

BRIEFING PAPER

Where to next? Future steps of the global climate regime

14 December 2004

Taishi Sugiyama, Kristian Tangen, Henrik Hasselknippe, Axel Michaelowa, John Drexhage, Jiahua Pan, Jonathan Sinton, and Arild Moe

Executive summary	1
Introduction	2
Advancing the current cap-and-trade regime.....	3
Re-engaging the US	4
Acceptable and predictable targets	4
Breaking the stalemate	4
Equitable target setting may secure global participation....	5
Promoting climate technology development	6
Why technology?	6
Technology cooperation treaties?	6
International interplay of technology and institutions....	6
International division of labor for climate technology....	7
The role of development assistance and investment flows	8
Concluding remarks	9
About the authors.....	10
Acknowledgements.....	11
More information	11
References.....	11

Executive summary

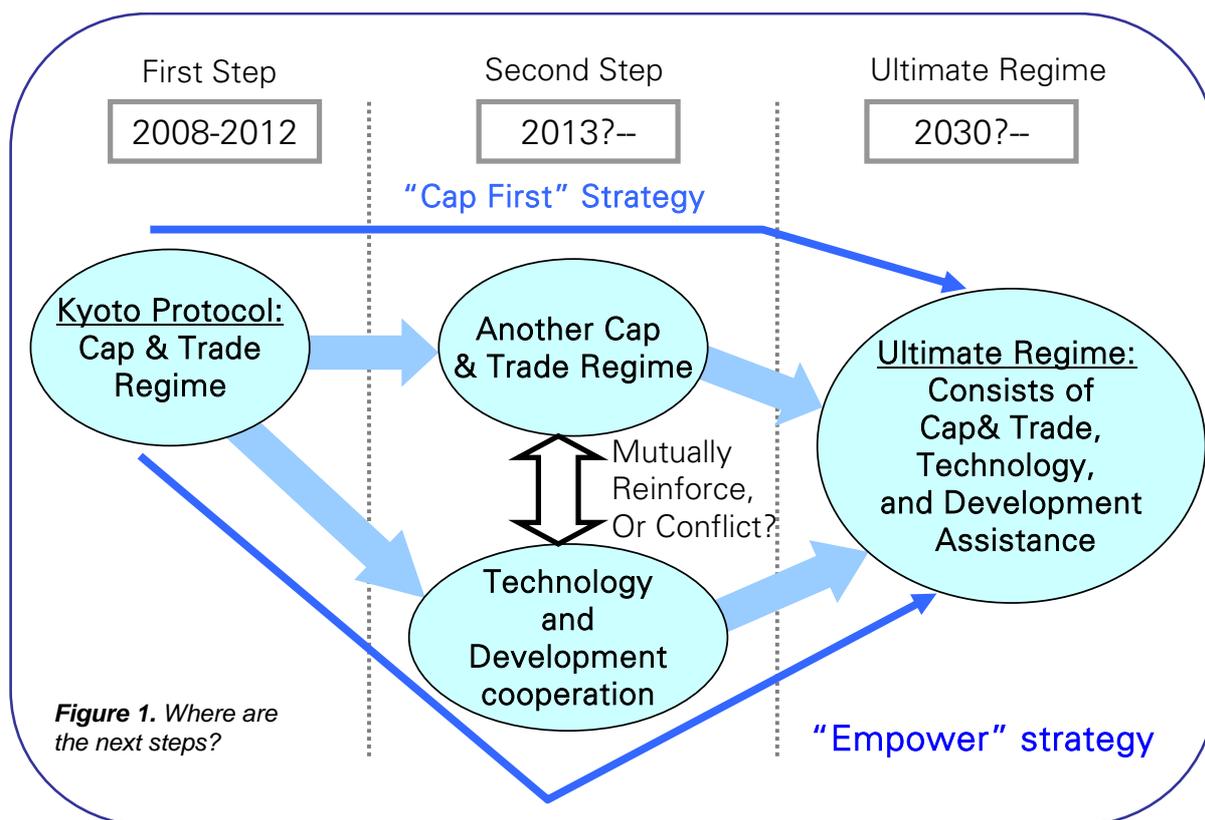
Negotiators from different countries cannot be expected to agree on climate policy if researchers from those same countries cannot find common ground. Over the past two years, a unique international collaboration has brought together people from very different perspectives to explore possible ways forward after the Kyoto Protocol's first commitment period. While strong differences remain among individual members of the team, the points of agreement indicate a possible way forward for negotiations. This paper presents their current collective understanding.

