



Clipore
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foreword

The Mistra-funded Climate Policy Research Program Clipore moves into its sixth year with as much anticipation and concern for a future climate policy agenda as the rest of the world.

Due to no, or very little, progress in the negotiations over the years for a new global climate agreement the only deal at the COP 15 meeting in December 2009 was the Copenhagen Accord, a political agreement with no legal implications. With this many questions have arisen and as the rest of the world we are now trying to grasp the current situation and make out our stance between the gloomiest future scenarios and the brightest ones. At this point, a few months after COP 15, the picture does seem slightly brighter than at least just days after the meeting. Even if the Copenhagen Accord has too low ambitions regarding mitigation it does have several substantial elements that can be further developed.

If truth be told, the expectations for reaching a satisfying deal in Copenhagen were set too high. Having closely followed the negotiation process it became clear already in Bali that we would see little actual progress for the COP 15. EU had high ambitions, especially regarding mitigation. However, at the end it was clearly shown that the real power was in the hands of those with low ambitions and high emissions. And given that negotiating parties has become more and more polarized over the years and that the rhetoric has hardened between the Annex I-countries, the G-77 and not least China and the US, it is not unlikely that we will see the same disappointing outcome in Mexico for the COP 16 at the end of the year. That is if we are unwilling to modify the process.

Main focus must remain on the actual climate change issue, and ahead of Mexico we must carefully reflect about how the negotiation process will move forward so that it in the end does lead us to a global deal that keeps climate change well under 2°C.

The Copenhagen Accord itself is a glimpse of hope. It covers all the major economies and 80 percent of all emissions. It must however urgently be harmonized into

the UN Climate Convention. The negotiation machinery too must be more manageable to give room and time for concrete progress. Instead of involving 194 countries in the talks on emission cuts, maybe it should be left only to the few countries that actually are obliged to cut emissions. The wide range of issues that fall under the climate change umbrella should in general be treated as individually as possible to make actual progression and show the way for further improvement.

To set the wheels in motion we need new ideas, new thinking. Research and knowledge is as many times before the answer to our questions and the questions are many and of different character.

How do we give coal rich countries the economical incentives not to pick up their black gold? How can rainforest covered developing countries be compensated for not felling their crucial carbon sinks? How do we bring oil dependant societies the tools and technology to turn to sustainable energy?

These and many other questions all boil down to policy instruments. The Clipore program has so far directed its research towards financial climate policy instruments and policy frameworks and processes, in relation to the UNFCCC. Running side by side with the international climate negotiations, continuously identifying gaps and opportunities for further research, Clipore is a dynamic establishment. For 2010, the program will focus particularly on cap- and trade programs, technology transfer, and the relation between climate change and development.

Hopefully, the program will continue to deliver important research results to the international climate change negotiations for years to come and hopefully this will lead us forward.

Lars-Erik Liljelund

Chairman of the Board and Special Advisor on Climate Change to the Swedish Prime Minister

A Road Map to Mexico? What Ways Forward for UNFCCC

after Copenhagen?

The year of 2009 saw climate change move into the realm of high politics with every summit meeting – and they were many – turning their attention on two central issues only, the economic crisis, and climate change. It was the Obama year, with the promise of radical change linked to the new American President: yes we can!

So expectations were floating high as the defining moment of climate politics, Copenhagen COP 15, came closer. True, the ever accelerating rhythm of negotiations between high officials and environment ministers did not go particularly well, but somehow we were many to believe that a summit at the highest level would turn COP 15 into Hopenhagen and allow the Bali Action Plan to have a happy ending.

Alas, this was not to be. Illusions were lost in a cold and unpleasant Copenhagen, all concentrated on security. Seen through the lens of unrealistic expectations, COP 15 was a disappointment. The Copenhagen Accord, laboriously brought together by world leaders under incredible confusion and a lot of frustration, was almost seen as an insult to all those tens of thousands who had come to Copenhagen because of genuine and accurate concern for the reality of global warming.

But was the Conference a disaster? As the weeks have passed, the feeling of lost illusions remains, but a new tone has emerged: the process begun on Bali is still on rails, COP 15 took at least two unanimous decisions: to continue the two negotiating working groups, and to mandate the Mexican Presidency to well prepare COP 16 at the end of 2010. The Copenhagen Accord has also been seen to contain more substance and force of guidance as the main drivers in Bella Center, the BASIC group of China, India, Brazil and South Africa have confirmed their support. By the end of January 2010, 55 countries representing almost 80 percent of emissions from energy use have made submissions of national pledges to cut and limit emissions by 2020 as part of the Accord. The EU submission reflected the fact that Copenhagen had not eroded the firm decisions on its negotiating stance that had been adopted at the highest level by the European Council.

All this can be dismissed as the building up of new illusions. It is true that there is no road map to Mexico. It is true that there is still

uncertainty about the real positions of the main players. It is true that the world economic crisis still takes its toll. It is true that geopolitical concerns in a new global landscape with a rising China, a weakened USA, and an uncertain EU, risk bringing climate change away from the centre of attention.

But there is also the reality of climate change, as a significant part of the human impact on incredibly powerful global natural systems. The arguments of the climate sceptics seem more and more desperate, the risks of approaching planetary boundaries, to use the title of a seminal article in *Nature* in September 2009, cannot be dismissed, particularly in this International Year of Biological Diversity. There are real concerns out there, which are also part of the political landscape of a globalized world.

It also seems that the Copenhagen outcome has inspired some creative thinking, opening new avenues of reflection outside the box. Maybe the sense of failure was a salutary shock releasing those new ideas in capitals that will define the enabling conditions which are to be the basis for negotiators' instructions.

So the moment of truth for post-Copenhagen and pre-Mexico is approaching. Will the AWG-KP and the AWG-LCA be able to build on the real progress made in the negotiations up to the high-level muddle in the Danish capital, thereby finding common ground on issues such as REDD, adaptation, or technology? Will they be able to explore in a positive spirit the possibilities that are hidden in the Copenhagen Accord, notably on the crucial issues of finance for adaptation and mitigation? Or will they go over the same ground again, repeating the worn-out arguments, killing negotiating creativity?

At the time of writing, in early February 2010, nobody knows. We know that much will depend on the US legislative process. Will the Boxer-Kerry bill be adopted by the Senate, and when? What will be the outcome of the mid-term elections, which are to be held before the Mexico COP? What other events in world politics will affect the climate negotiations?

Whatever happens, there is no alternative: negotiate, negotiate, and negotiate again. But the strength of agreements have to match the seriousness of the global threat. Therefore the role of the lawyers becomes particularly important. Not any agreement will do. There are voices out there who say that it is too difficult to negotiate a real legally binding multilateral treaty. Instead, let us go for national solutions within a pledge and review system, with loose international control functions.

This may sound realistic, but it breeds new illusions. We are faced with a global problem that needs to be tackled at the global level.



But any international agreement will have to be implemented, not just by the Governments, but by the actors in the world economy: the managers, the investors, the companies, big and small. And they need the security, stability, and level playing field that only a firm international treaty can offer. Like the Kyoto Protocol it cannot be perfect, but it must not create an impression that the Governments are reducing their ambitions to create a long-term agreed climate framework which will shape energy policies, infrastructure policies, spatial planning policies; a framework that can evolve with time.

This means that the road to Mexico must take us in the direction of a legally binding comprehensive agreement which will guide

all actors in a process that will pave the way for stronger commitments by 2020, exploring the possibilities for 2030, setting ever clearer targets for 2050, reflecting the significant changes in the world economy along the road. Mexico must be ambitious enough and precise enough to provide international action that is commensurate with the dimensions of the challenge.

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EU policies: 20% or 30% reductions

– is there a choice?

Nowhere has the disappointment on the outcome of Copenhagen been greater than in the EU. While there is an acknowledgement that progress has been made notably in engaging countries that hitherto did not have reduction commitments, the deal still falls significantly short of the EU's aspiration for a 'legally binding agreement ... to limit global warming to well below 2°C ... by reducing global emissions by 50% by 2050'.

This failure raises a tricky question for the EU, namely on the future EU commitment, i.e. whether to stick to the unilateral non-conditional 20% GHG reduction pledge by 2020 compared to 1990 or whether to move to the 30% reduction that is conditional to "other developed countries commit[ting] themselves to comparable emissions reductions". After the submissions to the Annex of the Copenhagen Accord on the face of it, there seems no justification for the latter. Still, the EU has submitted both the unilateral 20% and the conditional 30% commitment to the UNFCCC.

One school of thinking argues that a unilateral EU pledge of 30% could reinvigorate the EU leadership and infuse new dynamics into global climate change discussions. The number of supporters of this view is shrinking fast and there is little support in the Council and the Commission for this position. As Commission President Barroso has put it, nobody in Copenhagen has asked the EU for going to 30%.

On the other side of the spectrum, some member states, mainly but not only, the so-called 'new' member states from Central and Eastern Europe have been arguing that a 30% reduction cannot be an option and should not even be submitted to the UNFCCC. They fear that a unilateral commitment is too costly for them, especially after the economic crisis, and that just by being in the EU they are asked to reduce a multiple of what developing countries are asked to do. For example, Bulgaria's and Romania's GDP per capita (in purchasing power parity) is lower than the one of Mexico and less than two-thirds of Korea and only 25% higher than the one of South Africa. They are loath to contributing to large-scale finance transfers to developing countries that are actually richer than they themselves. And finally, an EU move

to 30% would quickly squeeze out the substantial excess AAUs that these countries possess and are keen to sell internationally.

Reaching the Commitment Step by Step

On the other hand the EU faces a situation where the economic crisis has quickly eroded incentives for low-carbon investment. It can be argued that a 30% post-crisis reduction target would roughly equal a pre-crisis 20% commitment. Some rough and tentative figures illustrate this. According to the IEA World Energy Outlook 2009, the economic crisis has reduced GHG by 3%. This would shift the EU-15 from 6% reductions in 2008 to more than 9% reductions compared to 1990, thereby beating its Kyoto Protocol commitment. The International Institute for Applied Systems Analysis (IIASA) – based on IEA 2008 and 2009 energy-related emissions projections – estimated in 2009 that as a result of the economic crisis, total Annex I emissions would fall by 6% in 2020. With the EU-27 registering in the pre-crisis year of 2008 a total reduction of 10.7% compared to 1990, the effect of the economic crisis could mean that the EU's 20% target is almost achieved. This is only half reflected in the EU's current allowance price, which currently stands somewhere between € 13 to € 14. This is still surprisingly high given that all industries are long but reflects the fact that most industries prefer to bank allowances rather than selling them.

This sheds a new light at EU domestic efforts to decarbonise the economy. A low carbon price, especially if it continues over a longer period will thwart EU efforts towards a low-carbon economy, one of the key objectives for the new Commission that has taken office in February and notably for the new Commissioner on Climate Action. The new Barroso II Commission wants to link the so-called 2020 strategy for sustainable growth, innovation and jobs creation – Euro-speak for making the EU economy more competitive – to climate change. It is difficult to see how this can be done in the near absence of a carbon price signal or for the non-trading sector the absence of political pressure to implement policies.

A Global "Shadow" Carbon Price

Still, given the current political dynamics in the EU, it is unlikely that the EU will move towards a 30% target quickly. Precondition will be a proper analysis on the implications of the economic crisis, which is required by the European Commission to be submitted by March. Following this, we should expect a difficult discussion on how the burden – or effort in Euro-speak – will be shared notably between rich and poor countries. This will necessarily need to include a review of the budget and by extension the Common Agricultural Policy (CAP), which is where the additional money would have to come from. Finally, this will require a EU low-carbon development strategy that singles out key sectors



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and key measures for action. At the latest within this context the issue of carbon prices and moving towards 30% will re-emerge. We should expect the Commission's analysis constantly being challenged by member states, researchers and stakeholders on how far and quickly to reduce. We should not necessarily expect the EU to move to 30% in one stroke but to step by step increase its commitment once the necessary policies are put into place, such as on transport or buildings.

The formulation of an EU low-carbon development strategy and/or the move to 30% will at the same time raise the issue of the usefulness of imposing border measures. Assuming that the EU adopts a 30% reduction target or more, auctions 100% of the allowances under the EU ETS and implements a national or an EU carbon tax CO₂ tax for the non-trading sector – a possible scenario – an import tax on the CO₂ content of all goods imported into the EU from countries that do not have their own cap-and-trade system or equivalent measures starts making sense. Currently such a move is still highly controversial not only between but also within member states and within the Commission because of potential implications for the EU's relations with China and India, the world trade regime and international relations but also for European businesses operating internationally. From a purely economic perspective however, this would

be a straightforward means of moving towards a global 'shadow' carbon price, even in the rest of the world. It thereby creates a mechanism that enforces the pass-through of carbon costs across the globe, thus making domestic consumers pay the full cost of carbon, as we show in a new CEPS study. Expect a fierce EU debate. More likely than not, the outcome will to a large extent also be determined in the US.

