable understanding, the US, not wanting to be put at a competitive disadvantage vis-à-vis China, might be reluctant to agree to a final climate deal in Copenhagen. In either case, the EU would then have to decide if an interim agreement that is less ambitious than they want, but includes the US, and perhaps China, is good enough. The absenteeism scenario, while the least likely, would be the most problematic for the EU. Should the US opt to remain on the sidelines then it will be up to the EU to decide whether or not it is prepared to take on the challenge of getting a new global agreement on climate change protection signed and ratified without the world's second largest GHG emitter. When the US rejected the Kyoto Protocol the EU managed to salvage it and bring it into force. Whether the EU would be willing and able to do this again for a new climate accord is questionable. Therefore, by virtue of its non-participation the US could be a veto player. Simply put, a US decision not to sign on to a new agreement could have the effect rendering it dead on arrival.

Which path is the most likely? The new president's stated aspirations to meaningfully address the threat of climate change, domestic policy developments in the US, and the global public diplomatic consequences at stake all suggest that some variation of the constructive engagement or the incremental approach is to be the most likely course of action for the US. For those hoping to see a meaningful global treaty forged in Copenhagen, the new president's initial actions along with the statement by Todd Stern, the US special envoy on climate, that the US would be involved in negotiations "in a robust way" is promising. This shift in US policy provides an opportunity for the US and the EU to work together towards a global agreement for the post-Kyoto period. The 2009 UNFCCC negotiations in Copenhagen will soon tell the story of whether or not these actors will be able to bridge their differences and provide the much needed leadership that would help to facilitate a successful outcome in Copenhagen.

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The functions of side events in global climate change

governance

Civil society involvement has grown substantially over the last decades to become an integral part of the United Nations' negotiating process. The side events at climate change negotiations are today the most visible component of civil society involvement in these negotiations. A research team within Clipore has studied what role side events play in the climate negotiations at Bali 2007 and Poznań 2008.

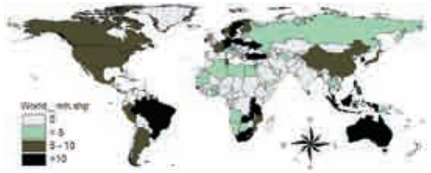
The results are based on roughly 2 300 answers from organizers, side event participants as well as a strategic sample of all participants attending the negotiations. We used questionnaires and semi-structured telephone interviews to survey i) who attends side events, ii) why they attend them, iii) why organizations arrange side events, and iv) the outcome of side events.

The study concluded that the side events we investigated fulfill the broader official objective of benefiting the COP participants. The overall assessment of participants, be they negotiators and researchers or UN, government, NGO, and media representatives, is that they found these events useful. Participants from the Group of 77 and the African continent rated side events as more valuable than did the average participant.

About two thirds of the organizers of side events came from Europe and one fourth from North America. Only a few came from developing countries, particularly outside Asia. Negotiators were by far the most important target audience of all categories of side events, followed by representatives of UN organizations and researchers. Organizers considered the G77 plus China to be the most important Party groupings to reach.

Contrary to what many expected when we started the investigation, quite a substantial share of negotiators attended the side events, in spite of a busy negotiating agenda. More than one quarter of the participants consisted of negotiators or government representatives. About half of the negotiators were part of the Group of 77 plus China, followed by EU negotiators representing almost a quarter of the negotiators present. At Bali, a quarter of the negotiators came from Least Developed Countries, whereas at Poznań they represented ten per cent.

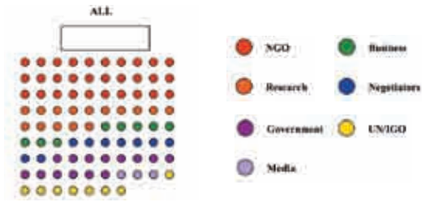
Figure 1. The estimated number of side event negotiator participants per million inhabitants by country, 2007 and 2008.



The estimated number of side event negotiator participants per million inhabitants per country was divided into three size categories.

Roughly a third was NGO representatives. Each side event was attended by an average of nine negotiators, 14 government representatives, eight business representatives, eight UN/IGO representatives, and three media representatives and 30 from civil society Non-Governmental Organizations (Figure 2). Business representatives came mainly from the power and energy, consulting and developing and finance sectors.

Figure 2. Number of side event participants according to primary role at COP 13 and COP 14.



The average number of side event participants was 83 at Bali and 88 in Poznań. The study indicates high side event participation from countries with large economies, countries near the COP venue, and the host country (Figure 3). Proximity to the negotiation country is important for participation. Europe has always high attendance.

Figure 3. The estimated number of side event participants at COP 13 and 14.

We identified six main functions of side events: capacity building, introducing potential items for negotiations, interconnecting people and policy areas, information dissemination, providing a forum for other levels of governance, and legitimizing global governance. Our main finding was the current importance and strength of COP side events in terms of capacity building. Side events provide an opportunity to access up-to-date information regarding research, NGO initiatives, business developments, and Party positions. The study indicates that this is particularly benefiting developing country participants, for whom it would be very costly to gather a wide range of highly qualified people elsewhere or at other times. In addition to the ratings in the survey, several of the free-text comments indicated participants' instrumental use of side events to access information, expressing a desire for more accurate information on their content, so they could better weigh their side event options. Attending side events is valued as a potentially efficient way of getting access to up-to-date information.

Side events can also function as an incubator for "link-up thinking" bringing together subjects that cannot be discussed in the formal negotiations. For example, quantified emission targets for the different Parties have been discussed at side events, at a time when it was not possible to bring the subject up at the formal negotiations. Side events also interconnect official, science and non governmental actors and policy areas, provide an arena for information dissemination, and a forum for other levels of governance.

Side events could be organized as to have an even closer relationship with the negotiations. If this were so, it is likely that more COP negotiators would deem it worthwhile to attend the side events, also making it more productive to organize side events. "Closer relationship" should not only be understood as implying physical proximity between the negotiation rooms and the side event venues – which was suggested by negotiators and other primary groups – but also as entailing more systematic documentation of side event outcomes, thus facilitating a more effective diffusion of ideas shared and recommendations formulated in side events. Side events may function as catalysts, slowly influencing opinions and raising awareness, not only at the COP but also among the general public. To do so, however, side events need to be well integrated into the work of the organizers and other organizations, and the results communicated by participants. If that were so, side events would be viewed as parts of other processes. Even though many organizers neglected to plan for the dissemination of the side event outcomes, most participants had planned to inform others of what they had observed. Furthermore, COPs attract attention to climate change, and the side events can contribute to this by attracting more media and participants to COPs. Many events also provide the media with broader context and more in-depth discussion of the issues negotiated. On average, three media representatives attended each side event. Side events also have a more instrumental function as a source of information during the COP.

There is definitely a weakness in how the outcomes of side events are disseminated. Our study demonstrated that very few organizers had plans for how to disseminate the outcomes of their events. In contrast, the vast majority of side event participants had an obligation to communicate the results of the side events attended in various forms and via various media. One way to strengthen the role of side events would be to request that all organizers present plans for how to spread the information and outcomes from their events to a wider audience. This could be included in the web-based application and information on best practices or common ways to disseminate information made available to facilitate organizers' planning. For side event organizers, more emphasis on information dissemination would likely increase contacts with other organizations and visits to their websites. Considering their capacity-building role, we believe that improved access to information from side events should be prioritized.

Through inclusively involving major stakeholder groups, such as environmental groups, businesses, trade unions, NGOs, indigenous peoples, and scientific communities, the input process to the negotiations is likely to be regarded as more valid and fair by these groups' constituencies. These legitimacy considerations are reflected in the side event objective to provide a forum also for civil society to generate input to the intergovernmental process, by disseminating ideas and findings. This would be enhanced if side events attract a wide range of stakeholders and of geographical, socioeconomic, and epistemic communities. This study illustrates that side events to a large extent involve these groups in the wider climate change negotiation process.

Even though the side events fulfilled their broader official objective of benefiting the negotiations, we suggest six ways to improve them further, by:

- recognizing their capacity-building function and the attendance of negotiators and government officials;
- recognizing and making use of their highly qualified audience;
- bringing side events closer to negotiations, not just spatially but, even more importantly, by more systematic documentation of side event outcomes and a clearer process for how side events can contribute to ongoing and future negotiations;
- reducing the number of side events, while increasing the significance of transparent selection criteria for side events so as to facilitate equitable representation;
- request plans for information dissemination; and
- prioritize presenters who have kept to the subject and adhered to time limits.

The study was done in cooperation with the UNFCCC secretariat and has been used by them to plan the organization of side events at future Conferences of Parties. The results of this study have been presented at seminars at the secretariat in Bonn and at COP 14 as well as in a report requested by a large number of delegations, International Organizations, and Non-Governmental Organizations.

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The greenhouse development rights framework - the right to development in a climate

constrained world

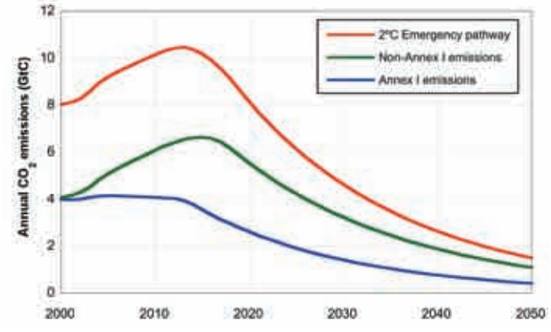
A warming of 2°C over pre-industrial level has been widely endorsed as the maximum that can be tolerated or even managed, and the emerging science increasingly underscores how extremely dangerous it would be to exceed 2°C. Its direct implication is that carbon-based growth is no longer a viable option, in either the North or the South.