Ultimately, all members of the group are of the view that negotiations addressing greenhouse

gas reduction commitments post-2012 should start immediately, as noted in the Kyoto Protocol. In addition, in the long run – say after 2030, a lasting global solution will include three elements: (1) a cap-and-trade scheme; (2) an agreement for technology development; and (3) an assistance package for developing countries. However, there can be many different ways to reach the goal, and our views on their feasibility and effectiveness are divided.

One way is to continue the efforts started at Kyoto and to broaden and deepen the current absolute, binding caps. Several ideas to envisage this are debated. This approach assumes that countries have the necessary political will and that international agreements have the teeth necessary to make real change.

Another way to get there is to focus on creating an “enabling environment” for a cap-and-trade regime through technology and development cooperation. Even if effectively implemented, emissions trading alone will not be sufficient to achieve radical emissions cuts. Emissions trading may also be politically unacceptable in some countries, particularly in the short term. Be it *ex ante* or *ex post* to a cap-and-trade regime, development and transfer of technologies will be critical. This could also mean that countries not yet ready to commit themselves to binding targets can become active participants in the climate regime through reframing climate issues so that they become embedded in countries' other national priorities. Such developments may be a more effective way of ensuring that the climate regime will be economically and environmentally effective in the long run.



These two strategies, named "Cap First" and "Empower First" are summarized in Figure 1. They may either be mutually reinforcing or conflicting. Caution is necessary to ensure that technology and development cooperation does not dilute political attention to climate change, and that the cap-and-trade regime does not cripple technology and development cooperation by creating an adversarial negotiation atmosphere.

While this team understands that integrating climate change considerations into the economic development and poverty eradication priorities of developing countries is critical to ensuring effective global engagement on climate change, it also recognizes that the willingness to pay by developed countries would be insufficient to induce developing countries to choose less carbon-intensive development paths immediately. However, development assistance, with modifications, could catalyze other financial resources and enable developing countries to take further actions themselves.

Introduction

The Kyoto Protocol under the United Nations Framework Convention on Climate Change (UNFCCC) is an important first step in the development of a truly global climate regime. Through the Kyoto Protocol, the climate change regime covers a range of gases, as well as emissions from all economic sectors, leading to linkages of multilateral discussions on energy, transportation, forestry, agriculture and broader issues related to trade and investment.

Further, once it comes into force in 2005, the importance of Kyoto over the long term is not the specific targets or number of Annex B Parties in the agreement, but that it has set the stage for international discussions on the issue. An important aspect of the current agreement is that it has helped assign an international market value to carbon. Carbon emissions now carry a price tag, and will continue to carry one in the post-2012 world.

That said, it must also be recognized that the regime will look markedly different than what was originally intended, mainly due to the decision of the US to opt out. And there is no

indication that the US is willing to return to the Kyoto fold anytime soon. For future negotiations, views are sharply divided between, and among, developed and developing countries on the issue of burden-sharing. While the Kyoto Protocol calls for another negotiation round beginning from 2005 to set further targets beyond 2012, countries may consider alternatives to the current framework, particularly if the world's largest emitter refuses to re-engage in the Kyoto process.

In the first phase of this two-year project, we developed a range of scenarios that countries may wish to consider for a post-2012 framework, illustrating the many possible futures under which the global climate regime may evolve. The scenarios include *Graduation and Deepening*, the strengthening of a binding-cap approach under UNFCCC, *Converging Markets*, the bottom-up evolution of emission markets on global scale, *Orchestra of Treaties*, a regime consisting of multiple treaties among like-minded countries, and *Human Development*, a regime with emphasis on equity among people in the world.

In the past year, we have continued to elaborate three key issues that were identified in the first phase of the project. They include the future of a binding-cap regime under the UNFCCC, promotion of technology, and development assistance.

This paper first presents a number of ideas on how to broaden the current binding cap regime, including a proposal from our developing-country member of the team with emphasis on social equity. Second, the role of technology is discussed. Lessons from past successes are explored with a view to developing options for their most effective use over the near future. Last, the issue of financial flows to developing countries is discussed, including the issue of mainstreaming assistance for climate-change response.