References

Egenhofer, C. and A. Georgiev (2009), "The Copenhagen Accord: A first stab at deciphering the implications for the EU", CEPS Commentary, CEPS, Brussels, 25 December 2009.

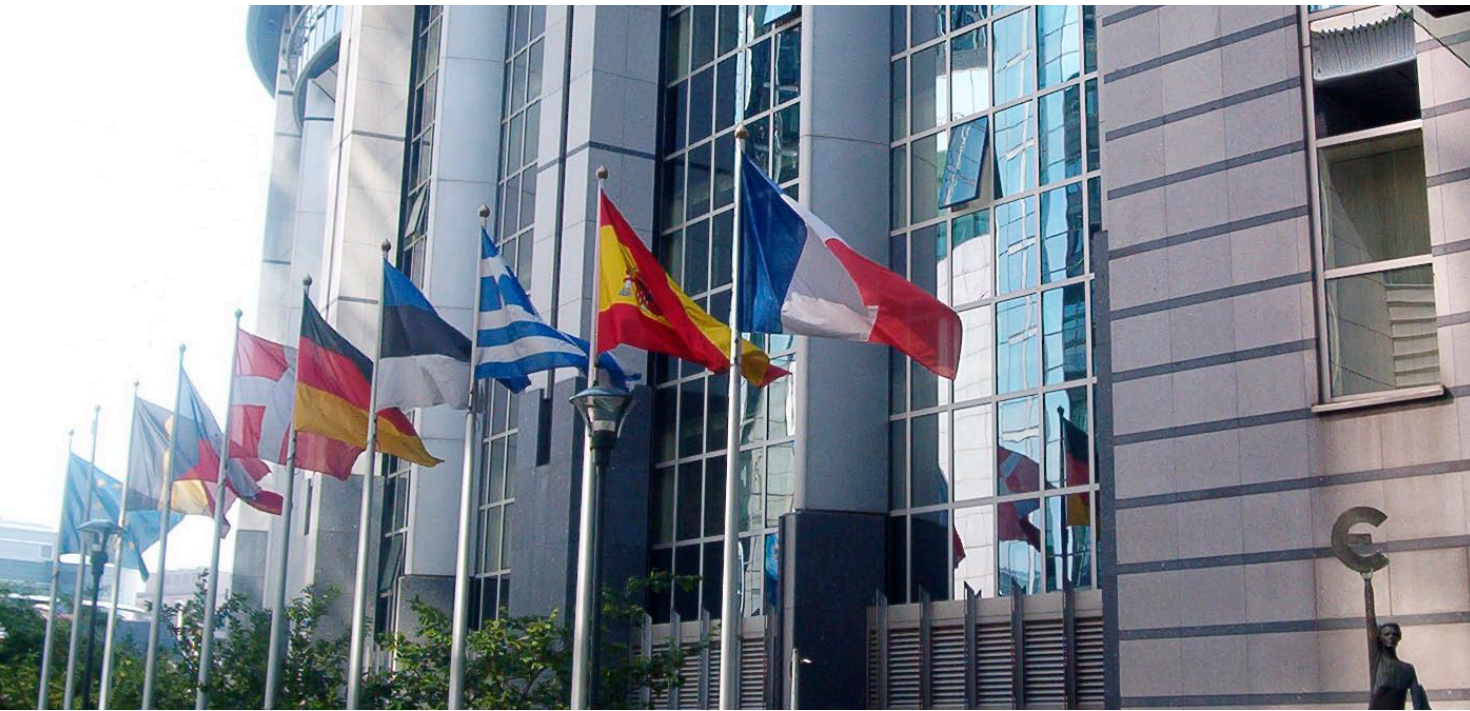
Egenhofer, C., D. Pumphries, S. Ladislav and A. Georgiev (2009), Next Steps for the Transatlantic Climate Change Partnership: A Report of the Global Dialogue between the European Union and the United States, CSIS, December.

Gros, D. and C. Egenhofer (2010), Climate Change and Trade: Taxing carbon at the border?, Centre for European Policy Studies, CEPS Paperback, CEPS, Brussels (download preliminary version at: <http://www.ceps.eu/system/files/article/2009/08/Climate%20Change%20and%20Trade.pdf>).

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Global Climate Change Leadership in the eyes of the beholders

Global leadership is urgently needed if the climate change challenge is to be successfully addressed. International climate negotiations are maddeningly intricate as they now involve over 190 countries with divergent exposure to climate change impacts and sharp differences in economic competitiveness, sustainable development trajectories, and capabilities for climate action.

Leadership is essential in situations such as these where stakes are high and commitments to act can be blocked by concerns over what other countries might or might not do. By making the first move a leader provides a model others may want to emulate and removes uncertainty about whether the leader is actually devoted to taking action rather than just engaging in cheap talk.

Leadership is a relationship between leaders and followers. An actor aspiring to be a leader needs to be recognised as such by potential followers. Despite its fundamental importance for leadership relationships, the demand side of the leadership equation has been comparatively neglected by past research. In this multi-year study we are looking for leaders by analysing the perceptions of climate change leadership among the participants at the UN climate negotiations.

Clipore has carried out this research by distributing survey questionnaires to COP participants, dating back to the 2007 COP 13 meeting in Bali, to study the priorities, preferences, and backgrounds of the participants of the international climate negotiations. The Clipore negotiations database now includes more than 3,000 completed questionnaires from participants at the UNFCCC meetings in Bali, Poznań, and Copenhagen as well as from the organisers, delegates and participants at the side events of these gatherings.

The survey conducted at Copenhagen includes almost 1,000 respondents from the main venue as well as from 50 official side events. The study is endorsed and coordinated with the UNFCCC secretariat. This effort provides a platform for several ongoing and future Clipore studies. The Copenhagen survey, which focused on leadership and effort sharing principles, involved researchers from the universities of Linköping, Uppsala, and Gothenburg as well as IVL Swedish Environmental Research Institute.

The results from the leadership study are based on a survey of 500 participants at the main venue, of which more than a third were negotiators or government representatives. Our results on leadership perceptions provide valuable insights into the leadership dynamics crucial for international cooperation.

Global Climate Leadership at Poznań and Copenhagen

The outcome in Copenhagen and our survey results demonstrate that the climate change leadership mantle is currently worn by more than one actor – or rather, there is more than one leadership mantle to be worn – and the degree of diplomatic engagement powerfully influences perceptions of leadership.

At the COP 14 conference in Poznań, the EU had the strongest support as leader. However, only 14% reported that they saw the EU as the *only* leader. The data also showed that the US, after eight years of international inaction on the climate issue failed to impress potential followers. Instead it was China that clearly emerged as the second strongest leadership candidate.

This picture shifted at the COP 15 gathering in Copenhagen. The reenergized US climate diplomacy practiced by the Obama administration dramatically altered perceptions of the US role in the climate negotiations. At the COP 15 meeting, the US gained the top position while China and the EU shared second place (Table 1).

A number of factors help explain the changes we see from COP 14 to COP 15. Since the EU's status as the undisputed climate change leader was, in part, a result of its ability to fill the void created by an absent US, some drop off was inevitable once the US resumed an active role in the negotiation process. China's growing economic and diplomatic clout as well as the fact that the climate negotiations were entering a new phase in Copenhagen were also important factors. For example, with regard to the tough negotiations needed to close a deal, structural power and the importance of the two largest greenhouse gas emitters (China and the US) became magnified. In contrast, the EU's leadership has been predicated primarily on leading by example and forwarding ideas and solutions for reaching a new agreement. These roles were particularly important in the creation of the Bali road map process and in the lead up to the Copenhagen meeting. In fact, rather than simply signalling the rise or fall of a particular actor, our findings reveal a trend towards more broadly shared leadership.

Table 1: Actors perceived as leaders on climate change, by party grouping, percentages (n)

| | EU as leader | | US as leader | | China as leader | | G77 as leader | |
|---|--------------|-------|--------------|-------|-----------------|-------|---------------|-------|
| | COP14 | COP15 | COP14 | COP15 | COP14 | COP15 | COP14 | COP15 |
| EU-citizens (119) | 77 | 63 | 43 | 66 | 55 | 56 | 34 | 17 |
| G77-citizens (156) | 50 | 37 | 15 | 37 | 50 | 38 | 38 | 25 |
| Umbrella group-citizens (84) | 56 | 45 | 33 | 63 | 33 | 46 | 11 | 16 |
| Environmental Integrity Group-citizens (14) | 70 | 71 | 30 | 57 | 50 | 57 | 0 | 21 |
| US-citizens (43) | 50 | 54 | 38 | 72 | 38 | 44 | 13 | 16 |
| All (445) | 62 14* | 46 4* | 27 0* | 53 3* | 46 1* | 47 0* | 27 4* | 22 3* |

* Represent the percentage of COP participants viewing the actor as the *only* leader in global negotiations on climate change

The Copenhagen negotiations also revealed a potentially profound emerging rift in the negotiating group of the developing countries – the G77 and China – where for the first time the Alliance of Small Island States (AOSIS) together with a number of other Least Developed Countries had an open confrontation with some of the major emerging developing countries over the issue of whether the stabilisation goal should be 1.5°C or 2°C. The survey also showed a notable increase in the divisions among the developing countries concerning climate leadership. Compared to COP 14, a substantially larger number of participants indicated either a major emerging economy country – China, Brazil, India – or the AOSIS, the African Group, and the Least Developed Countries as a leader.

It remains an open question whether the major international players will be able to provide the necessary leadership to overcome the remaining stumbling blocks to international cooperation and transform the Copenhagen Accord into a comprehensive and binding agreement in the years to come. Since climate negotiations are so complex, leadership from the key actors will be required if meaningful progress is to be achieved in the future. Leading by example, resource-based, and idea-based leadership all can be important elements of a successful strategy to combat climate change.

The Copenhagen Accord and the Road Ahead

Major questions and significant fault lines remain. Will the US be able to achieve the necessary domestic political consensus to implement the obligations it took on in the Copenhagen Accord and sustain its international climate engagement? If not, US credibility will suffer and its ability to be a leader will be threatened again. Will the EU be able to maintain its internal unity and sustain its policy of leading by example and living up to its ambitious climate goals in absence of similar commitments by the rest of the world? Will the EU be able to maintain an influential leadership position, or will potential followers, after witnessing the EU being diplomatically side-stepped to some degree at COP 15, look elsewhere for guidance? How will China's role as one of the most important global climate actors affect its status as a leader? Will China's positions on sovereignty and economic growth drive a wedge between it and the most vulnerable developing countries? Will other potential future leaders, such as Brazil, India, Japan, or the Small Island States be able to rise to the occasion and put together the global coalitions needed to seal a comprehensive climate deal and make what is agreed to work? These are all important questions which we will continue to analyse in future Clipore studies.

References

Hjerpe, M. and Linnér, B-O. (2010) *Functions of COP side-events in climate-change governance*, *Climate Policy* 10, doi: 10.3763/cpol.2008.0536.

Karlsson, C., Parker, C., Hjerpe, M. & Linnér, B. (2010) "Looking for Leaders: Perceptions of Climate Change Leadership among COP 14 Participants" (working paper under review).

Parker, Charles and Karlsson, Christer (September 2010) "Climate Change and the European Union's Leadership Moment: An Inconvenient Truth?" *Journal of Common Market Studies*, Volume 48, Number 4.

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No Agreement in Copenhagen: Effects of Postponed Coordinated Mitigation Commitments on risk and ambiguity

When a binding agreement was not reached in Copenhagen 2009 we added another COP meeting that postpones coordinated mitigation commitment. At the same time, recent scientific findings indicate that we might face a greater profound scientific uncertainty in climate change policy than considered before.

The feedback processes in the climate system demonstrate that once the earth has warmed, the conditions will be so different from what we can observe today that it is impossible to predict when a warming will stop. An initial warming may start processes that change ice cover, clouds' formation and water vapour in the atmosphere, which in turn will have unpredictable feedback effects that amplify or reduce the initial temperature increase. Waiting for more scientific certainty before acting may lead to irreversible consequences (Roe and Baker, 2007). However, already in 1992, the UNFCCC decided on a precautionary principle in article 3.¹

“The Parties should take precautionary measures to anticipate, prevent or minimize the causes of climate change and mitigate its adverse effects. Where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures”

A Classical Russian Roulette Game

One important type of tools in assessing policy measures is integrated climate-economic models (IAMs) such as the DICE model by Nordhaus. The Stern Review used for example the PAGE2002 model to come to its widely discussed policy results (Stern, 2007). The debate that followed generated important and still unanswered questions; how to deal with discounting, risk and ambiguity and how to employ richer behavioural assumptions in IAM policy analysis.

Uncertain feedback effects are just but one example illustrating that climate change predictions involve imprecise probabilities that are likely to be successively revised as new scientific information arrives. It is these imprecise probabilities that define ambiguity. Thus postponing mitigation action involves not only risk-taking but also ambiguity-taking. Moreover, the irreversible effects in climate change suggest that we should take the difference between risk and

ambiguity seriously in policy analysis. The difference between risk and ambiguity can be illustrated by the classical Russian roulette game, which also involves irreversible effects. The players place a single bullet in a six-shot revolver, spin the cylinder, place the muzzle against their head and pull the trigger. There is a 1/6 chance of the revolver discharging the bullet, and death. Pulling the trigger expose the player to risk over likely and unlikely outcomes. Knowing the outcomes and the probability of a catastrophic event, we can apply conventional expected utility theory in the analysis.