Figure 1 clearly demonstrates the scale of the implied challenge. It shows a scientifically realistic assessment of the size of the remaining global carbon budget (the 2ºC emergency pathway, shown in red) if we were to earnestly attempt to keep warming below 2ºC. Though extraordinarily ambitious, this global pathway is still highly risky, implying considerable climate impacts and a probability of approximately 15-30 percent of exceeding 2°C warming. (To use the IPCC's terminology, this is a trajectory that is "likely", but not "very likely" to keep warming below 2ºC.) Figure 1 also shows that portion of the global budget that the wealthy Annex I countries would consume even if they undertake bold efforts to virtually eliminate their emissions by 2050 (as shown in blue).

This reveals, by simple subtraction, the alarmingly small size of the carbon budget (shown in green) that would remain to support the South's development. Developing country emissions would need to peak only a few years later than those in the North, be rapidly declining by 2020, and fall by roughly 80% by 2050. And, crucially, this would have to take place while most of the South's citizens were still struggling in poverty and desperately seeking a significant improvement in their living standards.

It is this last point that makes the climate challenge so daunting. For the only proven routes to development – to water and food security, improved health care and education, and secure livelihoods – involve expanding access to energy services, and, given today's inadequate, expensive low-carbon energy systems, and the South's limited ability to afford them, these routes inevitably threaten an increase in fossil fuel use and thus carbon emissions. From the South's perspective, this pits development squarely against climate protection.

The only way forward is a climate regime that is explicitly and unambiguously structured to preserve a right to development.



The scale of the challenge. The red line shows a 2°C emergency stabilization pathway, in which global CO_2 emissions peak in 2013 and fall to 80% below 1990 levels in 2050. The blue line shows Annex 1 emissions declining to 90% below 1990 levels in 2050. The green line shows, by subtraction, the remarkably limited emissions space that would remain for the developing countries.

The Greenhouse Development Rights Framework

This is precisely the objective of the Greenhouse Development Rights framework. It is an effort-sharing system designed to be as simple as possible while still capturing the intention behind the UNFCCC's foundational principles of "common but differentiated responsibilities and respective capabilities." By incorporating responsibility, it captures the necessities of the polluter pays principle and establishes incentives for low-carbon development. By incorporating capacity, it respects the obvious truth that climate is an overarching civilizational challenge that will demand major financial resources, which obviously can be borne only by those who have such resources.

By defining both responsibility and capacity with respect to a development threshold, it safeguards a meaningful right to development by shielding those still striving for a decent livelihood from the burdens of the global climate transition. And, critically, by accounting for intra-national disparities in wealth, it recognizes that this right adheres to individuals, not countries, and that the relatively wealthy people in poor countries, like their compatriots in the North, should ultimately (if not immediately) share the common obligation to stabilize and protect the global climate.

Figure 2 illustrates the meaning and importance of defining capacity with respect to a development threshold and calculating it in a manner that acknowledges intra-national disparities in wealth.

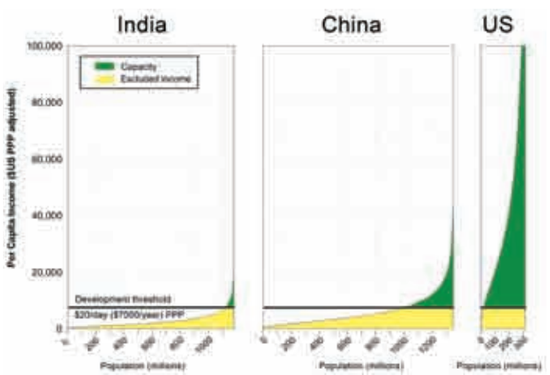


Figure 2. Capacity according to the GDR framework. These curves approximate income distributions within India, China, and the US. Thus, the green areas represent national incomes above the ($20 per person per day, PPP) development threshold. (The widths of the charts are proportional to population, making the areas directly comparable.)

In contrast to the rather standard approach of taking capacity to be equivalent to income, the GDR framework defines capacity as income excluding income below a development threshold. Figure 2 shows the income distributions of three key countries, along with line showing a development threshold set at an income level of $20/day. This choice of development threshold is justified by the empirical observation that above this income level people have generally achieved acceptable levels of Millennium Development Goal indicators and have generally satisfied their basic needs, whereas below this level there is still unacceptably high exposure to the classic plagues of poverty such as high infant mortality, malnutrition, and low life expectancy. It is therefore, for the purposes of this calculation, a plausible dividing line between those individuals who should be relieved from having to bear the costs of an ambitious climate transition so they can focus their resources on development, and those who have the capacity to start helping to shoulder those costs.

Responsibility can be defined analogously, as emissions that correspond to consumption above the development threshold. We have calculated the capacity and responsibility indicators for 195 countries, based on global datasets of incomes, income distributions, and historical emissions, and then straightforwardly combined the two to generate a national Responsibility and Capacity Indicator (RCI) for each country. This indicator can then be used to determine each nation's relative obligation with respect to the global climate effort. One can think in terms of contributions to a global fund, such as the Mexican "Green Fund" proposal or the "Financing Mechanism" proposed by G77 and China. Such a fund could be scaled to provide the resources needed for the global mitigation and adaptation challenges.

Alternatively, on the mitigation side, the GDR approach can also be used to specify national emission targets. The total annual amount of mitigation needed globally to shift us from a baseline path to a low-carbon path can be quantified, and this required effort can then be allocated among countries in proportion to their RCI. This gives each country a national mitigation requirement, which can then be directly subtracted from its baseline emission trajectory to define an national emission target.

Figure 3 shows the results of such a calculation for the combined Annex 1 countries. The top (black) curve shows business-as-usual emissions, derived from International Energy Agency scenarios. The green area is an estimate (based on the McKinsey cost curve analysis) of win-win mitigation opportunities that Annex 1 countries could implement at net financial benefits. The large tan area is the important part. It is the reduction obligation derived from the GDR analysis, and the red line at the bottom is thus the Annex 1 emission allocation, calculated through 2030. The allocation is nearly 70% below 1990 levels by 2020, and it goes negative by 2025.

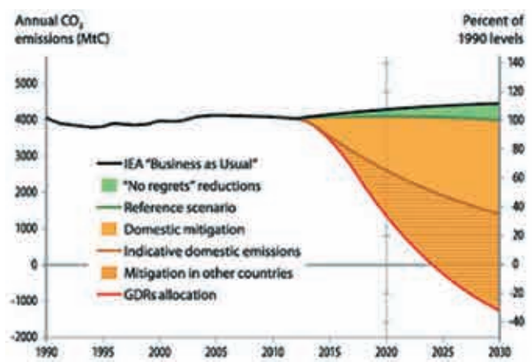


Figure 3: Annex 1 mitigation obligations, as calculated by the Greenhouse Development Rights framework. This mitigation obligation is shown divided into a domestic (solid) mitigation obligation and an international (striped) mitigation obligation.

Clearly, a reduction target of this magnitude is meaningful only if it is taken to signify a combined obligation to, on the one hand, make reductions domestically and, on the other, invest in international reductions. Figure 3 expresses this by showing an indicative division of this reduction obligation into a domestic mitigation effort (solid) and an international mitigation effort (striped). A precise dividing line between these two areas is not specified by the GDR approach, as there should be flexibility in order to accommodate economic and political factors. In this example, the portion of the total mitigation effort undertaken domestically is defined so as to match the rapid decline needed to put the Annex 1 countries on course toward a target of 90% reductions relative to 1990 levels by 2050 (as shown in figure 1). As a result, by 2020, domestic emissions are nearly 40% below 1990 levels. The international obligation, which is over and above this ambitious domestic effort, reflects an additional mitigation effort in 2020 of nearly another 30%, relative to 1990 levels. In the language of Bali, this can be thought of as the "measurable, reportable, and verifiable" financial and technological support that is needed to enable the low-carbon transition in the developing world. Which is to say that Annex 1 countries, by virtue of the fact that they have high levels of capacity and responsibility, have a two-fold obligation. They must both ensure deep domestic reductions, and simultaneously they must catalyze rapid reductions in developing countries through financial and technological support.

Aspirations for Copenhagen

Clearly, the GDR analysis can be used not only for Annex 1, as shown above, and all its constituent countries, but for non-Annex 1 countries as well. Currently, only a bit less than one-quarter of global capacity and responsibility is in non-Annex 1 countries, and a quite reasonable case can be made that the only possible way to build a consensus in the Annex 1 countries to honor a right to development and to bear their fair share of the global climate burden is for the consuming classes in the developing world to also bear their fair share.

And this will certainly need to happen. But not yet. The South cannot reasonably be expected to take on legally binding commitments in the Copenhagen period, not even if these commitments are defined in a rigorously principle-based way that genuinely safeguards its right to development. In reality, the South sees any agreement that would legally curtail its emissions as simply too big a risk to take. Nor is this reluctance hard to understand. To this point, industrial development has been almost entirely driven by fossil fuels, and why, without the North's demonstrated willingness to help chart out, and indeed pave, an alternative course, should the countries of the South sign away their rights to follow along this proven pathway?

And the North has thus far wholly failed to demonstrate such a willingness. Quite the contrary, given Annex 1's neglect of its Rio promise to return emissions to 1990 levels by 2000 (notwithstanding its unwitting formal compliance by virtue of the Soviet economic collapse), and given the past decade of half-hearted efforts to meet Kyoto commitments (and, in the case of the United States, of entirely shunning them). Indeed, the South's distrust of legally binding commitments is directly linked to the North's inattention to its own emission constraints, and equally to the North's repeated failure to meet its UNFCCC (Article 4) and Kyoto Protocol (Article 11) commitments to provide technological and financial support to the processes of mitigation and adaptation in the South.

This all constrains the prospects for the Copenhagen period. And it tells us that, above all, the Copenhagen accord must be one in which the Annex 1 countries seize the opportunity, finally and definitively, to "take the lead" (quoting Article 3 of the UNFCCC). In particular, the Copenhagen period is Annex 1's last best chance to earnestly work, through concerted action, to build confidence in the possibility of a fair and adequate global climate transition. For there is still time. Through aggressive and sweeping mitigation initiatives at home, and through good-faith assistance to non-Annex 1 countries seeking financial and technological assistance to mitigate and to adapt, it can still launch the transition to a climate-resilient, post-carbon world.