Advancing the current cap-and-trade regime

Many policymakers feel that a new protocol

under the UNFCCC, with binding targets and the same flexible instruments as in the Kyoto Protocol, would be the most effective structure for establishing a framework to control and reduce global greenhouse gas emissions. However, in order to move towards such a framework, negotiations will have to overcome significant and entangled barriers, including re-engaging the USA, establishing commitments for developing countries that are stronger than those in the Kyoto Protocol, establishing new emission targets, and breaking the current stalemate. While the UNFCCC and the Kyoto Protocol themselves provide precedents for moving forward while keeping Kyoto's core architecture intact, it is also true that there are severe challenges to overcome the barriers present in the current framework.

There are several potential modifications to the Kyoto Mechanisms that can be considered for a future framework, including: a procedure for allowing allowances from non-party trading schemes to be used for compliance; sector targets for developing countries; expanding the scope of Clean Development Mechanism (CDM) investments to cover sectoral, subnational, and/or policy-based activities; target-setting for sectors or whole economies as reductions from estimated baselines, approved by an international review team; and additional eligibility criteria for CDM host countries. In order to break the current stalemate, it will be important that some parties show leadership. A coalition of likeminded countries, notably those that already have introduced market-based mechanisms, might show leadership by presenting a mandate or plan for the future negotiation process, and proposing an allocation for these countries for the period after 2012. To be effective, this coalition, like any groups seeking to take on another form of leadership role, should lead by uniting, not dividing the world.

We also note the potential for using other negotiation arenas for furthering cooperation on climate, both within G8 and G20. Limiting the number of negotiating parties will help to more rapidly advance action on issues of common concern to major developed and

developing countries. It will, however, be important to include all major emitters in these discussions, both from the developed and the developing world. Looking at complementary agendas will also be critical, both on the demand and supply side of emission quota. For instance, serious efforts should be made to understand and discuss climate change in the context of overall global energy security, since clean energy forms are increasingly associated with enhancing energy security.

Re-engaging the US

Ironically, the Kyoto Protocol is essentially a US construct, and a US Administration that is serious about climate change is likely to support a similar framework. However, even if the administration is positive, it is still questionable whether the US Senate will ratify. The US may begin implementing a national cap and trade system, for example for the utility sector, but will be unable to ratify a treaty like Kyoto, at least until it is made clear when developing countries will be willing to take on their own commitments. In addition, US participation in an international agreement would be predicated on implementation of the necessary domestic policy measures, a development that could take some time.

To allow active US participation in case the Senate does not ratify the Kyoto Protocol or a successor agreement, the climate regime may need to develop a procedure by which the COP/MOP could permit allowances from non-parties' trading systems to be used for compliance, so long as those systems could be monitored to ensure the same quality as the overall international regime. It would also be worthwhile for the COP/MOP to consider allowing non-parties to participate in the governing institutions of the protocol, e.g. the CDM Executive Board.

Such developments could make it possible for a future US administration to link a domestic US trading scheme to the international trading system without ratification of the Kyoto Protocol. Under such circumstances, the US would be able to comply with its obligations under a protocol with the full use of the flexible mechanisms, even if it has not ratified.

At the same time, if the necessary domestic policy measures are indeed in place in the US, this would provide an incentive for a full-fledged accession to the international framework.

Acceptable and predictable targets

In terms of targets, the Kyoto Protocol has two major problems: the target-setting was arbitrary and unpredictable, and the targets turned out to be immensely skewed. Some countries, such as Russia, had very 'lax' targets while others, such as the US, Canada and Japan, took on targets that were far beyond their ability to make through domestic actions alone. Greater predictability would make it easier to develop long-term policies which can facilitate more effective goal-achievement. Such predictability will also be key to involve the business community, which seeks a predictable and acceptable framework. A model for guiding target-setting could be helpful, although, of course, politics will always play a role in such negotiations.

Still, it is worth considering whether a simple and transparent model could be used for developing fair targets in the post-2012 period. To this end, we have elaborated formulae for setting targets as reductions from baselines as a way to guide the establishment of Assigned Amounts. Establishing baselines for countries may be technically easier than in Kyoto, as all Annex B Parties, including Eastern European countries, Russia and the Ukraine, will have registries and inventory systems. Still it seems likely that baselines will be inflated, as witnessed in the EU's National Allocation Plan process, and this will have to be factored in.