There is no ambiguity but risk present in this classical game. Imagine instead a second revolver where no one knows how many bullets it contains. It may contain anything between zero and six bullets. Suppose that the player can choose between using the first and the second revolver in a round. Which one should he choose? Pulling the trigger of the second revolver is something very different from pulling the trigger of the first revolver. Besides the risk, the player is also exposed to ambiguity which leaves him to make ‘guesses about guesses’. He can arbitrarily guess that the cylinder has 0 or 1 or more than 1 bullet, and compare this guessed likely outcome with the known likely outcome for the first revolver. But whatever his guessing will be, how can he justify it? When is a *true* probability better or worse than any other *guessed* probability of an irreversible catastrophic event?

Probabilities Imprecise Enough

Climate change is certainly more complex than this simple game. Although the probabilities in the climate system in most cases are not completely unknown as in this example, they are imprecise enough as they are based on predictions from many different models, together producing ranges of probabilities for each single outcome. For this reason, science has for example not yet been able to produce a single probability distribution for climate sensitivity, which confirms ambiguity. The conventional economic decision theory, relying on expected utility theory usually assuming a single (objective or subjective) probability distribution, does not clearly apply to ambiguity with imprecise probabilities. More worrisome is that there are several experiments demonstrating that it fails to explain individuals' behaviour as they tend to avoid choices which expose them to more ambiguity. This was already seen in the classical experiment by Ellsberg, demonstrating that individuals prefer to bet on a lottery with known probabilities over one with unknown probabilities (Ellsberg, 1961). Several behavioural experiments have later confirmed this aversion to ambiguity in human behaviour. One might therefore question the applicability of the conventional expected utility framework in climate change policy analysis.



This is also what Weitzman (2009) did. He introduced ambiguity in a simpler model than IAMs and the result suggests that we should treat ambiguity more seriously in policy analysis. However, Weitzman's analysis has also been criticized for being too simple as he is not performing a dynamic analysis in an IAM.

Recent research by Clipore researcher Hennlock presents a theoretical method for incorporating ambiguity in an IAM by applying robust techniques (Hennlock, 2008). Instead of using fixed probability distributions as hitherto in IAM analysis, it uses unspecified distributions over certain ranges, making probabilities imprecise. This mimics the essential feature of the scientific uncertainty – that current climate data from underlying physical processes is statistically insufficient to predict future mean temperature probability distributions, nevertheless due to uncertain feedback effects.

Hennlock applies the method in two different IAMs to examine how ambiguity may affect producer and consumer decisions when facing imprecise probabilities over certain climate sensitivity ranges (Hennlock, 2008, 2009). The result indicates that the degree of ambiguity aversion can have a substantial influence on the expected carbon price and the optimal greenhouse gas emissions strategies. It can make policy more stringent also when taking into account that there is ambiguity about the effects of mitigation action on the economic system, besides the effects on the climate system. More important though, is that aversion to ambiguity induces a structural adaptation in optimal GHG policies to sudden changes in climate data observations. One real example is the unpredicted faster disappearance of Arctic ice that is contributing to amplify warming in the Arctic region beyond what the IPCC predicted in the past. The structural adaptation makes optimal policy more responsive to such sudden changes in observations as to adjust the insurance against ambiguity in irreversible high-impact outcomes.

Does Ambiguity Place Us in the Same Boat?

Another result has consequences for climate negotiations. Ambiguity in the climate system may actually contribute to hamper conflicting national interests, while ambiguity in the economic systems

may facilitate them. A climate agreement on mitigation therefore has a second function; besides fostering trust among nations, the coordinated mitigation both reduces and diversifies ambiguity across countries. The intuitive explanation is that ambiguity in the climate system changes the rules of the game by placing the countries to a larger extent ‘in the same boat’, while ambiguity in the economic systems does the opposite. The preliminary results from this Clipore research suggest that more research is needed on behavioural aspects in presence of risk and ambiguity in both the climate and the economic systems and their influence on future climate negotiations on designing long-range mitigation strategies.

¹ United Nations Framework Convention on Climate Change, adopted on May 9, 1992, Art. 3, 1771 UNTS 164.

References

D. Ellsberg. Risk, ambiguity, and the savage axioms. *Quarterly Journal of Economics*, 75: 643-669, July 1961.

G.H. Roe and M.B. Baker. Why is climate sensitivity so unpredictable? *Science*, 318: 629-632, 2007.

M. Hennlock. A robust feedback Nash equilibrium in a climate change policy game. In S.K. et al. Neogy, editor, *Mathematical Programming and Game Theory for Decision Making*. World Scientific Publishing, 2008.

M. Hennlock. Robust control in global warming management: An analytical dynamic integrated assessment. *RFF Discussion Paper 09-19, Resources for the Future*, 1616 P Street NW, Washington, DC 20036, USA, May 2009.

M. Weitzman. On modeling and interpreting the economics of catastrophic climate change. *The Review of Economics and Statistics*, Vol XCI, 1 February 2009.

N. Stern. *The Economics of Climate Change: the Stern Review*. Cambridge University Press, Cambridge, 2007.

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Adaptation and Development: a policy dilemma

Even the most stringent mitigation efforts will not prevent impacts of climate change in the next few decades. This makes adaptation essential, particularly in addressing near-term impacts. Yet mitigation also remains crucial: to rely on adaptation alone would lead to a level of climate change to which it is no longer possible to effectively adapt, or only at very high social, economic and environmental costs. Successful action on climate change therefore must include both mitigation and adaptation.

The Bali Action Plan, agreed on at COP 13 in December 2007, attached equal weight to mitigation and adaptation and identified technology and finance as the key mechanisms for enabling developing countries to respond to climate change. With the Bali Action Plan, the COP launched ‘a comprehensive process to enable the full, effective and sustained implementation of the Convention through long-term cooperative action, now, up to and beyond 2012, in order to reach an agreed outcome and adopt a decision at its fifteenth session’ (i.e., COP 15 in Copenhagen in December 2009). In the event, no agreed outcome was reached at COP 15. Instead, a decision was adopted to take note of the Copenhagen Accord, a non-binding political declaration about which there was no consensus among countries, and which provides much less substance on adaptation than the Bali Action Plan.

In 2009 Clipore researchers conducted various studies to inform the adaptation negotiations at COP 15. Clipore has analysed both the nature of adaptation activities that are needed in developing countries, and the ways in which financial support for adaptation can be generated, managed and disbursed. This chapter presents Clipore research that has identified and defined a policy dilemma related to ‘mainstreaming’: integrating adaptation to climate change into mainstream development planning and decision-making. The chapter sketches this dilemma and explains how it has influenced the pre-Copenhagen negotiations on adaptation finance. It ends by

outlining what developed countries can do to avoid a deadlock in the post-Copenhagen negotiations on this important issue.

Mainstreaming Adaptation into Development

Adaptation is closely connected to development, and possibilities to create synergies between the two are increasingly recognised and pursued. Climate-proofing refers to ensuring that projections of climate change are considered in development decisions, so that the choices made are suited to the future climate. For example, in an area projected to experience more intense rainfall events, water managers would fit a drainage system with bigger pipes when replacing old ones, and agricultural extension services concerned about the possibility of increased drought would advise farmers to select crop varieties that are better suited to dry conditions.

However, adaptation to climate change is not restricted to such technological solutions as installing bigger pipes and planting drought-resistant crops. An adaptation strategy that is fully mainstreamed into development includes measures that address the underlying factors of vulnerability to climate change. For example, it may be helpful to provide a farmer who grows a particular crop with a more drought-resistant variety, but a more robust and comprehensive adaptation strategy would seek to improve food security through a set of coordinated measures that include agricultural extension, crop diversification, integrated pest management, and rainwater harvesting. In addition, a poor rural household is more likely to use these options if it has a literate family member, if it has access to investment capital through local financial institutions, if it can draw on relatively intact social networks, and if it can hold policymakers accountable.

Mainstreaming and Adaptation Finance

One of the obvious arguments in favour of mainstreaming is that it results in a more efficient use of financial and human resources than if adaptation were designed, implemented, and managed separately from ongoing development planning and decision-making. But from a climate-policy perspective, mainstreaming creates a dilemma. Financial flows for adaptation and those for development (for example, official development assistance, ODA) are managed separately. Developing countries have expressed the concern that, as a result of donors’ seeking to create synergies between adaptation and development, finance for adaptation will not be new and additional but in effect will be absorbed into ODA budgets of a fixed size. The concern is fuelled by the fact that the amount of money currently available for adaptation is only a fraction of the estimated investment needs in developing

countries. Moreover, only a few countries have achieved the target of providing ODA equal to 0.7 percent of gross national income. A second, related concern is that mainstreaming could divert any new and additional funds for adaptation into more general development activities, thus limiting the opportunity to evaluate, at least quantitatively, their benefits with respect to climate change specifically. Third, there is concern that donors’ use of ODA to pursue mainstreamed adaptation could impose conditionalities on what should be a country-driven process.

As a result, developing countries have argued against mainstreamed adaptation and have instead called for stand-alone adaptation activities. Table 1 summarises the pros and cons of stand-alone adaptation and mainstreamed adaptation in the context of adaptation funding.

Table 1. Stand-alone adaptation and mainstreamed adaptation compared.

| | Stand-alone adaptation | Mainstreamed adaptation |
|------|--|--|
| Pros | Easy to calculate new and additional funding needs Greater country ownership | More efficient in implementation More effective, more sustainable impact |
| Cons | High administrative costs when scaled up Synergies with development possibly missed | Difficult funding situation, possibly diverting ODA Seen as imposing conditionalities |

Post-Copenhagen Adaptation Finance: Beyond Good Intentions

One area for which the Copenhagen Accord does represent progress is finance. The accord recognises that substantially greater financial resources are needed to support mitigation and adaptation, and includes the goal of mobilising USD 100 billion dollars a year by 2020 to address the needs of developing countries. To this end it establishes a new fund: the Copenhagen Green Climate Fund. In addition, it mentions the provision of new and additional resources approaching USD 30 billion for the period 2010–2012, with balanced allocation between adaptation and mitigation.

However, the dilemma of mainstreamed vs. stand-alone adaptation was not addressed in Copenhagen. The non-binding status of the Copenhagen Accord, the uncertain origin of the money, and the history of pledges not honoured have led some negotiators to express doubts that the amount mentioned in the accord will indeed be made available and if so, that they will be new and additional resources.

With respect to the use of the Copenhagen Green Climate Fund and other funds for adaptation, it is necessary to address two questions:

- Should adaptation finance be used to support stand-alone activities, or should it contribute to adaptation mainstreaming into development?
- Should the provision of adaptation finance follow the polluter-pays principle, or is adaptation an additional focus of ODA?

Developed countries will need to clarify their position concerning these questions. As for the first question, there is no need to make an a priori decision for one or the other. Rather, the choice should be an outcome of a country-driven national planning process. National adaptation planning in developing countries needs to be supported under the UNFCCC, and developed countries must

provide follow-up support to implement adaptation activities identified in these national plans. As for the second question, it depends on the nature of the adaptation activities whether ODA or new and additional funding is most appropriate. ODA could be used to support activities that address the drivers of vulnerability and build response capacity, while new and additional funding could support activities aimed at managing climate risks and confronting the impacts of climate change.

Developed countries also need to clarify how traditional ODA, the Adaptation Fund, the Copenhagen Green Climate Fund, private finance, and various other bilateral and multilateral funds for adaptation can complement one another. In addition, they need to provide a credible approach to generating adequate, new and additional money. Levies on carbon market transactions and auctions of emission permits are two existing mechanisms for generating new and additional funds consistent with the polluter-pays principle. The use of such mechanisms can be expanded. In addition, overall ODA should reach 0.7 percent of gross national income, without including new and additional funds generated by the carbon market.

Finally, developed countries need to invest in building trust with the developing countries. Developing countries question the good faith of developed countries because of the failure of many of them to meet their Kyoto commitments. Developing countries also question the neutrality of processes or institutions through which agreements are implemented, money is disbursed, and disagreements are resolved. The lack of trust will hobble any future agreement on climate finance unless developed countries can gain trust by addressing developing countries’ concerns regarding equity, fairness, and the neutrality of institutions.