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Mechanism for delivering adaptation funds in

developing countries

Climate change is one of the all-encompassing global environmental changes likely to have deleterious effects on natural and human systems, economies, and infrastructure. Given that it has emerged as an urgent priority, prompting need for action there is an urgent need that the concerns are incorporated/addressed at all levels of decision making. The risks associated with it therefore calls for a broad spectrum of policy responses and strategies at the local, regional, national, and global level.

In the initial years of climate change research and negotiations, attention had been focused on reduction of emissions of GHGs and enhancement of 'sink' options. It is now increasingly evident that irrespective of mitigation, climate change impacts are likely to be faced and there is an urgent need to build adaptive capacity to reduce vulnerability to climate variability and change.

While there are many elements that can be researched on and discussed in the field of adaptation to climate change, one of the primary issues that still remains unresolved is the issue on financing, besides, other relevant issues on technologies for adaptation, regulatory and policy incentives and mechanisms for enhancing adaptive behavior and capacity building. Even in case of financing, there are a number of issues discussed in different platforms, for example issues related to scale of funding required, the funding deficit (after considering the actual funds available), principles determining who should pay for adaptation, sources of funding, governance of funds and delivery mechanisms for disbursement of adaptation funds.

Delivery mechanisms refer to the criteria for allocating funds across different adaptation options, the criteria on the basis of which the funds could be allocated to different developing countries, modalities for disbursement of funds, and the institutional mechanisms for the delivery of the adaptation funds.

Given that the amount of funding that can realistically be raised would most likely fall short of the amount of financing required for adaptation, the criteria for allocating funds across different adaptation options would have to take this deficit into consideration. Therefore, a need for mechanisms that can support adaptation in a more holistic way is felt.

To be able to address the gaps more effectively, one criterion for identifying projects for support could be on the basis of the nature of the goods and services those projects/adaptation measures provide and their geographic reach. This has been discussed in detail in TERI (2004). Here the key issues and messages from that discussion are presented. Adaptation measures have both a private and public interest in the nature of the goods and services that they provide. The case for using a public good[1] lens lies in the fact that, with increased globalization, the lives of people are becoming more interdependent and the global scene today is one where threats recognize no national boundaries, are connected, and must be addressed at the global and regional as well as the national levels (UN High Level Panel on Threats, Challenge, and Change, December 2004). Sandler, Kanbur, and Morrison et al. (1999) provide the following categorization of public goods based on their geographical reach:

GPGs (global public goods) have universal impacts on regions, socioeconomic groups, and generations (inter and intra); for instance, the global climate system. Further, 'global' here means spanning all divides — border, sectors, or groups of actors (Kaul, Conceicao, Goulven et al. 2003).

RPGs (regional public goods) convey benefits to the public of nations with adjoining borders; for instance, information dissemination systems on extreme events such as those relating to GLOFs (glacial lake outburst floods), landslides, etc.

NPGs (national public goods) largely convey benefits to the national public; for instance, education, health, and other material infrastructure.

The spill-overs/benefits of **LPGs (local public goods)** are substantially sub-national; for instance, access to various facilities and services in a particular region.

The global public goods could be fully funded through the global adaptation funds. The main challenge would be to ensure that there are no asymmetries in the use of climate change adaptation related global public goods by developed and developing countries especially where the public goods are not pure[2] public goods. For the regional public goods a full cost model may not be appropriate but a substantial proportion of their costs could be covered through adaptation funding and the rest of the proportion be contributed by the countries within the region.

In case of national public goods, in developing countries, challenges such as sustained economic growth, access to potable water, food security, sanitation, improved health status, etc., take precedence over climate change as climate change is considered a long-term issue. Hence, the concept of mainstreaming – integration of policies and measures to address climate change into ongoing sectoral and development planning and decision making – was proposed so as to ensure long-term sustainability of investments as well as to reduce the sensitivity of development activities to current and future impacts of climate change. Therefore, national or local public good or service call for a top-up to conventional development transfers. Such additional funding will in fact provide greater value for resources invested, as these will in a way be 'climate-risk-proofed' (TERI, 2004). The top-up to conventional development transfers should ideally fund the 'additional' (over the baseline) adaptation burden posed by climate change. However, separating this 'additional' burden becomes difficult especially in the absence of baseline development levels and given that the progress on overall development helps to build general resilience/adaptive capacity.

In such a scenario too, co-financing models would have to be developed where a certain proportion of the funding is received from the international adaptation funds and the rest is contributed by the national or local authorities. This might also help allay the concerns of developed countries that in the name of adaptation they would essentially be funding development for which the funding requirement may be so huge that they may not consider it worthwhile to undertake the effort.

The various approaches discussed do provide a solution in addressing the issue at large but there is a need to ensure that on an overall the cost burden of adaptation does not get diluted. Efforts should be made to address the capacity needs of the poor.

[1] Public goods are so termed if they satisfy the following two criteria - non-excludability (impossible to prevent access by all) and non-rivalry/competition in consumption (consumption by one does not preclude consumption by another).

[2] It is important to discern between a 'pure' public good and an 'impure' public good. Impure goods are either club goods (non-rivalrous in consumption but excludable; for example, private schools, clubs, etc.) or common property resources (non-excludable, but rivalrous; prone to congestion) or collective (social) goods (can be delivered as private goods, but are delivered itself by the government for various reasons; usually social policy).

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Promotion of demand side energy efficiency: Evaluation of

clean development mechanism

Various studies have emphasized upon the significant contribution that Energy Efficiency (EE), particularly the end-use or demand side EE can make toward mitigating climate change as well as improving energy security (IEA 2007, Koakutus & Watanabe 2006).

It was envisaged that Clean Development Mechanism (CDM) would help in promoting such initiatives. However, the share of demand side EE projects in CDM projects has been abysmally low. So far the registered projects from the sector represent less than 4% of all CDM projects. The Certified Emission Reductions (CERs) from these projects account for a miniscule number of less than 1%.

In the analysis carried out by CD4CDM, demand side energy efficiency comprises of EE household, EE Service, and EE industry. As of 1st March 2009, only 55 projects were registered from the sector and only 22 have been able to reach the stage of issuance. The amount of CERs issued for them, is small compared to the vast savings potential.

There has been relatively greater CDM activity in India and Asia, even though these are predominantly small industrial efficiency projects with annual emission reductions of less than 30 kCERs. Almost three quarters of the projects accounting for two thirds of 2012 kCERs are from India alone (Table 1).

Table 1. Comparison of projects from demand side EE sector

	EE households		EE industry		EE service		Total	
	Projects No. (%)	2012 kCERs No. (%)	Projects No. (%)	2012 kCERs No. (%)	Projects No. (%)	2012 kCERs No. (%)	Projects No. (%)	2012 kCERs No. (%)
India	5 (35.7)	980 (24)	140 (77)	19200 (64)	10 (83.3)	483 (61.7)	155 (75)	20663 (59.6)
Asia & pacific	6 (43)	1237 (31.4)	163 (90)	26626 (89)	11 (91.7)	711 (90.8)	180 (87)	28547 (82.5)
World Total	14	3936	181	29925	12	783	207	34644

- The information in parentheses is the percentage share of world total.
- Asia & Pacific data is inclusive of India, World data is inclusive of Asia & Pacific. *Source: CD4CDM, March 2009*

Barriers

Researchers have identified various reasons as to why demand side EE is not successful under CDM. These reasons can be put into two broad categories: (a) those limited to realm of CDM; and (b) those outside the realm of CDM. A brief overview of these reasons is presented below.

CDM related factors

One of the reasons pertaining to the design of CDM for its relatively moderate performance on the demand side EE is the way various CDM provisions are interpreted and applied in practice. Requirement to demonstrate additionality, which is hindered due to lack of existing data, is an important factor. Another aspect is the lack of a viable methodology (and the narrow applicability of existing methodologies) to support the wide array of demand side EE project types. Monitoring and challenge of leakage always remain in such projects, as these are not single point source projects. Their dispersed nature and high transaction costs make implementation a concern.

At a larger level the problem with the Kyoto Protocol and Bali roadmap frameworks is that the approach has been climate centric, with an emphasis on climate commitments, carbon markets and technology. Instead it should have concentrated on how best to mainstream climate friendly choices into development planning to maximize co-benefits and transition towards a sustainable society (Shukla 2008). The related discussions of reforming the CDM only refer to EE as a possible "co-benefit" for CDM project activities. Overcoming the barriers to demand side EE under the CDM was not included in the list of 26 possible CDM reforms in FCCC/KP/AWG/2008/L.12 despite widespread recognition of the problem, including by the CDM Executive Board (Niederberger 2008).

Programmatic CDM (PoA) approach has been suggested to address potential of sectors such as EE. However, the process of programmatic CDM is subjective and a lot of implementation issues need to be addressed. The Designated Operational Entities are not willing to take the responsibility and the buyers are not very sure about delivery from program-based approach. Yet the performance of demand side EE projects is much better in programmatic CDM. Out of eight projects in the stage of validation under programmatic CDM, two are from EE households. This gives a hope that programmatic CDM might be a much better ground for such projects than normal CDM.

On the whole, the climate change negotiations have not yet conceptualized the necessary building blocks for promoting EE as a key instrument for climate change mitigation in developing countries. EE actions have traditionally focused on promoting end-use practices through various public and private sector instruments as national initiatives, including demand side policies, financial incentives and the establishment of EE market. Due to barriers arising from the nature of energy end uses and their derived market failures, however, past EE interventions have not been widely adopted or effectively enforced (Hinostroza et al. 2007).

Non-CDM Factors

These projects face multiple barriers, some of which cannot be overcome with CER revenues or investment alone, for example large-scale behavioral change is required on demand side for successful promotion of demand side EE. These barriers would require the host countries to adopt a systematic framework for integrating EE performance objectives into national poverty reduction strategies (Niederberger, 2006).