Whether the countries will agree upon such formulae is dependent on political will. Such will is not likely to coalesce immediately, but discussions about formulae would provide the basis for negotiating burden sharing and, eventually, possible agreement in the long run.

Breaking the stalemate

In order to break the current stalemate in international negotiations, many parties must show leadership. But leadership can have different forms.

A group of countries could show leadership by stating that it is unilaterally willing to take on a weak target (e.g., 10% from baseline) regardless of the positions of other countries, but that it is prepared to take on stronger targets if other Annex I countries take on targets, or if developing countries take on sectoral or other types of targets. COP 11 may be a natural time to announce such unilateral targets. The process could benefit from experience with tariff concession rounds in international trade negotiations seeking to reduce the level of trade barriers. Furthermore, such an initiative could lead to a draft mandate for a process that would lead to a new protocol under the UNFCCC for the period after 2012.

A weak unilateral target from a group of likeminded countries would be enough to keep the Kyoto institutions (barely) alive without hurting national competitiveness if they have to go it alone. But the main idea is that it could maintain the dynamics created by the Kyoto Protocol, and would make it difficult for other countries to do nothing. When other countries propose targets, the cap-and-trade leadership coalition could increase its own target, and hence create a "race to the top".

Without a supportive US, however, the best the cap-and-trade coalition could hope for would be to develop the institutional framework, establish new and weak targets for the rest of the OECD, and possibly involve a few advanced developing countries.

Even with limited participation and weak targets, it would be important that the climate regime maintain the cap-and-trade systems so that the institution would develop and the environmental effectiveness of the approach would be demonstrated, thus convincing other countries to follow suit.

Equitable target setting may secure global participation

The developing country member of the team developed a proposal seeking to show a possible international climate change

framework that focuses on social equity. Since it is the most detailed formula of burden sharing proposed by developing country experts, we believe it is worthwhile to present the core ideas in detail.

The detailed indicators used for the setting of differentiated commitments in the proposal should be seen as illustrative, and we are aware that countries do not possess political will to immediately agree upon the equity based formula. However, insight into the thinking in important developing countries will be crucial to constructing a truly effective climate regime.

Individual countries are at different stages of development. If equity is taken seriously, a logical and rational approach to emissions reductions should be based on countries' respective levels of development, and their commitments linked to responsibility, potential and capability to mitigate. Some commitments can be voluntary, some obligatory while others should be conditional. For developing countries to participate, emissions commitments will have to take into account development needs as well as technological and financial resources transferred from the developed world. Large developing countries, like China, in joining any agreement will naturally argue that the principle of common but differentiated commitments must be well reflected in the framework. For instance, developed countries would have to lead in reducing GHG emissions and demonstrating that mitigation actions are consistent with economic development.

To be both fair and reflective of national circumstances, six groups of countries can be differentiated in terms of their development and emissions status. Some of these indicators are given in Table 1.

To be equitable, commitments have to be linked to these development stages. In order to foster implementation one can choose to use both carrots and sticks. However, in most cases it will not be fruitful to use sticks at the multilateral level in order to include developing countries in environmental treaties, as a party has a choice to withdraw from commitments.

Therefore, incentives to developing countries play a more important and crucial role in implementation of the commitments. These incentives can take the form of e.g. emissions trading with generous targets for developing countries, or a progressive tax on emissions that reflects the principle of common but differentiated responsibilities.

Some practical problems with this approach would have to be worked out. Dividing countries into categories may prove easier than differentiating and implementing their actual commitments. The problem of broader participation is analogous to the “chicken and egg” issue. In the case of commitments under Kyoto, developing countries argue that OECD nations should take the lead on actions and reduction targets, while OECD countries argue

that if they ‘lead’ too aggressively, they will lose their competitive positions to other economies that do not have to take on targets. Both viewpoints need to be considered in a balanced way in developing an effective post-2012 commitments regime, and taking into account the rule of common but differentiated commitments. It should be pointed out that both groups of countries are far from homogenous, and that there are great differences between OECD countries as well as within the groups of developing countries. In order to create a framework that respects different countries needs and abilities we may identify small steps that can be taken in this direction, analogous to the “confidence-building” measures used in arms negotiations.