References

- Atteridge, A., 2009:** *Private Sector Finance and Climate Change Adaptation. Policy brief, Stockholm Environment Institute, Stockholm, Sweden, 4 pp.*
- Klein, R.J.T. and A. Möhner, 2009:** *Governance limits to effective global financial support for adaptation. In: Adapting to Climate Change: Thresholds, Values, Governance, W.N. Adger, I. Lorenzoni and K.L. O'Brien (eds), Cambridge University Press, Cambridge, UK, pp. 465–475.*
- Klein, R.J.T. and B. Müller, 2009:** *Adaptation Financing Instruments. Policy brief for the African Ministerial Conference ‘Financing for Development: Conference on Climate Change’, Kigali, Rwanda, 21–22 May 2009, 5 pp.*
- Persson, Å. and R.J.T. Klein, 2009:** *Mainstreaming adaptation to climate change into official development assistance: challenges to foreign policy integration. In: Climate Change and Foreign Policy: Case Studies from East to West, P. Harris (ed.), Routledge, London, UK, pp. 162–177.*
- Persson, Å., R.J.T. Klein, C. Kehler Siebert, A. Atteridge, B. Müller, J. Hoffmaister, M. Lazarus and T. Takama, 2009:** *Adaptation Finance under a Copenhagen Agreed Outcome. Stockholm Environment Institute, Stockholm, Sweden, viii+187 pp.*
- Atteridge, A., C. Kehler Siebert, R.J.T. Klein, C. Butler and P. Tella, 2009:** *Bilateral Finance Institutions and Climate Change: A Mapping of Climate Portfolios. SEI Working Paper, Stockholm Environment Institute, Stockholm, Sweden, x+33 pp.*

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Reducing GHG's in India: How can India and the EU collaborate?

India's 1.15 billion people though having low per capita emissions, are collectively a major source of greenhouse gas emissions (GHG), which means that if human-induced climate change is to have any hope of being limited to 2 degrees ways must be found to address the country's projected emissions growth.

This proposition is both morally and technically challenging and, coupled with the Indian government's immediate priority of tackling widespread poverty, means that the international community must play a major role in providing financial and technological resources to support India's domestic efforts. EU interests lie in the possibility to reduce global GHG emissions and reduce competitive distortions in industries that compete on the international market.

In annual GHG emissions India ranks fourth globally (behind the US, China, and the EU), and emissions are poised to rise dramatically as the country pursues a rapid expansion in energy supply.

However India's cumulative historical emissions remain low relative to most industrialised countries, and its per capita emissions are very low even relative to other major developing economies (just over a quarter of the world average). This dichotomy partly explains the difficulties faced in designing a global climate agreement that is both effective and fair. Nonetheless, ways must be found to catalyse deep emission reductions in India, both in the near- and longer-term.

This does not necessarily require that India bear the financial burden for mitigation. International financing mechanisms and other forms of partnership will need to play a key role in fostering the widespread transfer and deployment of suitable low-emissions technology.

The Task

More than 60% of India's total greenhouse gas emissions come from the energy sector (see Figure 1), and this share is projected to increase in the future as the country implements a massive expansion in power capacity. Major transformations in the energy sector are needed if emissions are to be reigned in, catalysing massive deployment in renewable energy, a broad and rapid uptake of energy efficiency opportunities, and a shift to higher efficiency coal plant to lessen the impacts of planned new fossil fuel-based capacity.

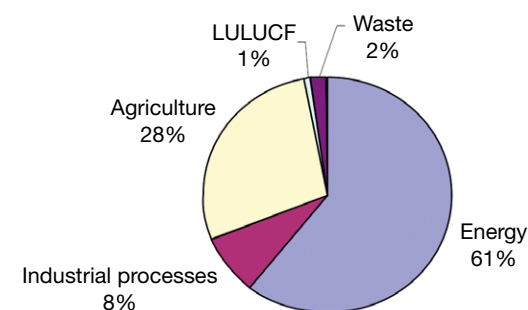


Figure 1. Indian greenhouse gas emissions by sector, 1994

India's non-commercial energy sector is also very large, some sources suggesting it provides 30-40% of the country's primary energy needs mainly through the burning of biomass and dung. This has major local health impacts – 400,000 deaths annually in India have been attributed to the inhalation of indoor smoke, mostly affecting women and children – and places stress on local ecosystems. The release of 'black carbon' (or soot) has also been linked with important regional climate-forcing effects. Reducing black carbon emissions by fostering a shift to cleaner cooking fuels and technologies could therefore potentially bring both development and climate benefits for India.

India's Domestic Policy Settings

In 2007 Prime Minister Dr. Manmohan Singh publicly committed to ensuring that "India's per capita emissions never exceed the per capita emissions of the industrialized countries". While an important statement of intent, without a legal basis either domestically or internationally to motivate compliance it is at this stage largely symbolic. India's strategy for tackling climate change while pursuing development is set out in its National Action Plan on

Climate Change (NAPCC), released in 2008. This plan includes a target to reduce the emissions intensity of India's economy (per unit of GDP) by 20% between 2007/08 and 2016/17. In terms of renewable energy, India already ranks fifth in the world in terms of installed wind power capacity, around 11.3 GW by the end of 2007. The final details of the "Jawaharlal Nehru National Solar Mission" have recently emerged – it establishes an ambitious near-term target for deployment of 20 GW of solar power by 2022, and aims to deploy 20 million solar lighting systems by 2022 in rural areas.

The National Mission on Enhanced Energy Efficiency, once finalised, will set out some key initiatives to improve efficiency of energy use. For large energy-intensive industries it will establish trading of energy saving certificates based on emission intensity targets, and will also introduce measures targeting small and medium enterprises which make up a substantial portion of the Indian economy. In the forestry sector, the National Mission for a Green India aims to achieve afforestation of 6 million hectares of degraded forest lands and the expansion of overall forest cover from 23 to 33% of India's territory by 2012.

International Financial Mechanisms

The ultimate success of GHG mitigation efforts will be significantly influenced not only by domestic policies but also by the effectiveness of international finance mechanisms and other forms of international partnership.

The Clean Development Mechanism (CDM) and the Global Environment Facility (GEF) have contributed some finance towards clean energy projects in India, though it is fair to say they have not delivered the scale of transformative change needed to shift India's

emissions trajectory. While CDM has supported both renewable energy and energy efficiency, it has not lived up to several key Indian objectives including support for technology transfer and for development (or non-climate related) co-benefits. The GEF supported clean energy projects, however, are burdened with a cumbersome administrative process, a donor-driven agenda and an inadequate scale of funds to deliver transformative change.

There is a clear need for re-shaping international finance delivery. While India supports a transition to program-based finance, it has been reluctant to support various sectoral crediting mechanism proposals floated by the EU, arguing that – like the CDM – these fail to sufficiently stimulate technology transfer. Perhaps a deeper concern within India is the perception that such a mechanism may lay the foundation for emission reduction obligations to be imposed on India at a later stage by the international community. Bilateral and multilateral finance institutions are also playing a role in delivering climate finance into India, usually in the form of debt or equity investments rather than as grant or revenue streams. Various proposals for new climate funds have emerged, under both the UNFCCC itself and through bilateral and multilateral channels, and these could yet play a prominent role in the delivery of international finance to India for mitigation.

Opportunities for EU-India Collaboration to Tackle Emissions

Through the EU's relationship with India, the parties should be able to work collaboratively to find areas that are mutually beneficial for both, implementing practical actions to reduce emissions that contribute to global warming and at the same time stimulate India's domestic agenda for economic development and poverty reduction. There is scope for collaboration both through the UNFCCC process and through complementary efforts outside the UNFCCC. Indeed, initiating a process of genuine, productive collaboration outside the UNFCCC framework could not only foster the sorts of transformative changes that are needed in India's growing economy but could also create a spirit of cooperation that spills over into UNFCCC negotiations. Successful collaboration will necessarily be focused in areas of common interest for both parties. For the EU this means catalysing major GHG emission reductions, introducing incentives for carbon reductions in India and reducing competitive distortions for industries that compete on the international market. India's key interests are in supporting economic development and enhancing technology transfer. Areas of collaboration must therefore lie at the intersection of these objectives.

Opportunities to tackle rising energy sector emissions not only have the potential to deliver major emission cuts, they also have strong local and regional environmental co-benefits which means they can be well aligned with India's development priorities. From an EU viewpoint, supporting the Indian energy savings and solar programs could be very interesting as these programs may lead to substantial GHG reductions and possibly create a more level playing field for energy intensive industries competing on the international market. Building to a large extent on policy priorities already articulated by India in the NAPCC, as well as on the very large non-commercial energy sector, three key opportunities have been identified for possible collaboration – tackling black carbon emissions arising from biomass burning, financially and technically supporting the roll-out

of solar energy capacity, and support for the establishment of Energy Service Companies (ESCOs) which play a vital role in helping small to medium enterprises seek out and implement energy efficiency opportunities.

Tackling Black Carbon Emissions Brings Climate, Health and Development Benefits

Implementing a clean-cooking stoves program to reduce both the health and climate impacts of black carbon (“soot”) emissions from India's very large non-commercial energy sector, and to provide an understanding of the technological, economic and policy conditions needed to dramatically scale up the deployment of cleaner stoves.

Solar Energy

The EU could underwrite a concrete package for supporting solar energy development and deployment, consisting of financial resources raised and delivered through European Development Banks as well as a joint research program with India to drive down technology costs and foster local manufacture.

Energy Efficiency in Small and Medium Enterprises

Supporting implementation of the National Mission on Enhanced Energy Efficiency, in particular by creating credit lines that can be used for lending to ESCOs by Indian financial institutions. By establishing EU-India research teams to work on identifying and tailoring high efficiency technologies for deployment in the small and medium-sized industry sector.

There is clearly huge potential for collaboration between the EU and India in the coming years. However, the single most important factor to ensure this collaboration will be the political will on both sides, to mend the current differences and look at the bigger picture of combating climate change while defining a new, sustainable path of development.

References

Atteridge, A., G.N. Axberg, N. Goel, A. Kumar, M. Lazarus, M. Ostwald, C. Polycarp, P. Tollefsen, A. Torvanger, P. Upadhyaya and L. Zetterberg, *Reducing Greenhouse Gas Emissions in India: Financial Mechanisms and Opportunities for EU-India Collaboration. Report for the Swedish Ministry of Environment, Stockholm Environment Institute and Clipore, October 2009.*

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Progress and Challenges for Forests in Climate Policy – seeing redd

The Copenhagen climate negotiations have been called both a complete failure and a praiseworthy step towards climate action. Although our overall assessment of the Accord will continue to mature in the months after Copenhagen, there was clear progress in one area – Reducing Emissions from Deforestation and Forest Degradation, or REDD/REDD+ for short.

The Copenhagen Accord specifically mentions the “crucial role” of REDD and the need to provide positive incentives for these activities. Negotiators agreed on the overall objectives of REDD, which now include activities to reduce emissions from deforestation and degradation, conserve and enhance forest carbon stocks, and sustainably manage forests. It also includes guidance on methods for monitoring and measurement, and on safeguards for indigenous rights and biodiversity. Further, the United States, United Kingdom, France, Australia, Japan and Norway demonstrated a commitment to move REDD forward in the immediate term, pledging US\$3.5 billion for REDD over the next 3 years. Although progress was made, there are still a number of issues that were not resolved and a number of avenues where research and analysis is needed to realize effective, efficient and equitable REDD.

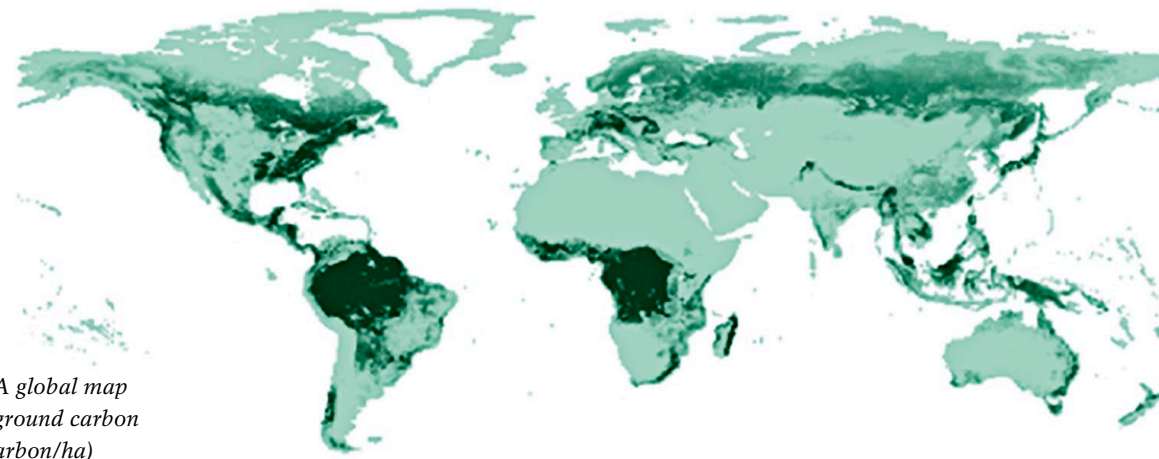


Figure 1. A global map of above ground carbon (tons of carbon/ha)

The changing vocabulary associated with controlling emissions from forests reflects the focus of policy discussions over time. These discussions initially concentrated on avoided deforestation (AD or RED for short), but the central importance of forest degradation was soon recognized and the issue became known as REDD (Reduced Emissions from Deforestation and Degradation). Whereas REDD focused mostly on the direct prevention of the loss of primary forests, it was then broadly recognized that reducing emissions requires not only the deterrence of primary forest loss but also calls for other positive changes to conserve and sustainably manage forests. Denoting the broader range of activities directed towards reducing forest loss and degradation and improving forest conservation and sustainable management, REDD+ was introduced to the vocabulary in COP-14 in Poznan in 2008. For simplicity, we use the label REDD, keeping in mind that the current policy debate generally refers to REDD+.