Designing and implementing effective policies and regulatory environments require resources, which have generally been under-supplied, even in developed economies and poorly managed in developing countries. Even in a favorable regulatory environment, local governments, on whom the enforcement burden often falls, have limited workforce and little expertise to undertake tasks stipulated by law including local enforcement, supervision, and inspection. All these tasks require large numbers of professionals with sufficient knowledge of EE and experience in various engineering fields. This knowledge and experience is drastically lacking among LDCs. Promotion of EE faces the inert attitude of various firms and individuals, particularly those who look for short-term expenditure minimization. Behavioral inertia in choice making is also a big hurdle in promoting EE.

Financial Barriers:

At the initial state installing EE equipments, building and appliances requires additional funding. These additional investments are compensated via the energy savings in the product use cycle yet the users are hesitant to opt for energy efficient options due to (a) lack of information on the relative efficiency of products and services, (b) lack of information on the cost effectiveness of energy efficient choices, (c) constraints in initial funding. To meet the need of finance they can sell their CERs upfront but the price offer will be low.

Limited technological expertise

The developing countries lack sufficient EE technological capacity for designing and manufacturing EE products as well as to deploy EE technologies and practices in the marketplace. Small and Medium Enterprises (SMEs) generally have less access to EE technologies than their publicly owned counterparts and large companies leading to technological asymmetry.

Dispersed nature of end-user

A large part of financial, technical and informational barriers for EE improvement comes from its dispersed nature. The widespread geographical locations, multiplicity of small end-users and differing technological and knowledge levels of end-users make the management of EE activities difficult and costly. Command-and-control type government policies work the best in large and aggregated energy consumers, but find it difficult to reach the dispersed consumers effectively.

CDM has largely been ineffective in stimulating investment in demand side EE projects. The sector per se also has some barriers. The steps being taken, however, are not sufficient enough to promote these projects in CDM cycle. The sector needs much more acknowledgement to ensure that the potential be tapped. Programmatic CDMs are definitely of help to such projects but they will take time before becoming replicable. There is an urgent need to address the sector so that projects, which are not limited to one point source and having higher sustainable development criteria, are benefited.

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Climate change abatement:

not stern enough?

That Earth is undergoing anthropogenically induced climate change is no longer in dispute, yet uncertainties abound – concerning cloud formation, feedback from methane in melting permafrost, and ecosystem responses to rapid change, to mention just a few. There are also economic uncertainties: what will the physical effects of climate change mean for the global economy, and how will that affect the world's societies?

As the nations of the world consider actions to mitigate a changing climate, the crucial policy issue boils down to this: what level of investment in climate change abatement should we make today to avoid costs associated with climate change in the future?

The British government asked Lord Nicholas Stern, former chief economist at the World Bank, to consider the costs and benefits of climate change mitigation and give policymakers advice for addressing the problem. The resulting report, the Stern Review of the Economics of Climate Change, recommended that one percent of global gross domestic product (GDP) be invested each year to avoid the economic consequences and the unprecedented risks from climate change. That was in 2006. In June 2008, looking at faster-than-expected climate change, Stern doubled the estimate, to two percent of GDP. The Stern Review has drawn criticism. It is too pessimistic or too optimistic; it makes incorrect assumptions or is more a political document than an economic analysis, depending on one's proclivities.

A central issue has been the discount rate that Stern used to calculate the future benefits and costs of climate change. Because the impacts of climate change will mostly be felt in the future, the rate at which we "discount" the future affects the level of emissions reduction that is economically warranted today.

Discounting builds on the simple fact that money earns interest. In a growing economy – and growth is an important assumption – with a six percent interest rate and no inflation, an investment of $100 will be expected to have increased to $106 after one year. Inversely, a cost of $106 next year is equivalent to $100 today.

The effect of discounting is strongly nonlinear. At a discount rate of one percent, the discounted value of $1 million 300 years hence is around $50,000 today. But if the discount rate is five percent, the discounted value is less than a mere 50 cents. In this example, the discounted value changed by a factor of 100,000 when the discount rate changed by a factor of just five.

Economists disagree about what value to choose for the discount rate when determining an appropriate level of investment in climate change abatement. Stern used an unusually low discount rate of 1.4 percent, and when that figure was plugged into his computer model, unusually high damage figures came out at the other end. Hence his call for a high level of investment in climate change abatement today.

Nordhaus (2007) would use a higher discount rate and therefore arrive at less startling results with respect to an economic estimate of the damages from climate change, and with respect to the measures we should take in the near term to mitigate negative impacts. Sterner et al. argue that one cannot be sanguine that Stern's discount rate is too low; there are reasonable justifications for his choice. On the other hand, however, we think Stern's estimates may not be drastic enough. Instead, we would fault the Stern Review as well as most previous investigations including Nordhaus for not analyzing the effects of the changing composition of economic wellbeing and changing relative prices.

Any discount rate assumes a growing economy. But it's unrealistic to assume constant, unwavering growth, equal for all sectors. Both logic and history indicate that growth tends to be concentrated in some sectors, depending on resources, technical innovations, and consumer preferences. If the output of some material goods (e.g., mobile phones) increases, but the availability of environmental goods and services (e.g., clean water, biodiversity, rain-fed agricultural production) declines, then the relative prices (or willingness to pay) for the environmental amenities should rise over time. Because of rising relative prices, the environmental sector could see its share of the economy grow in value even as it becomes physically smaller relative to a growing conventional sector. This has consequences for discounting itself that have been overlooked. In a multisector model, discount rates will not generally be constant – nor will they be the same for each sector. There will be a relative price term that will counteract the traditional effect of discounting for the sectors that do not grow (see Hoel and Sterner 2007).

We find that accounting for relative price changes can dramatically increase the abatement necessary to mitigate climate change. In fact, using Nordhaus's own integrated assessment model for climate change (called DICE), we can show that using relatively high discount rate parameters used by Nordhaus but also modeling relative prices yields results that are similar to the conclusions of the Stern Review and differ greatly from previous work by Nordhaus. If we were to use both low discount rates and changing relative prices, we would find even stronger support for strict and immediate abatement measures.

We also have a second concern with the Stern Review – that it may not give sufficient weight to nonmarket damages.

The nonmarket impacts of climate change are at center stage, because it is precisely the prices of these goods and services that we expect to rise over time. Nonmarket impacts from climate change include biodiversity and ecosystem loss, the effects of air pollution on human health, and damage from extreme hurricanes, droughts, and floods (Manne et al. 1995). The Stern Review does a great job of presenting many of these, the costs of which could be very high over the coming century: billions of people could suffer water shortages, and tens to hundreds of millions are at risk of hunger, diseases like malaria, and coastal flooding (Parry et al. 2001).

Those impacts could also have extreme social consequences if droughts force mass migrations, coastal inundation drives environmental refugees inland, and conflicts erupt over increasingly scarce resources. Such social problems have the potential to make the already serious climate damages much worse. However, social impacts are not included in the Stern analysis. To give a full picture of the costs of climate change and the benefits of mitigation, these impacts should also be taken into account, together with their expected increase in relative value over time. We believe that it is exactly the nonmarket effects of climate change that are the most worrisome. Given the risk of catastrophes, the main effect of climate change will be not to stop growth in conventional manufacturing, but rather to damage some vital ecosystem services, making them relatively scarcer and raising their relative prices.

In a thorough evaluation of the effect of relative prices, one would assess changes by sector. Clean water, rain-fed agriculture, and some other ecosystem services have particular importance for the very poor, and the climate change damages suffered by the poor are particularly important for human welfare. More work should be done in this area.

In the meantime, analyses of abatement costs and benefits need to take into account the content of future growth. Future scarcities, whether caused by the changing composition of the economy or by climate change, will lead to rising prices for certain goods and services. This price escalation should raise the estimated damage of climate change, counteracting the effect of discounting.

When we consider the likely future scarcity values for nonmarket environmental assets, we see high damage figures even when we assume high discount rates. If we combine the low discount rates in the Stern Review with rising relative prices, the conclusions would support even higher levels of abatement than recommended by the Stern Review. This would lead us to consider atmospheric greenhouse gas concentrations that Stern deems unrealistic: we would aim for a target below 450 ppm of CO_2 equivalents. We therefore think that even more restrictive stabilization scenarios than those discussed in the Stern Review may be required.

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Price effects of

emissions trading

Predicting effects of policies is not a straightforward task. As an example, expectations of what effects the EU Emissions Trading System (EU ETS) would have on downstream products have clearly differed among consumers, policy makers and industry. This issue is analysed in two Clipore papers in 2008: one study of pricing strategies under emissions trading using experimental methods, and one econometric analysis of price effects of the EU ETS in the Nordic elecricity market.

A central objective of the EU ETS is to alter relative prices throughout the economy by including the social cost of pollution in product prices. At the same time, higher retail prices for goods such as electricity may be a concern to policy makers and politically controversial. To many observers, an initially obvious solution would be to distribute the allowances to the polluting entities for free so that the direct costs of production remain the same, resulting in no change in retail prices. This is also the primary allocation methodology in the EU ETS.

However, economic theory would argue that at least in competitive markets, retail prices will increase reflecting the economic value of the allowances whether polluting entities received them for free or not. While using a free allowance may not incur any direct costs to firms, it is an opportunity cost of production that will be reflected in retail prices.

Nevertheless, many disagree with the reasoning that firms will, or even have the right to, raise product prices to include the value of emissions allowances received for free. The intuition that only direct costs should be included in product prices seems deeply ingrained among parts of the public, the political sphere and industry. Furthermore, there are numerous examples of the real world failing to conform to economic theory. Thus, the fundamental question of what price effects the EU ETS has yielded, and whether the choice of allocation methodology influence this, is an empirical one.

For the paper Pricing Strategies under emissions trading: an experimental analysis Clipore researchers Markus Wråke and Dallas Burtraw partnered with colleagues at other institutions to develop a laboratory setting that allowed real people to make decisions earning real money under conditions similar to those in an actual cap and trade system. The paper offers a deeper understanding of some of the dynamics of market performance. Experiments makes it possible to study aspects that are hard or impossible to capture econometrically based on real market data, and they also carry persuasive powers beyond what textbook economics can provide.