In order for REDD to lead to long-term, sustainable emissions reductions, strategies must include policy reform as well as on-the-ground activities. Deforestation in developing countries is frequently driven by agriculture, logging, and road expansion. Rising prices for soy, palm oil, and beef make it increasingly profitable for landowners in developing countries to clear forests and convert the land to agriculture. Expansion of road infrastructure can provide access for loggers, farmers and homesteaders to the previously inaccessible forest interior. REDD strategies will include some project-level activities, but these will be folded into a broader program. REDD will involve landscape-wide planning, either at the national or sub-national level and must address drivers of deforestation and degradation, land tenure issues, and forest governance issues. In this manner, REDD is distinctly different from the Clean Development Mechanism, which focuses mainly on site-level projects.

Challenges for Policy Design

Although the negotiating body has made a clear indication that REDD will be implemented at a broad landscape level, there is no decision about whether sub-national REDD programs would be recognized in addition to national programs. In some large forested countries, a sub-national REDD program could, arguably, have greater impact than a national program in a smaller country. Take Brazil and Indonesia, two of the most important REDD countries due to their forest size and rate of deforestation. Amazonas State in Brazil and Berau Regency in Indonesia have both led in developing

landscape-wide REDD programs, but would be excluded from a REDD program that only allowed for national participation even though the vast majority of their territories are forested and they are 19 times and 2.8 times, respectively, the size of Panama, a country that is part of the United Nations REDD and World Bank Forest Carbon Partnership Facility programs.

One of the concerns with REDD, especially with sub-national programs, is “leakage.” Leakage results when implementing REDD in one location displaces activities and encourages deforestation and emissions somewhere else. For instance, the equipment and labor employed for deforestation might simply shift to a nearby area. REDD activities could also create market leakage by forcing up the market prices of timber, livestock, and crops, making deforestation somewhere else yet more profitable. Leakage diminishes the amount of emissions actually reduced, effectively raising the cost of achieving a certain level of actual emission reductions.

The Role of Funds and Market-Based Sources

REDD programs that incorporate climate and carbon considerations into land-use planning may help avoid and account for displaced emissions in the landscape. However, unless all global forests are included in a unified REDD policy, leakage cannot be completely eliminated, and questions remain about how best to prevent and account for leakage in the absence of a global system. A better understanding is needed of the effects of REDD on timber and agricultural production, and the potential for improved harvest and agricultural practices to ameliorate the displacing effects that REDD could have. The idea that REDD will be supported by results-based payments has gained broad acceptance and is a key defining aspect of REDD that differentiates it from other types of support. However, the role of funds and alternatively market-based sources in providing this support is still in debate. Market-based support could come from carbon credits that could be traded on a market and used by regulated entities to meet their compliance obligations. The REDD activities that generate marketable credits would have to be subject to rigorous measuring, monitoring, and verification to ensure that the emissions reductions are robust.

Market approaches may be better able to leverage private funds and potentially channel significantly larger sums to support REDD. Two concerns about markets are that REDD credits might not be as robust as emissions reductions made domestically and that REDD credits could cause significant market volatility.

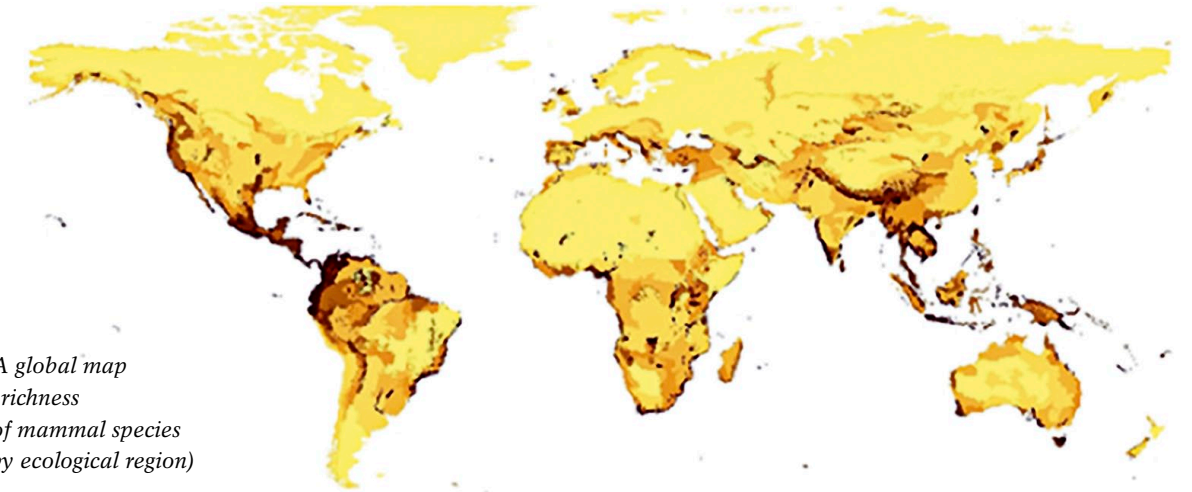


Figure 2. A global map of species richness (number of mammal species per km², by ecological region)

In contrast, approaches that could be used by funds to support activities range from capacity building to verification, and could include pay for performance mechanisms that were linked to policy implementation rather than carbon savings. Funds provide significant flexibility to support the spectrum of activities necessary for countries to develop REDD programs. As this debate moves forward, there is a role for analysis to inform the tradeoffs between the use of funds and markets, the readiness of different countries to participate in different mechanisms, and how to design credits that are environmentally robust.

Realizing Co-Benefits of REDD

In addition to sequestering and storing carbon in the form of biomass, forests provide a range of other benefits. Forests are an important source of livelihoods to many people around the world, and forests are also central to the preservation of biodiversity and other ecosystem benefits, such as water or clean air. Undoubtedly, one of the chief reasons for the broad support for REDD is its potential to promote biodiversity and human well-being in addition to generating potentially a large reduction of global carbon emissions. At first, the potential for ancillary benefits from REDD would seem to be great; carbon emissions from deforestation are particularly high in regions where much of the global biodiversity is located and poverty is serious. Co-benefits are created so long as REDD activities, at some level, contribute towards biodiversity conservation and local income. However, where, what kind, and how much co-benefits will be generated will depend on the implementation of REDD.

As of now, we have a poor understanding of how best to design REDD to deliver multiple benefits to the local, national, and international community. While it is apparent that REDD will provide some co-benefits, it is yet unclear to what extent, and at what cost, REDD may help resolve the broader problems with global biodiversity conservation and poverty alleviation.

A recent assessment by the Center for International Forestry Research (CIFOR) of over 100 actual or proposed REDD projects concludes that they tend to target areas with high rates of deforestation and carbon emissions from deforestation, reflecting the primary goal of REDD activities to reduce emissions. However, the projects had only a limited focus on the co-benefits of carbon. For example, dry forests with high levels of biodiversity and poverty tend to be carbon poor and, thus, unlikely to receive considerable

REDD spending focused on carbon. Our current research aims to evaluate the potential of REDD to generate co-benefits, especially in biodiversity conservation. Rather than assessing actual or planned REDD projects, which tend to concentrate on geographical areas particularly suitable for carbon offsets, we examine options for reduced forest carbon emissions and species conservation more broadly. To conduct these analyses, we are constructing high resolution spatial data on potential REDD activities, their costs, and potential multiple benefits. Figure 1 shows the geographical patterns of the amount of above-ground carbon. Figure 2 maps the richness of mammal species around the world.

Our initial findings suggest that the REDD activities targeted solely towards reducing carbon emissions generate noticeably less co-benefits than would REDD activities designed to endorse multiple goals. For example, though the figures above show some similarities in the geographical distribution of carbon and biodiversity, they also indicate that concentrating REDD activities on the areas richest in carbon does not necessarily guarantee the inclusion of most species rich areas. The question then becomes how much do “carbon-only” REDD activities contribute to the conservation of biodiversity, and how costly and otherwise feasible would it be to target REDD towards multiple goals.

Additional Reading:

Wertz-Kanounnikoff, Sheila, and Meta Kongphan-Apirak. 2009. Reducing emissions from deforestation and forest degradation (REDD): a preliminary survey of emerging demonstration and readiness activities. Working paper. Bogor, Indonesia: Center for International Forestry Research.

Deveny, Adrian et al. 2009. Forest Carbon Index: The Geography of Forests in Climate Solutions. Resources for the Future report, 80pp.

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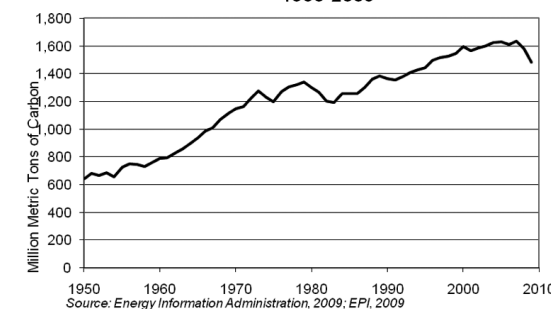
U.S. Internal Dynamics: Convergence on GHG Reductions, but when?

As most observers are already acutely aware, efforts to pass climate legislation through the US Senate remain stalled behind health care reform and are still hampered by concerns among influential Democrats about potential local effects of the proposed policies. Nevertheless, important developments continue both within the Congress and via alternative pathways.

Reduction of US CO₂ Emissions Begins

U.S. CO₂ emissions declined from 2007 to 2008 by 2.8%, according to the U.S. Energy Information Administration (EIA), a result both of high energy prices in early 2008 and the financial crisis in late 2008. The EIA currently projects an additional 5.6% reduction for 2009. According to December 2009 estimates by the Energy Information Administration, emissions are expected to remain under 2008 levels until 2019, after which they are expected to rise slightly. These projections are made based on current law and

U.S. Energy-Related Carbon Dioxide Emissions,
1950-2009



do not incorporate the effects of additional legislation at the state, regional, or national level.

It is especially notable that current CO₂ reductions are not solely a result of reduced consumption. The EIA notes that the emissions reductions also reflect important changes in the energy producing sector that include a substantial shift from coal to natural gas and the further development of renewables. This shift is driven in part by state and regional regulations and initiatives beginning to produce effects and by market actors' anticipation of more stringent regulation by the financial and energy sectors.

State and Regional Trends

Regulatory efforts at the state and regional level continue to move forward, largely independent of efforts to pass climate legislation through Congress. To date, some 33 of 50 states have adopted Renewable Portfolio Standards, 37 have adopted or are developing climate action plans, and 35 have adopted energy efficiency standards for new construction. The three regional initiatives for reducing emissions currently cover 36 states. The Northeast Regional Greenhouse Gas Initiative (RGGI) is already auctioning permits and California announced in November its plans to move forward – a prelude to emissions trading among Western Climate Initiative states. These developments are largely independent of those at the national level, yet also exert an important influence on the prospects for federal climate legislation. They help reduce opposition in swing districts, expand the base of political support, provide concrete experience of how particular policy innovations can work, offer concrete evidence to counter doomsday scenarios, and help build momentum.

Such trends at the state and regional level provide evidence of the approaching inevitability of significant policy changes in the US. The 2/3rd proportion of states that appears with increasing frequency also represents an important tipping point – not least in terms of providing the critical mass necessary for the success of major national level policy changes. While the important details are

available elsewhere (<http://www.wri.org>; http://www.eia.doe.gov/overview_hd.html), these trends illustrate a convergence of developments critical to capping U.S. greenhouse emissions.

EPA: Administrative Regulation on Schedule

On a parallel track, the EPA is rapidly preparing to regulate CO₂ following a 2007 Supreme Court decision ruling that the EPA must take steps to regulate CO₂ as a pollutant under the Clean Air Act. The set of criteria determining which GHG sources will be regulated, (referred to as the “tailoring rule”) is a key element of the proposed regulations. In September 2009, the EPA issued a draft rule containing thresholds that would regulate nearly 70% percent of GHG emission sources, including an estimated 14,000 large industrial emitters, while exempting emitters under 25000 tons per year. This would avoid the potentially nightmarish problems of regulating all CO₂ sources. The comment period for the proposed regulations ended in December and EPA officials project that the agency regulation of CO₂ emissions could be in place early in 2010.