The results show that market performance as well as the learning is influenced by policy design and market environment. In the first rounds of the experiments, participants displayed a range of behaviors. While many failed to incorporate the value of free allowances in their pricing strategies, the others who did earned substantially higher profits. Participants made decisions that were closer to economic theory when they had to purchase allowances than when they receive them for free. However, over the course of repeated experiments, individuals learned from each others' success and the long-term outcome evolved toward that predicted by economic theory: the method of allocation had no effect on the final price. Thus while passing through the cost of freely allocated allowances is theoretically superior, recognizing opportunity costs is not intuitive, which may explain why policy makers have opted for free allocation in the past.

Harrison Fell uses a different approach to the question of price effects. To better understand the impact prices of emission allowances (EUA) have had on Nordic electricity prices, Fell estimates the relationship among spot electricity prices, EUA spot prices, and the prices of various generation fuels through a cointegrated vector autoregressive (CVAR) model. The response of electricity prices to EUA price changes is then assessed in an impulse response analysis. The impulse response analysis shows how a price shock to the EUA market propagates through the electricity market in a way that accounts for the interrelated system dynamics. In addition, to control for the possibility that responses in electricity prices to EUA price fluctuations may vary between peak and off-peak electricity demand periods as generating fuels of electricity producers at the margin change, Fell estimates the relationship between EUA prices and electricity prices sampled various points in the day. Running an impulse response analysis on these various estimated relationships, it can be seen if there is any marked difference in the response of peak-demand electricity prices compared to the responses of off-peak period prices to EUA price increases.

Using a weekday average electricity price series, the impulse response analysis reveals that electricity prices have large short-term responses to CO_2 price shocks, but that this response dampens over time. Using hourly Nordic electricity spot market prices, Fell finds that the value of short-term response of electricity prices to a shock in CO_2 prices in off-peak hours is consistent with expected values for near complete pass-through of CO_2 emission costs when coal-generated power is at the margin. Likewise, the estimates reveal that peak hour electricity price responses to CO_2 price shocks are as expected for a market that has near complete pass-through of CO_2 emission costs when natural gas-generated power is at the margin. These results further suggest the Nordic electricity market is pricing as a competitive market.

These two studies, while using vastly different approaches, arrive at a remarkably similar and theoretically consistent conclusion – emission costs, based on the market value of emissions allowances, are almost fully reflected in electricity prices for seemingly competitive markets. These results also provide support for those calling for an increase in the allocation of emission permits through auctions on the grounds of distributional equity between consumer and producers.

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Sectoral agreements and competitive distortions – a

Swedish perspective

Under the current climate policy regime, there are discussions whether the Kyoto protocol distorts the competition for industries. When the EU now has decided on stricter emission reduction commitments (20% to the year 2020, or 30% if an international agreement is reached), there are fears that the competitive situation between the EU and the rest of the world will become further distorted.

To reduce this risk, a possible solution is to introduce so called sectoral agreements for developing countries. This means that one or several developing countries take on commitments for one or several sectors, which potentially can reduce the competitive distortion between the developing countries and Sweden/EU. Such sectoral agreements may also allow developing countries to reduce emissions below a reference level (compliance level), which can render emission reduction credits (off-sets) that can be sold on the international market.

Clipore has performed a study with the objectives to:

- Give an overview of the current discussion concerning competition distortion in relation to climate policy,
- Describe results from some studies estimating the actual competition situation for selected activities,
- Describe which sector agreement models are suggested/ discussed by the EU,
- Describe which sectors are most interesting to target with a sector agreement from a Swedish point of view,
- Analyze which parameters are important for reducing competition distortion for Swedish industry.

Two studies, for the United Kingdom (Hourcade et al. 2008) and Germany (Graichen et al. 2008), have recently assessed the potential cost impact for different industrial sectors of CO_2-prices due to the EU ETS. *Maximum value at stake*[1] was used as metrics. The sectors with high potential impact, with a maximum value at stake larger than 10%, are in the United Kingdom lime and cement, basic iron and steel, starches, refined petroleum, fertilizers and nitrogen compounds, and aluminum. In Germany, the sectors with a *maximum value at stake* larger than 10% are: cement and lime, fertilizers and nitrogen compounds, basic iron and steel, aluminum, paper and board, other basic inorganic compounds and coke, refined petroleum, and nuclear fuels. Ex-ante studies of the impacts of competitiveness and carbon leakage due to the EU ETS fail to find actual impacts. However, that does not mean that there will be no impact in the future, which hold changes both in the EU ETS (method for allowance allocation, allowance prices etc.) and possibly also other important circumstances (global demand for certain products and global product prices).

In the Clipore study, based on official Swedish statistics, the *maximum value at stake* has been calculated for 52 Swedish sectors. Seven sectors have a *maximum value at stake* of more than 4%: coke and refined petroleum (21%), pulp and paper (11%), basic metals (10%), non-metallic mineral (9%), metal ore mines (6%), air transport (5%), and electricity, gas and heat (4%). If air transport and electricity, gas and heat are omitted, the five remaining sectors account for 22% of Sweden's carbon emissions. In the Swedish *non-metallic mineral* sector (including cement and lime) the *maximum value at stake* is considerably lower than for cement and lime in the UK and Germany. This is most likely due

differences in system boundaries. In the Swedish statistics, the cement and lime industry is a minor part (in terms of value added) of the *non-metallic mineral* sector, a sector that also includes stone, sand and soil industry. The calculated *maximum value at stake* for *non-metallic mineral* is therefore a poor proxy for the *maximum value at stake* for the cement and lime sector since other sub sectors may "dilute" the *maximum value at stake*. Differences in system boundaries may also explain the significant difference in *maximum value at stake* between the Swedish steel industry and UK and German steel industries. Other possible explanations may be a higher value added per unit, differences in how value added is calculated, different years applied for the analysis, and lower CO_2-intensity for Swedish products.

In late 2008, the EU proposed three types of sector approaches to be discussed under *the Ad-hoc Working Group on future commitments for Annex I Parties under the Kyoto Protocol (AWG-KP):*

i) *Sector CDM* – a CDM crediting mechanism with a previously established baseline
ii) *Sectoral no-lose mechanism* – Sectoral crediting against a previously established no-lose target
iii) *Sectoral emission trading* based on a sector emissions cap

Based on these three sectoral models, we have analyzed which parameters are important for reducing competition distortion for Swedish industry. We have assumed that these sector agreements are implemented in a developing country. We conclude that if sector agreements are to reduce distortions on competition, it is important that the sector agreements create a **real carbon price** in the developing countries, that is that emissions of carbon dioxide are associated with a cost for the emitter. All three sector agreement-models suggested by the EU can potentially create a carbon price. The driver for emission reductions are in all three cases the international demand for off-sets.

As a potentially large buyer of off-sets, the EU demand for off-sets is likely to increase the carbon price in the developing country sector. The choice of EU policy with respect to imports of off-sets will therefore have great importance. Other buyers, such as other countries, emission trading systems, or the voluntary credit market will of course also be important. Moreover, imports of off-sets may reduce the price on EU ETS allowances, thus further narrowing the carbon price gap between the two markets.

If an important objective of a sectoral agreement is to reduce competition distortion it should be implemented in sectors where the corresponding Swedish industry has significant carbon related costs and where there is significant trade intensity between Sweden and regions outside the EU. Our preliminary analysis indicates that Swedish sectors with potentially high *maximum value at stake* (direct carbon and indirect electricity cost) are refineries, pulp and paper, iron and steel, cement and lime, and metal ore mining. The sectors aluminum and fertilizers may be important, but have not been assessed explicitly in this study. In addition, electricity production can be important to include in a sectoral agreement since the electricity price may be a significant cost for certain sectors exposed to international competition.

Pass-through of costs – consumer incentives. If a sectoral agreement is to reduce competition distortion it is important that the sector participating in the sectoral agreement can pass through the additional carbon costs on the commodity so the carbon intensive products become more expensive for the consumer. A full pass through of the carbon cost could be compromised in countries with centrally regulated prices on carbon intensive commodities or other measures that shield the true price of carbon from the consumer.

Target setting – producer incentives. The rules for setting the targets in the developing country sector are crucial from a producer incentive point of view. There are two main options here: 1) **absolute targets** and 2) **intensity targets**. Absolute targets create high incentives for carbon reductions as long as the targets are not re-negotiated. The disadvantage is that they might be difficult to negotiate due to difficulties in finding an appropriate emission level, risk for hot air, and the inflexibility to future adjustments. Intensity targets are based on *output* times an intensity factor (called *benchmarking*). But benchmarking leads to reduced incentives: i) as a production subsidy it encourages overproduction, and ii) lowers the incentives for substitution to carbon efficient products. A third, theoretical, option would be absolute targets that are updated according to historic emissions. This model would, however, seriously undermine the incentives for emission reductions.

In the Clipore study, we argue that from a competition point of view, it is important to create a **carbon price** in the developing country. A different issue relates to how different sector agreement models influence the **compliance costs** of participating firms. We describe a situation where a developing country industry sector is linked to the EU ETS, and where the EU industry pays for allowances (no free allocation). For a *Sector emission trading system* where the developing country industry has to pay for allowances, the compliance costs could be compatible in the two regions. For *Sector CDM* and *Sector no-lose mechanism*, if the government implements a domestic carbon tax, the compliance costs may also be compatible in the two regions. However, if allowances are allocated freely to the developing country industry and no tax is implemented, the developing country industry would have no costs associated with the carbon emissions below the compliance level. There would here be a significant difference in compliance costs between the industries in the two regions. We have, however, not analyzed if significant asymmetries in compliance costs can lead to competitive distortions between regions.

[1] The Maximum value at stake for a company is the cost increase due to an introduced carbon price divided by the value added. The cost increase includes both direct costs and indirect costs such as cost increases due to increased electricity prices.