The EPA route represents the Obama Administration’s trump card in that the required procedures are already underway and do not require Congressional approval. However, even if the EPA formalizes its proposed GHG regulations, they are likely to be tied up in the near term by court challenges. The imminent threat of EPA regulation has prompted an increasing number of business interests to press for Congressional action. Because it is generally viewed as a rather blunt instrument, many prefer comprehensive federal climate legislation, boosting the incentive for Congressional action. The EPA not only offers a fall-back in the event the legislative process breaks down; it provides important leverage to bring to the table Senators who want their concerns taken into account. The overall impact at this point in time can be summarized as increasing certainty of implementing U.S. GHG emissions limits in the near future, but with the exact time frame and mode of implementation remaining uncertain.

The Congressional Politics of Climate Change

Even while Senate Climate Legislation remains stuck in traffic waiting its turn to be considered by the full Senate, many challenges remain in the path to the required 60 votes. Recent polling suggests that concern about anthropogenic climate change has weakened among Americans, but that the greater part of that weakening has occurred among respondents identifying themselves as Republican. Among Democrats and Independents, the economy and health care remain the top priority concerns. Even so, a majority of Americans supports action on climate change, with crucial differences at the regional and state levels.

Assessments as of early 2010 place the solid support in the Senate at 41 votes – all Democrats. The list of likely or certain no votes include most Republicans – 30, and only 2 Democrats, both of whom are conservatives Democrats from states with economies tied to fossil fuels. Meanwhile, the number of “fence sitter” Democrats has grown to 17, and as many as 10 Republicans who could consider supporting a climate bill under the right conditions. The most immediate promise of the fence sitter list is possible bipartisanship – a goal that during Obama’s first year in office has proven itself to be largely wishful thinking. Herein lies one of the more important factors that will influence the direction undecided Senators might go.

| Partisan Politics of Cap and Trade | | |
|--|---------------------------------------|--|
| Senate Legislation | Democrats (60) | Republicans (40) |
| Support for Cap & Trade (Kerry-Boxer + Graham & Leiberman) | Progressive/Mainstream Democrats (41) | |
| Fence Sitters (conditional support) | Moderate/Conservative Democrats (17) | Moderate Republicans (10) |
| Opposed and very probably opposed | Conservative Democrats (2) | Mainstream/Conservative Republicans (30) |

For Democrats, there is considerable pressure to support Kerry-Boxer from the Obama Administration, from the Democratic Party and from environmental organizations and other NGOs that tend to support Democratic candidates. Many of the undecided Democrats have long expressed reluctance toward cap and trade out of concern for its effects on constituents in states with economically hard-hit energy intensive industries and those dependent on coal production or coal-based electricity generation. Their crucial votes will be won through compromise, with the most problematic compromises from an international perspective entailing implementation delays, weakening of near-term reductions targets, and dedication of auction revenues that might otherwise be channeled to provide development aid. Some of these likely compromises are also generating serious strain among Democrats.

Fence sitting Republicans face a different set of challenges. The national Republican Party organization and its grassroots conservative base are unequivocally opposed to a climate bill. The reasons include denial of climate change as a problem, ideological opposition to government intervention or to signing away sovereignty in international agreements, and a political strategy that entails fighting Obama and the Democrats at every turn. Senator Lindsay Graham has been censured by his own home state Republican Party for his collaboration with Democrats on climate change. The names and images of the eight House Democrats who supported the Waxman-Markey legislation were put on a Wanted Poster that was distributed in Republican circles following the House vote. It is unclear how many of the 10 undecided Senate Republicans will be ultimately willing to buck their party establishment and join with the Democrats, but it will not be without some difficult choices for the Democratic leadership. Likely tradeoffs include support for expanded nuclear power, increased offshore exploration for oil, and the investment in technologies to boost the viability of coal that coal-state Democrats are seeking.

Even as the Republicans seek to maintain party unity to defeat climate legislation, Democratic supporters of ambitious climate legislation are struggling to hold together a coalition that includes both climate realists and political pragmatists. The realists include many environmental NGOs that find themselves unable to support the legislation now moving through Congress because they consider it too weak. They take the position that time is running out and Congress has one opportunity to get it right. They also enjoy important high-stature support in people such as James Hansen, who fears that weak climate legislation will lock in failure. On the other side of the Democrats’ internal divide are political pragmatists who argue that legislation on the scale required by climate change has never passed the Congress in a single step. Here, the Obama Administration, Al Gore, and numerous moderate environmental organizations argue that only after the basic structure is first set in place first can the necessary targets be set. Their strategy is reflected in modest near term reductions targets followed by a much steeper drop after 2020.



The combination of the U.S. history of major legislative reforms and the reservations expressed by fence sitting Senators suggest the pragmatist strategy is necessary to pass legislation – even as the climate realists are arguably correct in their assessment of the risks. Here, Obama’s critical challenge will be to hold together the coalition of groups that support aggressive action to reduce greenhouse emissions.

On the Republican side, it is clear that hopes for a resurgence in the 2010 elections are being built on an agenda of opposition to Obama on his core policy priorities, including climate change. Thus far, only one of the major Republican candidates for U.S. Senate has supported climate action – Florida Governor Charlie Crist – and he is now trying to avoid talking about climate change. Once expected to easily win the Republican nomination for the fall 2010 elections, Crist is now being challenged from the right. These developments strongly suggest that opposition to climate change legislation will be a centerpiece of the Republican strategy for the November 2010 elections.

China Factor

The ‘China card’ remains crucial in the climate legislation process. Two aspects on China are important for the Obama Administration to persuade the Senate: China’s ambitious targets for slowing its carbon emission growth, and China’s progressive and increasingly leading position on the clean technology market. While the Administration is making little headway on the former issue, it is re-

sponding to domestic concerns about trade competitiveness. In the US, China’s drive to rein in its carbon emission has promoted some people to switch from worrying about the ‘China threat’ to the global climate to worrying about the threat of China soon seizing the lead in clean energy technology. Many people cite this new threat in order to spur U.S. climate efforts as well as bilateral cooperation. The tactic of the Obama Administration has been to counter these concerns with the warning that the U.S. could lose out on jobs and trade if it does not invest in a low-carbon future. Speaking recently at MIT, President Obama warned of the gloomy prospect faced by federal officials and business leaders alike as they confront the twin challenges of combating climate change and trying to keep the U.S. competitive in the multitrillion-dollar race to develop and sell new energy systems. U.S. Energy Secretary Steve Chu offered warnings along similar lines, noting that China spends almost three times as much as the U.S. on clean technology.

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Linking ETS With Developing Countries: The Missing Link to a global carbon market

There is a growing concern that the UNFCCC process, with the best of its intentions might not be able to come up with a strong post-2012 climate change regime in time. It is of utmost importance that signals be provided to policymakers to reflect the ground reality and the preparedness or lack of it in different countries to implement actions to tackle climate change¹.

Trading Schemes are being discussed in developing countries as a means to mitigate climate change. Linking such schemes with existing or emerging ETS in industrialised countries offers an additional vehicle for bi- and multilateral cooperation, complementing the UN-driven climate negotiation process. Not only can such cooperation potentially increase the mutual good will and align domestic interests, thereby supporting the UN negotiations, but it could also promote the eventual convergence of domestic policies and administrative capacities in participating jurisdictions – in itself a condition for more ambitious global cooperation. It is of importance, therefore, to explore whether such schemes can be linked at a global scale to provide cost effectiveness and improve implementation.

Carbon Market: The Progress Made So Far

The entry in force of the Kyoto Protocol created the foundation for what we now know as carbon markets (Ellis and Tirpak, 2006). The creation of Emission Trading Schemes (ETS) in different Annex

I countries and development of project based mechanisms such as the Clean Development Mechanism (CDM) and Joint Implementation (JI) have been the building blocks that laid the building of carbon market in different parts of the world. By the end of 2008 the carbon market had reached a total value transacted of about US\$126 billion, double its 2007 value. Almost three fourths of this overall value is accounted for by transactions of allowances and derivatives under the EU Emissions Trading Scheme (EU ETS) (Capoor and Ambrosi, 2009). The secondary market for Certified Emission Reductions (CERs) was the second largest segment of the carbon market at US\$26 billion. The primary CDM market has reduced in size by around 30% and that is of concern as it means that there has been a reduction in new credits arising from developing countries. CDM's inability to reach out to all the developing countries has been of a concern and a prominent discussion point in the CDM Executive Board (EB) meetings as well. Further, the experience on carbon markets in developing countries has made it clear that project based mechanisms though useful will not be able to tap the inherent potential and provide the scale of reduction needed. This has led to inclusion of the Programmatic approach or Programme of activities (PoA) to be followed in the CDM Executive Board (EB). Only time will tell whether it will be successful enough to meet the necessary reductions or not.

Within this global market, the EU-ETS has become a common reference point, primarily because of its large size and coverage. Some ETS have already established links with the CDM, JI and other voluntary mechanisms (Ellis and Tirpak, 2006; Tuerk et al., 2009a). Most of these links are unilateral in nature and are mostly between an ETS and a project based mechanism. EU has also set up a target to link with Organization for Economic Cooperation and Development (OECD) countries by 2015 and select developing countries by 2020. If a global carbon market is to emerge on the basis of such linkages, it would need a more detailed platform where dif-

ferent ETS and project based mechanisms can interact with each other to achieve stringent and cost effective emission reductions.

Interactive Carbon Markets: Current Situation

In practice, we are yet to witness a fully functional bilateral linking of two or more ETS. It is expected, though, that if a combined EU-US market is established, then it would serve as the backbone of a global carbon market, as it will originate the largest demand for carbon credits (Sterk and Kruger 2009; Tuerk et al., 2009b). Studies have been undertaken that highlight opportunities for and barriers to linking of carbon markets (Ellis and Tirpak, 2006; Mehling and Haites, 2009; Tuerk et al., 2009a; Tuerk et al., 2009b; Flachsland et al., 2009). However, these studies focus on ETS in developed countries only. The role of developing countries is limited to that of suppliers of Certified Emission Reductions (CERs) through the CDM, with CERs from project activities serving as a form of common currency that can be traded across ETS. Recent announcements from several developing countries, however, herald the possibility that these will move beyond serving as mere hosts to project activities and instead establish domestic emission trading schemes. However, the possibility of ETS arising in developing countries and the subsequent issue of linking these with other ETS is a subject that still needs much study.

The linkage can make the market much more complex. Yet a linkage may very well enhance the dynamic efficiency of climate policy (Flachsland et al., 2009), which is needed to ensure a collective effective response to the problem of climate change. The schemes in developing countries, at least initially, are likely to be smaller in size and less ambitious in scope. Linking them with a bigger scheme such as the EU ETS or the Regional Greenhouse Gas Initiative (RGGI) can lead to dissolution ceding control of smaller ETS to the effect that their price and provisions such as price caps, allowable “offsets” etc. will be influenced by the dominant schemes in the global carbon market. For instance, the EU ETS could well become the “price maker” and the systems linking with it could then become “price takers” (Ellis and Tirpak, 2006).

It is important that linking is real time in nature. The biggest benefit of linking will be that a common carbon price discovery will be easier to achieve. This will in a way help to address the problem of price of carbon. Linking can increase the diversity of abatement

options (Mehling and Haites, 2009) by providing both the buyers and suppliers with the best price and more than one avenue to trade carbon. It can also lead to lower compliance costs. Also the market participants get a long term policy direction and can plan their investments taking into account the conditions of withdrawal.

Linking can make the mitigation options cost effective. Active involvement of developing countries in the same though, remains to be studied. It is therefore important to explore the possibility of linking the existing mechanisms in a bi-lateral manner wherein developing countries can progress from a project based mechanism to a much broader engagement.

¹ It is not necessary that carbon is being looked upon as the commodity to be traded. In some cases the intensity based or energy efficiency targets are being looked upon to establish a Trading Scheme.

References

- Capoor, K., Ambrosi, P. 2009, 'State and trends of Carbon Market 2009', World Bank Washington D.C.
- Ellis, J., Tirpak, D., 2006, *Linking GHG Emission Trading Systems and Markets*, OECD/IEA, Paris.
- Flachsland, C., Marschinski, R., Edenhofer, O., 2009, 'To link or not to link: Benefits and disadvantages of linking cap-and-trade systems', *Climate Policy* 9(4) Special Issue Linking GHG Trading Systems, 358-372.
- Mehling, M., Haites, E., 2009, 'Mechanisms for linking emission trading scheme', *Climate Policy* 9, 169-184.
- Sterk, W., Kruger, J., 2009, 'Establishing a transatlantic carbon market', *Climate Policy* 9(4) Special Issue Linking GHG Trading Systems, 389-401.
- Tuerk, A., Sterk, W., Haites, E., Mehling, M., Flachsland, C., Kimura, H., Betz, R., Jotzo, F., 2009a, *Linking Emission Trading Schemes: Synthesis Report*, Climate Strategies.
- Tuerk, A., Mehling, M., Flachsland, C., Sterk, W., 2009b, 'Linking carbon markets: concepts, case studies and pathways', *Climate Policy* 9(4) Special Issue Linking GHG Trading Systems, 341 – 357.