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What's the best way to promote renewable energy? Don't forget the

emissions price

Renewable energy – from sources like geothermal, solar, wind, tide, and hydro – is a major component of most strategies for addressing global climate change. Not all policies that promote renewables are created equal, however; our research shows that if the goal is to reduce greenhouse emissions in the near and medium terms, broad-based policies like emissions fees are substantially more cost-effective than more targeted approaches, such as research and development subsidies.

Many proposed targets for renewable energy production can only be described as ambitious. Proposals in the United States aim to increase renewable electricity production to 15 percent by 2020, a significant amount, given that hydropower capacity is extremely unlikely to expand. The targets set by the European Union are higher still, to produce 22 percent of electricity and 12 percent of gross national energy consumption from renewable energy sources by 2010. The feasibility of achieving those goals depends on technological innovation that will lower the cost of the nonemitting energy sources. To stimulate innovation in cleaner technologies, countries in the Organisation for Economic Co-operation and Development are implementing a wide range of policies.

- A carbon dioxide (CO_2) emissions price – via either an emissions tax or tradable emissions permits – provides incentives to reduce CO_2 intensity (that is, CO_2 emissions per unit of economic output) and makes fossil-fueled sources more expensive than renewables. Several Scandinavian countries and the Canadian province of British Columbia have implemented CO_2 taxes, and in 2005, the European Union launched a program of tradable CO_2 emissions permits.
- A tax on fossil-fueled energy also makes renewables more competitive. The United Kingdom, Germany, Sweden, and the Netherlands tax fossil-fueled sources, in most cases by exempting renewable sources from an energy tax.
- A tradable emissions performance standard, or generation performance standard, mandates that the average emissions intensity per unit of output (for fossil-fueled and renewables generation combined) not exceed a standard. Such policies target energy-intensive industries; the United Kingdom's Climate Change Levy is an example.
- Renewable energy portfolio standards – also called market share requirements or green certificates – may require either producers or users to derive a certain percentage of their energy or electricity from renewable sources. Portfolio standards have been planned or established in Italy, Denmark, Belgium, Australia, Austria, Sweden, and the United Kingdom, as well as several U.S. states and Canadian provinces.
- A production subsidy for renewable energy boosts the price received by renewables and lowers their effective marginal cost relative to other sources, improving the competitiveness of these sources vis-à-vis fossil fuels. The U.S. Renewable Energy Production Incentive is 1.9 cents per kWh, and 24 states add their own subsidies. Canada has its Market Incentive Program, and several European countries and Korea also have production subsidies.
- Subsidies for R&D investment in renewable energy, including government-sponsored research programs, grants, and tax incentives, are used to encourage near-term and long-term innovations through targeted research. Major programs exist in the United States, the United Kingdom, Denmark, Ireland, Germany, Japan, and the Netherlands. In theory, a direct price for CO_2 (a tax or tradable emissions permit system) creates efficient incentives for developing and using cleaner technologies. In practice, the issue is complicated by political acceptability and distributional questions. Other complications affect economic efficiency; for example, spillovers in R&D markets reduce incentives for firms to innovate because a portion of the returns on their investments will be captured by others. Moreover, innovation may occur not only through R&D investments, but also through firms' "learning" from the production and use of new technologies.

Most studies have focused on the effectiveness of emissions pricing policies, such as emissions taxes and emissions permits, for stimulating innovation in green technologies. The more pragmatic policies, such as performance standards and support for renewable energy, have generally been neglected.

A recent study by Clipore researchers compares this wider range of policies. Fischer and Newell (2008a, summarized in 2008b) develop a modeling framework for the electricity sector that incorporates both a knowledge accumulation stage, when R&D and learning occur, and a knowledge application stage, when the cost-reducing benefits are realized. Using this consistent framework, they evaluate the six aforementioned policy options according to four metrics: emissions reduction, renewable energy production, R&D, and economic surplus. To better understand both the magnitude of the efficiency and cost differences among the policies, they applied this approach to a numerical model of the U.S. electricity sector.

From an emissions price of $7 per ton of CO_2 (or about $25 per ton of carbon) and the resulting emissions were set as a target for the other scenarios, allowing for an apples-to-apples comparison. For the portfolio standard and the emissions performance standard, the price of credits was held constant over time, while meeting the implied emissions target. The resulting renewables portfolio standard rises from 6 percent in the first stage to 9.6 percent in the second stage, which is close to a recent proposal for a U.S. renewables portfolio standard that would rise from 5 percent by 2012 to 10 percent by 2020.

The results indicate that the emissions price is indeed the most efficient single means of achieving a given emissions target, leading to the least cost to society and requiring the least investment in renewable energy R&D. Conversely, the renewables research subsidy is by far the most costly single policy for reducing emissions.

The renewable portfolio standard is roughly twice as costly as the emissions price; the performance standard and the output tax lie in between. The renewables production subsidy is 2.5 times as costly, and relying on the R&D subsidy alone is a whopping 12 times more costly than setting a price on emissions.

When the goal is to reduce emissions, policies that also create incentives for fossil-fueled energy generators to reduce emissions intensity and for consumers to conserve energy perform better than those that rely solely on incentives for renewable energy producers. For the modest, mid-term emissions targets examined, a renewable energy R&D subsidy turns out to be particularly inefficient – when used alone – because it postpones most of the effort to displace fossil-fueled generation until after the costs of renewables are reduced.

Nonetheless, no single policy can simultaneously correct multiple market failures – in this case, the emissions externality and the knowledge spillovers from learning and R&D. Each policy poses different trade-offs. In the presence of knowledge spillovers, an optimal portfolio of policies – an emissions price combined with optimal subsidies for learning and R&D – can achieve emissions reductions at significantly lower cost than any single policy. Yet the emissions reductions continue to be attributable primarily to the emissions price, and the learning subsidy (a production subsidy) is small. If even a modest emissions price is not politically feasible, an R&D subsidy by itself is not the next best policy, and the costs of that political constraint are likely to be quite large and increasing with restrictions on the remaining policy options. Of course, for the long term, R&D policies probably have greater salience, given the possibility of developing breakthrough technologies that might achieve deep reductions. But that should not diminish the role of emissions pricing in quickly improving the competitiveness of all green alternatives in the market.

These themes are echoed in additional Clipore research. Fischer (2008) demonstrates how environmental policies and knowledge spillovers affect the social return to innovation. She finds that strong public support for innovation in abatement technologies is only justified if at least a moderate emissions policy is in place and spillover effects are significant – or if innovation will ultimately allow emissions to be more fully priced. The intuition is that without sufficient market signals to use greener technologies as they are developed, R&D investments will not have much impact. Fuller emissions pricing thus makes technology policy more effective and the two policies are better viewed as complements, not substitutes.

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Compensation rules for climate policy in the electricity sector

Policies to cap emissions of carbon dioxide (CO_2) in the U.S. economy are likely to pose significant costs on the electricity sector, which contributes 40 percent of total U.S. CO_2 emissions but is expected to account for nearly three-quarters of emission reductions in the first couple of decades of a policy.

Who bears the cost will have a large effect on the political debate and ultimately the economic impact of climate policy. A question of interest to policy makers is whether electricity firms need compensation for the costs of a cap-and-trade program, and how might that be delivered.

Two issues determine who will bear the cost of climate policy in the electricity sector in the U.S. and in many other economies. One issue is the organization of electricity markets, that is, whether electricity generators operate in states subject to cost-of-service regulation or where power is sold at market-determined prices. In the U.S., a little more than half of the electricity is sold in regulated markets and the rest is sold at market based prices. A second issue is how emission allowances are allocated. Firms in the U.S. as well as in Europe have argued that allowances should be allocated for free to offset the increase in costs they face in complying with climate policy.

These two issues, the regulation of the electricity market and the way that allowances are initially distributed, interact in ways that many policy makers have only begun to appreciate. If allowances were given away for free, firms in regulated regions would be precluded from passing on the market value of allowances to consumers under standard accounting rules. Consequently, there would be only small changes in electricity prices. The electricity price faced by consumers would be affected by a change in fuel use and investment; but in regulated regions the electricity price would not be affected by the value of emissions allowances that are used by firms when they generate electricity if the firm received these allowances at an original cost of zero.

In contrast, if allowances were auctioned, firms in regulated regions would incur the cost of buying allowances and they would be allowed to pass that cost on to consumers. Since the allowance cost is several times greater than the cost of the change in fuel use and investment in the electricity sector, the change in electricity price would be much greater under an auction than under free allocation.

The situation is different in competitive regions, where electricity prices are determined in a market. All the factors of production in electricity generation including fuel, capital, labor and emissions allowances are reflected in the electricity price at their market value. In particular, the value of emissions allowances does not depend on how they were initially acquired, but instead it depends on their value in the allowance market. Consequently, electricity prices are always expected to reflect the value of emissions allowances.

This study analyzed the impact of climate policy on the market value of electricity firms in U.S. electricity markets. In regulated markets firms are compensated directly for their costs, but in competitive markets the profitability of firms could be significantly affected by the way that emissions allowances are allocated.

The research used a detailed simulation model to examine one recent, relatively modest proposal for reducing emissions of CO_2 in the US. The central case policy that we analyze originated with the National Commission on Energy Policy. The proposal assumes upstream allocation of allowances, which is equivalent to an auction from the perspective of the electricity sector. This policy would cause a cumulative *loss* in market value at affected facilities with high emissions rates equal to more than 35 percent of the net present value of emissions allowances that would be distributed. (Because the outcome is relative to the stringency of the program, we describe all quantitative results as a percentage of the total value of allowances that would be distributed in the electricity sector.) However, another group of facilities with low emissions rates would *gain* value equal to more than 29 percent of the value of emissions allowances.

Policy makers do not usually consider compensating "facilities" that lose value, but they may consider compensating the shareholders of firms that own the facilities. Since firms typically own a portfolio of facilities, the losses at some facilities may be offset by gains at other facilities, affecting the calculation of deserved compensation for the firm, and some firms may actually gain value. We found that under an auction firms that are negatively affected would suffer a loss that would total nearly 11 percent of the total value of allowances, while other firms that are positively affected would gain value equal to more than 4 percent of the allowance value. Harm measured across the industry level would add up to be less than 7 percent of total allowance value.

In contrast to the effect on producers, we find consumers would incur a loss approximately eight times as great as that of industry. The free allocation of allowances to producers diverts money that could be used for other purposes, including compensation for consumers, as well as investing in policies that could reduce the overall cost of the policy. If compensation for producers is a policy objective, policy makers should have an interest in the question of how to target the free allocation of allowances to producers in an efficient way so as to minimize the number of allowances given away for free.

We find the award of free allowances to producers is a blunt instrument for compensation, especially if free allocation is implemented at the federal level. We find it tends to reward *producers* in regions with market-based electricity pricing and consumers in regions of the country with cost-of-service pricing. Furthermore, it tends to reward winners as well as losers, thereby eroding efficiency and the ability to compensate other affected parties. Free distribution of all emissions allowances would yield a net gain in the industry equivalent to 46 percent of the total allowance value, accruing entirely in competitive regions of the country.

We examine several decision rules to guide the delivery of compensation to shareholders with the objective of minimizing overcompensation to undeserving parties. Using readily available facility-specific information about fuel use and technology characteristics to calculate allocation rules at the federal level, full compensation of the least-well-off firms requires 86 percent of the allowances in competitive regions (42 percent of the allowances nationally) to be allocated for free, which creates a net gain in the industry equal to 37 percent of the value of allowances. Allocation rules based on more appropriate firm-specific average emissions rates are used, full compensation could be achieved with 65 percent of emissions allowances in the competitive regions (31 percent of allowances nationally). The cost effectiveness of compensation policy can be improved significantly by apportioning allowances to regions/states prior to allocating to firms. If implemented on a regional/state level using firm-specific information, the same compensation target could be achieved with just 32 percent of the emissions allowances in competitive regions (15 percent of allowances nationally) reducing the net gain in the industry to 10 percent of the value of allowances.

Strong incentives exist for regulated entities to argue for an ever-increasing share of emissions allowances through free allocation. Free allocation diverts revenues that otherwise could be dedicated to general tax relief or to other purposes such as research initiatives or energy efficiency programs linked to climate policy. The findings of this research suggest that shareholders could be fully compensated with a small fraction of allowance value, leaving the rest to be auctioned with revenue dedicated to compensating consumers or to other purposes. Compensation could be accomplished more cost effectively if implemented at the state level, but it has a high opportunity cost nonetheless. However, developing rules to deliver compensation to deserving firms without also compensating undeserving firms is challenging. Policymakers need to be cognizant of likely impacts on all affected parties, and they may want to limit and narrowly target free distribution of emissions allowances to better address a broader set of efficiency and compensation goals.

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Reducing

transport emissions

The transport sector is responsible for 25% of global energy-related greenhouse gas (GHG) emissions, where the dominating gas is CO_2. Global as well as most national emissions have been steadily increasing the last decades due to economic growth and globalization of economies.

At the same time regulation of GHG emissions from transportation is broadly speaking lax. Some countries have introduced a relative broad CO_2-tax on transportation fuel use, while others have introduced emission standards for vehicles. Still, a large share of global emissions in transportation is largely unregulated, in particular emissions from international aviation and shipping. EU has decided to link flights within the EU and international arrivals in and departures from the EU region to the EU's emissions trading system (ETS) from January 2012. In terms of shipping there are negotiations under the auspices of the International Maritime Organization (IMO), but no agreement yet. The EU has stated that it will consider a regional regulation system for shipping if the international regulation process moves too slowly.

Let us consider three issues that are important for efficient regulation of GHG emissions from transportation, namely choice of policy instruments for passenger vehicles, policy instruments used to handle a large oil price volatility that affects CO_2 emissions, and emission regulation schemes for international shipping.

CO_2 emissions from land transport (e.g. passenger vehicles) can be reduced through improved production and use of vehicle fuels, improved vehicle fuel economy, and reduced total distance driven, see Kopp (2008). The carbon content of fuels can be reduced through mixing in a share of low-carbon biofuels. Improved fuel economy makes driving cheaper and thus there is a rebound effect that gives incentives for more driving. There are three groups of actors that control emissions, namely drivers (households), vehicle producers, and fuel providers. These actors have different preferences with respect to characteristics like power, comfort, appearance, utility, safety, and fuel economy.

Vehicle emissions can be regulated through broad-based instruments, vehicle-oriented standards, or fuel-oriented policies. A CO_2 tax and an ETS are well-known examples of broad-based instruments, where the idea is to put a price on fuel used equivalent to carbon content. In principle the full life-cycle emissions of producing and using a fuel should be accounted for, but this often proves difficult. Even though broad-based instruments are cost-effective in the short-term and also should influence the type of vehicles people buy, they may not give sufficient long-term stimulus to include new low-emission technologies in vehicles. In the short-term, a fuel price increase need not affect driving so much since the lion's cost share of owning and using a vehicle are in the capital invested, and is thus a fixed cost. There are indications that households undervalue fuel economy and possible savings from this.

The main types of vehicle-oriented policies are fuel-economy standards, emissions performance standards (based on expected CO_2 emissions per kilometer), tradable performance standards (where a vehicle manufacturer producing vehicles beating the emission standard earns credits that can be traded), feebates (with a fee on emissions for vehicles above the standard and a rebate on vehicles with emissions below the standard), cap-and-trade programs for vehicle emissions (where transportation is included in a broad ETS, or a sector-based ETS for transportation), and technology mandates (where manufacturers are required to produce specific types of vehicles). Fuel-economy standards are found in the EU and in the US (e.g. Corporate Average Fuel Economy, CAFÉ, in the US). One example of a technology mandate is the California Zero Emissions Vehicle mandate.

In terms of fuel-oriented policies there is a proposal for a California Low Carbon Fuel Standard. In this case fuel manufacturers and distributors are required to produce and sell fuels with lower carbon content. Another alternative is a fuel feebate, analogous to vehicle feebates, see Kopp (2008). Finally, an example of a fuel-specific mandate is found in the US Renewable Fuel Standard.

Only the broad-based emission pricing instruments give incentives in all three areas of lower-carbon vehicles, lower-carbon fuels, and reduced driving. This indicates that transportation should be regulated as one of many sectors as part of a general climate policy. However, there are arguments for specific instruments aimed at transportation to give sufficient stimulus of technology development and to correct for households' undervaluation of fuel economy. In any case, climate policy directed at the transport sector must be co-ordinated with policies in other sectors and overall policy.

One challenge of regulating CO_2 emissions from land transportation is a highly volatile oil price, as oil price changes cause emission changes. Studies have shown that consumers' demand for fuel is relatively sensitive to price changes. During the last eight months the crude oil price has shown great volatility due to the financial crisis and slower economic growth; from a peak at 145 USD a barrel in July 2008 to a reduction to 44 USD by late February 2009. Torvanger et al. (2009) analyze how the EU should design its climate policy for the land transportation sector given a ceiling on CO_2 emissions and the high oil price volatility. If the oil price is lower than anticipated by the EU, a stronger climate policy instrument signal is needed to avoid increased emissions and a compromised climate target. At present there is a minimum fuel excise tax in the EU, but the actual tax varies between EU member states. There is a discussion on whether transportation should be included in the EU ETS, but no decision has yet been made. Torvanger et al. (2009) use an economic model to show that there potentially are significant welfare gains from including transportation in the EU ETS. The policy scenarios included are full emission trading among industrialized countries, the current EU ETS with land transportation included, the current EU ETS (with equalized abatement costs in non-ETS sectors), and finally sector targets (where abatement costs in transportation and other non-ETS sectors are not equalized). The welfare gain from inclusion of transportation in the EU ETS is driven by the whole emission trading system helping absorb any climate policy "shocks" from a stronger climate instrument price signal needed to compensate for a low oil price. However, there is a cost in terms of a somewhat greater permit price volatility. The alternative policy of adjusting a CO_2 tax is deemed less tractable given different national policies and the time needed for policy decisions.

Moving to regulation of CO_2 emissions from international shipping, both market-based and standard-based schemes have been proposed. One challenge regulating emissions in this sector is the cooling effect of sulfur dioxide and nitrogen oxides from marine bunker fuels, which some stakeholders use as an excuse to move slowly on emission regulation. Five major alternatives for emission regulation are a cap-and-trade scheme, a charge on emissions, a combined cap and charge scheme, a design emission standard, and an operational emission standard, see Torvanger et al. (2007).

In the case of a cap-and-trade scheme, IMO could agree on a cap on emissions from the marine sector globally, but where the scheme is open to trading with a wider emissions trading system covering many sectors (such as emissions trading under a new global climate policy agreement after 2012). The easiest way to implement a charge on emissions from international shipping is to put this on fuel use, since availability of marine fuel sales data is fairly good. Still, sales data are not complete, for example due to some states not being IMO members. Some countries are supporting a combined cap and charge scheme, where the idea is to put a cap on marine emissions, introduce a charge on CO_2 emissions from shipping, and establish a fund under IMO. The purpose of the fund is to buy CO_2 permits from other sectors - if required, support improvements in the marine industry to reduce emissions, and support climate change adaptation in developing countries. A design emission standard builds on a required level of expected CO_2 emissions for each ship category, where the ship builder is free to choose suitable technical solutions. This type of standard is different from an operational emission standard, where the latter standard type is based on actual emissions per ton and nautical mile from both new and existing ships. An additional feature could be to introduce a fee on emissions above the standard.

To compare the regulation schemes some relevant criteria are: ensuring a level playing field (among ship owners and countries), prevent evasion from the scheme, low overall cost, simple administration, high acceptability, and easy modification – if circumstances change. All in all, there might be a tradeoff between acceptability within IMO, where the standard-based schemes have highest score, and on incentives and cost-effectiveness, where the market-based schemes have best performance – but likely also lower acceptability within IMO.