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Sharing the Costs of Climate Change: a Matter of willingness to pay

A common description of justice is to share something equally unless there are good reasons to the contrary. This claim is widely accepted, although the good reasons become controversial as they are specified in greater detail. What good reasons would there be for departing from equal burden-sharing among countries in climate mitigation and adaptation?

Already in 1992 the UNFCCC adopted the view that equity (which here refers to distributive justice); historic responsibility (countries emitting more historically should also mitigate more); and capabilities (countries with for example higher income should mitigate more) should be good reasons for departing from an equal burden-sharing¹. The UNFCCC is now ratified by 194 countries representing almost universal membership.

However, the almost two decades that now have passed since the Convention entered into force have witnessed countries sincerely pledging to reduce their emissions to meet targets, but also, the same countries failing to agree on a burden-sharing for binding

quantifiable emissions reductions, despite the perennial enthusiasm and optimism seen from local hosts of the COP meetings.

Copenhagen was yet another COP meeting closing without binding targets. The outcome was instead the Copenhagen Accord – a political agreement instead of a binding treaty – calling for countries' willingness to mitigate by reporting their emissions reductions until 2020. So far, 55 countries covering about 80% of current emissions have submitted their voluntary willingness to reduce emissions. Expressed in 1990s emissions level the EU pledged for a 20% reduction by 2020, the US 4%, whereas China promised a reduction in emissions intensity by 40 – 45% 2020 (compared to 2005).

WTP Increases if Warming is Limited

The outcome of future climate negotiations will ultimately depend on how politically acceptable they are to their domestic constituencies. One important key issue is therefore how strongly people in various countries feel about bearing the expected costs for avoiding climate change; another is the perceived fairness in distributing the economic burden among countries. Despite national-level opinion polls, little is known about how the willingness to pay (WTP) to avoid the consequences of climate change differs across countries. This WTP can be taken as a barometer of the strength of political support for costly mitigation actions.

In a joint multinational effort, co-funded by Clipore, a team of

Chinese, Swedish and US researchers address this issue by asking citizens in these three countries for their WTP to avoid the consequences of global temperature changes as reported by the IPCC. More precisely, we asked ordinary citizens for their WTP if temperature increases could be held to 1°C, 1.5°C, and 2°C (compared to today) until year 2050. An identical survey was administrated and used in all three countries.

Preliminary results for Sweden and the US – China is still underway – show that a large majority of the US and Swedish respondents believe that the mean temperature has increased globally over the last 100 years and also that human activity is partly or fully responsible. When it comes to the inter-country differences, Americans generally seem to believe less in climate change and human responsibility for the changes compared to the Swedes. Americans are also more pessimistic: a larger share, 17% compared to 6% in Sweden, of the American respondents believe that climate change is inevitable, and that we can do nothing to stop it.

To avoid the consequences of climate change that would arise from a 2°C temperature increase, 92% of the Swedish respondents and 76% of the US respondents are willing to pay some amount of money – but Swedes are willing to pay more, averaging \$23/month versus \$17/month for the US average. Respondents in both countries were willing to pay even more if temperature increases could be limited to 1.5°C (\$28/month in the US and \$44/month in Sweden) and more still to hold the increase at 1°C (\$36/month in the US and \$61/month in Sweden).

Capability Measure Most Preferred

Preferences for four burden-sharing rules were also examined: distributing the costs among countries by measures of capability (income level), equity (current emissions), responsibility (historic emissions since 1990) and a strict egalitarian measure (equal emissions per capita). Interestingly, the preliminary results show that the capability- and equity-based measures emerge as the most preferred among Swedes and Americans. The most preferred is the current emissions rule, also being the least costly rule for the US and the second least costly rule for Sweden.

In another Clipore study, nearly 500 of the more than 30,000 participants at the Copenhagen COP 15 meeting were asked to indicate their degree of support for eight burden sharing rules for mitigation². The preliminary results of the study confirms that a capability measure (here capacity to pay) again is the most preferred by both the average participant and for negotiators (extracting this group from the total data). Negotiators also put greater weight on responsibility (historic emissions since 1990) being the second preferred rule among negotiators. The group of all participants favors a distributive equity rule (equal emissions per capita) in the second place. These averages will be broken down according to primary roles at the COP meeting, party affiliation and geographical regions.

The COP participants were also asked to indicate their degree of support for five burden-sharing rules for contributing to an adaptation fund. The study shows that a capability measure (capacity to pay) is the most preferred in the group of all participants. The

average negotiator favored a capability measure (capacity to pay) with a responsibility measure (emissions since 1990) clearly on second place. From a moral philosophical viewpoint there is an important ethical asymmetry between mitigation and adaptation. The latter involves consequences from historic and future emissions while the former only involves consequences from future emissions. A responsibility principle will therefore *ceteris paribus*, have a greater leverage in adaptation than mitigation. On the other hand, responsibility under ignorance, and therefore lack of intention (here defined as pre 1990), is morally a relevant difference. It is perhaps therefore not surprising to find that responsibility under ignorance (emissions since preindustrial time) is a less (actually the least) preferred principle at the same time as responsibility (emissions since 1990) is the second most preferred among negotiators.

Looking forward to future negotiations, it is of interest to note that the least preferred rule among all participants in Copenhagen was the “willingness to contribute” which is clearly the one that is closest to the actual content of the Copenhagen Accord (in which each country simply selects its own target). The rules that are preferred all emphasize other aspects of equity, responsibility or capabilities such as “historical emissions since 1990”, “capacity to pay” or “obligation to converge to equal emissions per capita”. Clearly there is a tension between what is perceived as justice and what has so far been attained in negotiations.

The results presented in this article are preliminary, and we therefore ask the reader not to quote any figures until the respective working papers are published. For more information regarding the studies please contact the authors.

¹ United Nations Framework Convention on Climate Change, adopted on May 9, 1992, Art. 3, 1771 UNTS 164.

² The surveys were distributed face-to-face at the conference venue during the first week one and during the high-level segment in week two. A total of 498 completed surveys were collected.

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A Global Climate Regime: Rethinking future technology

The urgency for a globally concerted effort for mitigating and adapting to climate change is widely recognised. Yet, the negotiation process seems to encounter more differing opinions than mutually agreeable proposals.

At the core of these disagreements is the divide that persists between the developed North and the developing and underdeveloped South (Shrivastava and Goel 2010). Arguably, an ideal global climate regime would be the one that significantly works towards bridging the North-South divide. This divide is, perhaps, most explicit in the context of technology related issues. Considering that current approach to climate strategy is by and large techno-centric, the significance of issues concerning access to technology, including difference in technological capabilities, high upfront costs and lack of finance, IPR related barriers, inadequate research, development and demonstration, flow of technologies and resources from developed to developing countries and so on, is highlighted by many studies (Tamura 2006, Shrivastava 2008). The submissions made by developing countries to the UNFCCC on technology related issues also highlight the same.

Evidently, a successful response to climate change requires an immediate large scale technological transition. A new technological society indeed needs to emerge soon. Given that technological transformations as well as the technology-society relationships are fairly complex processes and evolve over a long period of time, one has to be extremely careful in conceptualizing a technological fix to the problem of climate change. From this vantage point, there are four key elements with which climate policy needs innovative engagement: (a) difference in access to technology; (b) uncertainty with regard to future technologies; (c) the dynamics of technology-society relationship and its significance for technology development agenda, and (d) context specificities of a technology strategy.

(a) Difference in Access to Technology

One key component of the North-South divide is the difference in the levels of technological capabilities among countries. Particularly, limited access to clean and advanced technologies is a major constraint that the developing countries face in agreeing to take up a much bigger role in global efforts to address climate change. This is reflected in the assertion repeatedly made by developing country Parties in the negotiations that it is the responsibility of developed countries to provide technology and financial assistance to developing countries, which is also recognised, even though in a convoluted manner, in the Convention.

The present climate regime, however, by focusing only on commercial technology transfer from developed to developing countries, seems to have taken the issue of technological capability rather simplistically. It does not seem to recognise (at least it does not do so explicitly) that (a) the technological requirements and the path of technological change in different countries vary according to their existing levels of economic and technological development; and (b) many developing and underdeveloped countries do not have the necessary capabilities to identify their technological needs, suitable for the specific socio-economic context (Cohen 2004; Kameyama 2004; Salomon and Labeau 1993). Consequently, the fact that the agenda for technology development has to vary for different countries has also been marginalised.

Even though there is an emerging consensus on the need for regional innovation centres and domestic technological capability building via support for technology needs assessment for countries, there is no clear pathway outlined as to how and what precise functions these innovation centres will perform. Particularly, there is considerable ambiguity with respect to how the differences in national contexts will be addressed at regional level.

(b) Uncertainty with Regard to Future Technologies

There are a number of studies outlining possible low-carbon pathways (TERI.2008, IEA 2008). These studies suggest that it is possible to meet the emission reduction targets, provided adequate

financial resources are available. However, these studies are based on a number of assumptions with respect to availability of new technologies for commercial deployment. For instance, IEA (2008) assumes commercial availability of carbon capture and storage (CCS) technology in near future, which is seen with suspicion by many scholars and policy makers, particularly in developing countries. Moreover, such uncertainties are also believed to be at the back of why developed countries are hesitant in taking up deeper emission reduction commitments.¹ Therefore, a more realistic policy strategy would be the one that builds upon existing technologies. Subsequently, a climate strategy has to have a technological strategy to fully utilize the existing technological potential, combined with a non-technological strategy to fill in for the gap between technologically feasible emission reductions and required emission reductions to limit the rise in global mean temperatures to 2°C above the pre-industrial level.

(c) Technology – Society Relationships and Agenda for Technology Development

In a technological society, the available set of technologies has a substantial bearing upon the way society approaches a problem. A number of scholars have pointed out that there exists an interrelationship between a variety of technological trajectories and the prevailing social and political institutions governing the behaviour of the system as a whole (MacKenzie 1990, Bijker et al. 1987). This implies that while designing a technological strategy, particularly for future technologies, one must be cautious about its potential implications on social and political behaviour. In particular, those technologies should be strongly promoted which can potentially lead to a change in lifestyles towards sustainable consumption patterns. For example, the promotion of CCS could also mean an implicit promotion of carbon intensive lifestyles for it provides an option of emitting more CO₂ without actually adding to temperature rise. Therefore, CCS has to be thought of very carefully. In general, a technological strategy should be designed not only in terms of exploiting its scientific and technical potential but also as an option to influence social and behavioural transformations towards a sustainable society.

(d) Context Specificities of a Technology Strategy

Many scholars have argued that if the commitments for different countries are rooted in their domestic needs, priorities and policy cultures and countries are encouraged and enabled to put forward policies of their choosing then it is more likely that commitments are not only accepted but fulfilled as well (Lewis and Diringer 2007, Shrivastava and Goel, 2010). It follows then that the future climate regime must support the specific technological capability building needs of the developing countries. However, the present approach towards technology, which rests the responsibility of technology development primarily with developed countries and the flow and diffusion of technology from the North to the South through various modes of assistance, is inadequate in addressing these differences. Ignoring the need to build technological capabilities of developing countries so that they can identify and develop technologies which are suited to their specific requirements could only mean that, in future also, there would be a need for the flow of technology from developed to developing countries (Shrivastava 2007). This would mean that the North-South divide would persist

and arriving at a universally agreeable and applicable action plan would remain as elusive as it has been.

To conclude, given the urgency of the challenge and a rather inadequate success of prevailing technological responses, a comprehensive rethink over a new technology strategy is necessary. And it is vital that in designing a technological strategy to address climate change, the nuances of technology-society relationship, particularly the impact of technological change on social attitudes needs to be given a more pronounced importance as compared to its marginalized status in most of the current approaches.

¹ Jeffery Sachs expressed this line of reasoning during the Delhi Sustainable Development Summit 2010, organized by TERI from 5-7 February 2010.

References

- Bijker, W. E., Hughes, T., and Pinch, T. (eds.) 1987. *The Social Construction of Technological Systems*, Cambridge, MA: MIT Press, 1987.
- Cohen, G. 2004. *Technology Transfer: Strategic Management in Developing Countries*. Sage: New Delhi.
- IEA. 2008. *CO₂ capture and storage: a key carbon abatement option*. Paris: OECD/IEA
- Kameyama, Yasuko. 2004. *The Future Climate Regime: A regional Comparison of Proposals*. *International Environmental Agreements: Politics, Law and Economics* 4: 307-326.
- Lewis, Joanna and Elliot Diringer. 2007. *Policy Based Commitments in a Post-2012 Climate Framework*. PEW Center on Global Climate Change Working Paper. Arlington: PEW Center on Global Climate Change.
- MacKenzi, D. (1990). *Inventing Accuracy: A Historical Sociology of Nuclear Missile Guidance*, MIT, London;
- Salomon, J.J. and A. Labeau. 1993. *Mirages of Development: Science and Technology for the Third Worlds*, Boulder: Lynne Rienner.
- Shrivastava, M. K. and N. Goel, 2010. "Shaping the Architecture of Future Climate Governance: Perspectives from the South" in F. Biermann, P. Pattberg and F. Zelli. (eds.) *Global Climate Governance beyond 2012: Architecture, Agency and Adaptation*, Cambridge University Press. UK. (In Press)
- Shrivastava, M.K. 2007. *Convergence in Climate Change Institutions and Consequences for Developing Countries: A Case Study of Supercritical Technology Adoption by NTPC*, (Unpublished) M.Phil. Dissertation submitted to Jawaharlal Nehru University, New Delhi.
- Shrivastava, M.K. 2008. *Climate Change and Technology: Building Capabilities*. TERI Viewpoint Paper 1. TERI. New Delhi. <<http://www.teriin.org/events/docs/Cop14/TechPosition.pdf>>
- Tamura, Kentaro. 2006. *Technology Development and Transfer* in Ancha Srinivasan. ed. *Asian Aspirations for Climate Regime beyond 2012*. Hayama: IGES: 53-76.
- TERI. 2008. *Mitigation Options for India: Role of International Community*. <<http://www.teriin.org/events/docs/Cop14/mitigation.pdf>>

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Curbing Climate Change: business as usual?