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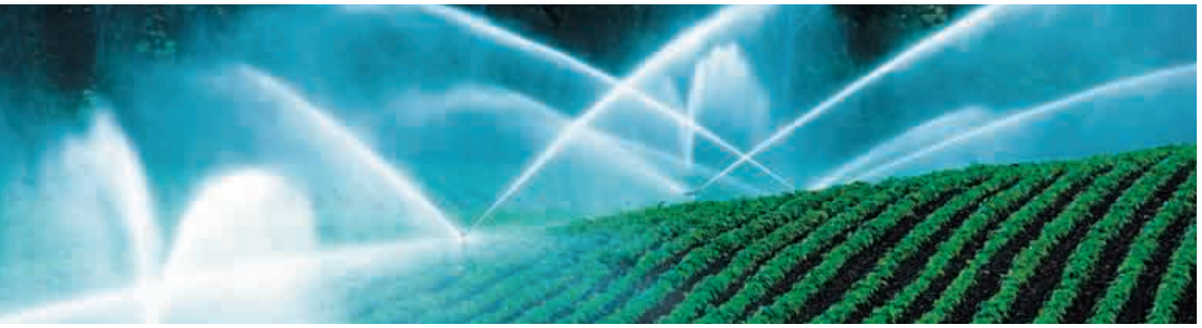

Climate policy

issues beyond CO_2

International climate negotiations are mainly directed towards carbon dioxide and a possible agreement in Copenhagen. The focus is natural, given that carbon dioxide is the most important greenhouse gas and that the use of fossil energy is so important for the development of and for maintaining our living standard.

The priority is also natural given that carbon dioxide is such a long-living gas in the atmosphere and that today's emissions will significantly influence radiation balance even in the 22nd century.

But carbon dioxide is only responsible for less than half of the global warming potential normally referred to and used in the IPCC reports. Other components such as methane, long-lived halocarbons, nitrous oxide, ozone and black particles also need thorough consideration and a strong policy development.

What are the prospects for such a development? These components will be subject for alternative approaches and in particular for those related to other environmental problems there will be alternative ways forward.

Control of black particles and ozone is today driven entirely by air pollution policies and there is an increasing concern all over the world about health effects from air pollution. For these compounds so far air pollution has been a much stronger policy driver than climate change. The air pollution policies have also a different time scale. Policy developments are in most cases directed towards regulations to be implemented over a time period of at most 10 to 20 years.

There is also an increasing interest to take actions that are global and that will give a substantial reduction in air pollution over the next 10-20 years. In fact, air pollution policies may offer a possibility to suppress the expected temperature increase over the next two decades. In addition, many control measures reduce both air pollution and carbon dioxide, such as energy conservation. These possibilities will be the focus for a conference under the Swedish EU Presidency with an active participation from Clipore scientists.

For the long-lived gas nitrous oxide, the situation is more complex. The main origin is biologic denitrification of manufactured nitrogen fertilizers and nitrogen oxides from combustion. Nitrogen fertilizer production, of crucial importance for delivering food to the increasing global population, and NO_x formation through combustion cause together an anthropogenic nitrogen fixation of approximately 200 million tonnes annually.

Fixed nitrogen or reactive nitrogen, does however contribute severely to many other negative effects such as eutrophication of terrestrial and aquatic ecosystems, acidification, and high nitrate concentrations in groundwater. These negative effects are also, just like for air pollution, strong driving forces to control nitrogen and develop effective nitrogen management procedures. The greenhouse gas nitrous oxide comes on top of this, and climate policies need to carefully look into the efforts to control nitrogen from the general pollution aspects before developing a particular strategy to control nitrous oxide.

The complexity in the nitrogen issue has been the basis for the International Nitrogen Initiative, a global initiative to deepen our scientific understanding of the nitrogen issue, both its value for our food supply but also its various environmental consequences. There is however no common international policy arena that can take onboard all the various aspects of nitrogen. Instead, problems are handled one by one, which mostly lead to suboptimization of control measures. A more common policy, which handles both the environmental and climate aspects, may be a challenge for future policy research and policy development over the coming years.

Peringe Grennfelt
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Clipore policy

outreach 2008

In the Clipore research world, 2008 started off with the Bali Action Plan fresh in mind from the international climate negotiations in Bali in December 2007. Already on 10 January, Clipore participated and gave reflections on the Bali meeting in a seminar entitled *What happens after Bali?*, a part of the collaboration Clipore has with the European Commission's Representation in Stockholm.

The difficulties of reaching a new international climate agreement were further discussed in the scientific workshop *The Climate Change Challenge*, arranged by Clipore on 22 January. The implications of climate change were also presented on 14 May to the media as a part of a course for Swedish journalists to learn more about the topic.

During the Bali meeting, Clipore performed a study on the function of side-events at UNFCCC meetings, and in March, Clipore presented the study for the UNFCCC secretariat with very positive feedback as a result. On 10 March, the collaboration with the European Commission continued as Clipore participated in the seminar *How much will it cost for Sweden to reach the energy and climate goals set by the EU?* This was in response to the Commission's Climate and Energy Package that was presented one and a half month earlier.

Clipore is in collaboration with Centre for European Policy Studies in Brussels hosting the European Climate Platform. Its aim is to once or twice a year bring a select number of high-level policy-makers, negotiators and experts together to debate key topics in the area of international climate change policy. On 17–18 April in Madrid, the European Climate Platform focused on *Positive Incentives for Climate Action*. Clipore presented the two background papers *Linking Measurable, Reportable and Verifiable Mitigation Actions by Developing Countries to Measurable, Reportable and Verifiable Financial and Technical Support by Developed Countries,* and *A Bottom Up Approach for India*. These reports were also presented at a side-event arranged by Clipore at the thirtieth sessions of the UNFCCC Convention subsidiary bodies in Bonn, 10 June.

Just after midsummer, Clipore arranged on 25 June a pre-conference to the 16th EAERE (European Association of Environmental and Resources Economists) conference on *Critical Aspects of the Post-2012 EU Climate Policy*. The presentations given by Clipore scientists were *Climate change and cap and trade programmes – An introduction, An updated emissions trading system: Critical aspects of auction design, What happens in sectors outside EU-ETS: Shipping and aviation, What happens in sectors outside EU-ETS: Land transportation, Comparing policies to combat emissions leakage: Border tax adjustments versus rebates,* and *Reforestation and deforestation*. Special Clipore sessions were also arranged during the EAERE conference itself for the benefit of Clipore stakeholders: *Auction and allocation, EU climate policies post-2012,* and *EU-ETS 2005-2007 revisited*.

Autumn activities started off with an ECP event in Brussels on the *Financial Architecture for the Post–2012 Period*, 30 September. Clipore contributed with the background paper *Financing Adaptation to Climate Change: Issues and priorities*.

Clipore Week, organized on 13-16 October, included a conference on *The 2008 US Presidential Election: What Might it Mean for International Climate Change Cooperation?* Three weeks ahead of the presidential elections, the aim was to examine the potential impact that a new presidential administration might have concerning future efforts to address the climate change threat. The presentations given were *US & EU Approaches to Climate Change: Allies or Adversaries?, The Next US President's Climate Change Agenda: Issues of Domestic and Foreign Policy,* and *The Impossibility of Coordination in US Regional, National and International Policies? A Contrarian View*. A week after the elections, a workshop on *The 2008 US Presidential Election and the Future of Climate Change Cooperation* was organized. The new US president's climate protection agenda, regional and national climate policies in the US, and the potential for the US and the EU to provide joint leadership to address the challenge of climate change were issues that were discussed.

The Clipore outreach agenda for 2008 ended during the UNFCCC meetings in Poznań. The results from the ECP seminar on the Financial Architecture for the Post-2012 Period was presented during a side-event on 4 December, and the follow-up of the side-event study performed a year earlier in Bali was presented during a special seminar two days later.

In 2009, Clipore's communication activities will mainly focus on two major processes. Clipore will closely follow the development of US climate policy with the new president Barack Obama at the steering wheel. In parallel, attention will be given to the Swedish EU Presidency beginning on the 1 July and culminating in the United Nations Climate Change Conference in Copenhagen in December. The most prominent Clipore events during 2009 are two seminars focusing on the development of the US climate policies in relation to the EU, held at the Swedish Embassy in Washington D.C., and participation in the Climate Change and Air Pollution Conference under the Swedish EU Presidency during the Clipore Week in October.

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Mistra in brief: Research with practical benefits

A MISTRA FUNDED RESEARCH PROGRAMME

Mistra – The Swedish Foundation for Strategic Environmental Research – supports research of strategic importance for a good living environment and sustainable development.

It invests in research groups who, working alongside users, are able to contribute to solving major environmental problems.

Mistra's programs cut across disciplinary boundaries, and the results are intended to find practical applications in companies, public agencies and non-governmental organizations.

Mistra provides funding for some twenty major programs, each extending over six to eight years. All of them have the aim of building bridges, both between disciplines and between researchers and users.

The Foundation's strategy is to seek to ensure that its funds produce a threefold return: strong research environments that create value for users, asset management in support of sustainable development, and active communication to make the results known.

Further information can be found on our web site:
www.mistra.org

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CLIPORE

A MISTRA FUNDED RESEARCH PROGRAMME

Clipore seeks new paths for successfully addressing

climate change

Addressing human impacts on climate is one of society's most important challenges. The path we choose will affect lives, in many different ways. One thing is certain – successfully addressing climate change will require high levels of cooperation at all levels – between individuals, companies, environmental organizations, and nations.

This is why Clipore – Mistra's Climate Policy Research Program – was launched in 2004. The United Nations Framework Convention on Climate Change (UNFCCC) is the point of departure for Clipore research. The program focuses its work on the development of concepts and tools in support of international climate negotiations both in relation to the UNFCCC process and the European Union.

Clipore is financed by Mistra, the Swedish Foundation for Strategic Environmental Research. Mistra programs are characterized by their interdisciplinary nature and their strong stakeholder focus. Clipore research is carried out through extensive collaboration between researchers from different disciplines and institutions, nations and cultures, and in ongoing dialogue with representatives from government, industry and academia.

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