The scientific message is clear: in order to stand a chance of limiting global temperature rise above 2°C, greenhouse gas emissions must peak by 2020 and be at least halved by 2050 compared with 1990 levels. Business as usual is not an option. The only option for business is knowledge.

Speaking from a general business point of view it is simple common sense to stay updated with the international climate policy processes. As for the transport sector, and not least the Volvo Group which I am representing, it is a prerequisite.

As much as the transport industry is a significant part of the problem it is equally a part of the solution. The industry may not have been very visible in the climate negotiations, but even if not communicated covertly, many among us have already taken the first carbon friendly steps accordingly to present research. What the industry altogether now awaits is financial and policy-based mechanisms that address climate change globally and sustainably. In this global market world it is imperative to harmonize solutions and ensure that the entire industrial processes are included.

A Reliable Signal

There are no limits to developing clean technology, but what is needed first hand is a reliable signal for entering new fields that will match with reality. An outlook of ten years is the absolute minimum before investing in new tracks. When orienting towards a future surrounded by question marks and continuous competition we need factual research that puts solutions and measures on the table. It is a question of survival, especially for the heavily energy dependent sectors.

Clipore being one of those compasses guiding the industry to a safe path is invaluable and also an important bridge between business and politics. And with Europe now being a climate policy testing site for the ETS it is also necessary to have adequate research tools to analyse and develop strategies and instruments for a broader market. Here too, Clipore fills a void.

The industrial sector listens carefully to facts and managing science based information is part of the daily routine. The IPCC reports are

for example of major importance to the industry and the majority of the industry also considers the 2°C goal a reasonable benchmark.

However, while moving towards a playing field where science, policy and industry come together, continuous growth must be allowed for. Solving the equation of reaching a near fossil fuel free future and keeping the vehicle driven society is the ultimate challenge. The world will not stop moving, not even in 2° C world; rather it will increase with growing and wealthier populations.

Planning for the Transition

Today practically everything we have around us, our pets, our light bulbs and even our eco-friendly bread and wine has spent some time on a road. It is most likely that this will be the case also tomorrow, and it is most unlikely that there will be horses and carriages travelling the road. People need to rely on their choice of transport, and alternative means of transport will like all other products be judged by their performance. If new fuels leaves the vehicle standing after a mile or two the way back to win the confidence of the market will be long and expensive and if the alternative vehicle it self is not coordinated with the socio-economic development it risks being only a futuristic experiment. When leaving the fossil fuel based society the transition must be coherent with today's technologies. Carefully planning and preparing for a shift to less CO₂ emitting fuels have been on Volvo's agenda for decades – for this the hybrid technology is a living proof, constituting a stepping stone between fossil oil-based fuels, natural gas and renewable fuels.

On our way to sustainability there are a lot of low hanging fruits to pick. Simple measures such as developing and widen public transport is a hands-on and very effective way forward. We can also easily increase energy efficiency with as much as 30% in buses and goods traffic and of course reduce the price for public transport.

All this we can do, and soon. But unless we take into account the whole chain of events, from the way bio-fuels and electricity is being produced to how it is perceived by the market and how the eco-friendly vehicles perform in reality and being re-cycled, we loose. The thinking must be long-term and holistic and it means nothing less than revolutionising the way the world moves.

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outreach 2009

The climate year of 2009 was an all-time-high for the international attempts to find common ground to counter climate change. Lesson learned looking back is that those attempts must only increase in the years to come.

In turn 2009 also proved to be a particularly intense year for the Clipore researchers. The Clipore programme has not only kept its ear to the ground and stayed tuned to the international development in climate change policy, but rather been one or two steps ahead of the sometimes slow moving international policy machinery.

Most of the wide range of scientific publications, reports and seminars produced through the programme during the year also culminated at the COP 15. Although the conference itself may have come to an abrupt ending those two weeks in Copenhagen was a rewarding platform for Clipore to put forth its findings to negotiators, politicians, industry and other NGOs. Clipore looks back at a productive year with a special focus dedicated to the international policy dialogue within and in between the US, EU and India. The Clipore seminars in Washington late April focused on the EU-US relations, including both a scientific discussion on crucial issues such as carbon offsets, and a more policy oriented discussion on intentions and ways forward for US and EU in order to reach an agreement in Copenhagen. The continuous expert role of Clipore scientists in the development of the Congress bills (Waxman/Markey and Boxer/Kerry) has been demonstrated through Clipore scientists that have several times been asked to give testimonies in this process. It has also been satisfying to see the employment of five previous Clipore scientists at various positions in the US Administration.

For India, Clipore was deeply involved in the preparation of a report on common grounds and possibilities for EU's support to India's climate change policies. The report was prepared as a background document for the EU – India summit in November 2009. Also with regard to the Swedish presidency of the European Union Clipore has been supporting the negotiations through seminars, reports and personal contacts.

The European Climate Platform (ECP) – the Clipore collaboration with Centre for European Policy Studies (CEPS) – has frequently operated as a meeting place and informal forum for European climate negotiators, scientists and stakeholders (industry and NGOs). For 2009 ECP organized two seminars and workshops in Brussels.

Hands-on scientific activities and achievements of Clipore are:

- 1) In-depth studies of the design of cap and trade programs, in particular design of allowance allocation and how it influences markets. With an increasing interest in auctioning of emission

allowances for the EU ETS phase 3, Clipore has increased its focus on auctioning design.

- 2) An empirical analysis of how the energy market is influenced by the allowance price on the ETS market.
- 3) Design of deforestation credit mechanisms to be incorporated in mainstream market-based mechanisms.
- 4) Studies on how market-based regimes outside the EU can be linked to the EU ETS.
- 5) Several aspects of climate and technologies have been studied including public investments, green power, technology policies and renewable portfolio standards.
- 6) Policy analysis and suggested for development country commitments, emphasizing the connection between climate and development (SD-PAM).
- 7) Case studies on the development and application of a conceptual framework for burden-sharing i.e. Greenhouse Development Rights.
- 8) The development of the Adaptation Atlas. During 2009 the Atlas reached a pilot level and was presented at COP 15.

The program has during 2009 further integrated the competence within the program and increased its efforts to use the broader competence that the involvement of several institutions can offer. Such efforts include:

- Research on emission trading systems, in which primarily RFF, University of Gothenburg and IVL have been involved.
- The development of the Adaptation Atlas, a project led by RFF and with strong involvement of Linköping University.
- Alternative approaches to the UNFCCC emission cap system, including sector approaches.
- Issues related to CCS, in which RFF, Cicero, Linköping University and IVL are involved.
- Linkages between climate change policies and other development country priorities, including SEI and Linköping University.
- Policy development in the context of leadership, legislation, priorities and obstacles at key actors. The focus was in particular set on the EU and the US, but emerging economies, in particular India, was also considered.

The above listed activities combined with various lectures, seminars and briefings in the US, all over Europe and at many places around the world have all been important initiatives and forums for reaching out with the Clipore expertise. Being close to the centre of decision-making arenas is important for Clipore, and for 2010, the last year of phase 2, Clipore will pin point its research for long-term policy instruments aiming to influence the way forward for a sustainable approach to counter climate change.

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glossary

AAU: Assigned Amount Unit

Annex I Parties: The industrialized countries as of the 24 original OECD members, the European Union and 14 countries with economies in transition.

Annex II Parties: Countries which have a special obligation to provide financial resources and facilitate technology transfer to developing countries. Annex II Parties include the 24 original OECD members plus the European Union.

AOSIS: Alliance of Small Island States

AWG-KP: Ad Hoc Working Group on Further Commitments for Annex I Parties under the Kyoto Protocol.

AWG-LCA: Ad Hoc Working Group on Long-term Cooperative Action under the Convention.

BASIC-countries: Brazil, South Africa, India and China

CCS: Carbon Capture and Storage

CER: Certified Emission Reductions

CDM: Clean Development Mechanism

COP: Conference of the Parties

EPA: Environmental Protection Agency (US)

EU-ETS: European Union Emission Trading Scheme Group of 77 (G-77) and China: A large negotiating alliance of developing countries that seeks to harmonize the negotiating positions of its 131 member states.

GEF: Global Environment Facility

GHG: Greenhouse gases

IEA: International Energy Agency

IIASA: The International Institute for Applied System Analysis

IPCC: Intergovernmental Panel on Climate Change

IPR: Intellectual Property Rights

JI: Joint Implementation

LDC: Least Developed Countries

LULUCF: Land use, land-use change, and forestry

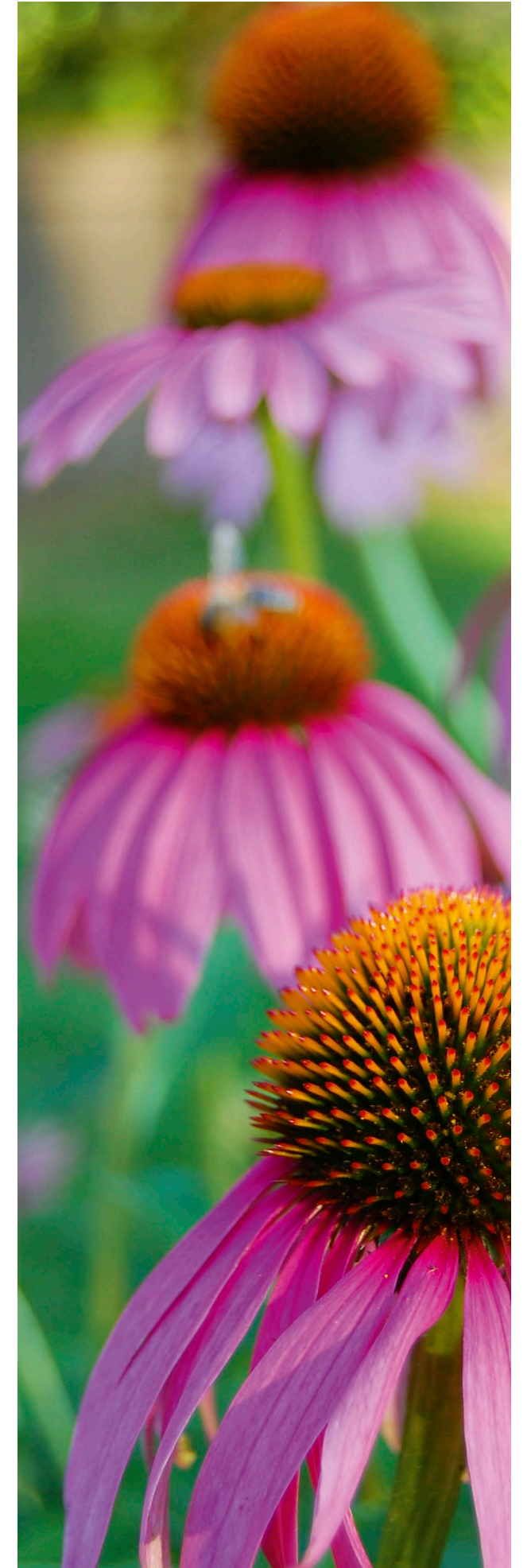
ODA: Official Development Assistance

REDD/REDD+: Reducing Emissions from Deforestation and Forest Degradation

RGGI: Regional Greenhouse Gas Initiative

UNFCCC: United Nations Framework Convention on Climate Change

WTP: Willingness To Pay



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Mistra invests in research that
solve tomorrow's environmental

problems



The Swedish Foundation for Environmental Research – Mistra – supports research of strategic importance for a good living environment and sustainable development. It seeks to promote creation of strong research environments of the highest international class and of importance of Sweden's future competitiveness. The research funded is intended to be of significance in finding solutions to major environmental problems and promoting the sustainable development of society. Full use is to be made of opportunities to achieve industrial applications.

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

Mistra provides funding for some twenty major programmes, 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 results are intended to find practical applications in companies, public agencies and non-governmental organizations.

Further information can be found on Mistra's web site:
www.mistra.org

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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.