Table 1. Indicative indicators used to set equitable targets for global participation

Stages	GHG/cap, 2000 (t-CO ₂ e)	Cumulative emissions, 1990-2000 (Gt-CO ₂ e)	GDP/cap, 2000 ('000 US\$)	Commitments
Annex II	15.9	134.9	27.5	Binding (strict) absolute reduction targets, domestic reduction, high direct payments to non-Annex I
Annex I, but not Annex II	10.0	95.4	7.0	Absolute limitation or reduction targets, domestic reduction,* qualitative commitments some financial transfers from Annex II
NICs	12.0	92.3	10.4	Binding absolute reduction targets, domestic reduction, low / no payments to non-Annex I
RIDCs	4.3	27.4	5.0	Absolute limitation targets (conditional to funding),* qualitative commitments , direct payments from Annex II
IgDCs	2.1	10.1	2.6	No quantified commitments, qualitative commitments, direct payments from Annex II
LDCs	1.5	1.4	1.2	No quantified commitments, qualitative commitments, direct payments from Annex II
<p>N.B. The figures in the table are group averages. There exists large variations in one group. Cumulative emissions 1990-2000 may be controversial, but for simplicity, the Kyoto base year 1990 is chosen as the starting year. GDP numbers are in PPP (based on Ott <i>et al.</i>, 2004).</p> <p>Groups of countries: <i>Annex II</i>—highly developed (fully industrialized with a tendency to de-industrialize, no physical expansion of the economy) countries; <i>Annex I but not Annex II</i>—fully industrialized, no physical expansion of the economy; <i>newly industrialized countries (NICs)</i>—limited need for further physical expansion of the economy; <i>rapidly industrializing countries (RIDCs)</i>—rapid physical expansion of the economy; <i>Industrializing countries (IgDCs)</i>—physical expansion of the economy; and <i>least developed countries (LDCs)</i>—limited physical expansion of the economy at the current stage.</p>				

Promoting climate technology development

Why technology?

A cap and trade regime alone will not be enough to induce the technological innovation instrumental to prevent climate change in the long term. The price signal created by the carbon market is currently between 5 and 10 € per tonne of CO₂ and it is politically difficult to raise this much higher. At this level, the price signal may foster short-term emission cuts using existing technologies, but it by no means represents a high enough price to justify significant R&D investments in nascent technologies. Hence, it is necessary to develop additional policies that will enhance technology development and deployment.

A distinctive opportunity lies in international cooperation on technology. If we can successfully reframe the climate issue as the promotion of technologies, there may be more chances for countries to mobilize a large amount of resources towards preventing climate change. The current US Administration, for example, has made it clear that it will emphasize technology in fighting greenhouse gas emissions.

Technology cooperation treaties?

We investigated existing energy technology cooperation treaties in general. There have been some success stories on basic R&D such as particle physics and grand circulation models for climate change research. Also, there have been some successes in sharing information from demonstration projects or other core data, such as Implementation Agreements coordinated by the International Energy Agency. However, it is difficult to point to a particular technological innovation fully attributable to such international cooperation. International frameworks have been helpful, but only in a catalytic role and not as drivers of technological innovation itself. The literature also points to many governmental failure, particularly technology demonstration projects in developing countries. Lessons must be developed from these experiences to ensure that the failures of the past are not repeated.

International interplay of technology and institutions

Knowing the limit of formal international technology treaties, we investigated the informal interplay of technologies and institutions across countries. Case studies included automobile pollutant emissions and stationary SO_x regulation in developed countries in the 1970s and 80s, and wind-power development in Europe in the 1990s.

There are four main findings. First, technological innovation takes place mainly at the national or regional levels by the interaction among private and public sectors, and rarely through formal global treaties.¹ The historical patterns of technological innovation reflect the diversity of resource endowments and political salience of issues among countries.

Second, informal interplay of technologies and institutions are more important than formal international agreements. In most cases, once a technology is marketable in a country, it is only a matter of time before it is diffused to the rest of the world.

Third, creation of niche markets for nascent technologies are key to fostering innovation, and one or two economically powerful countries or regions are usually sufficient to create a critical mass for innovation. Furthermore, US experience has shown that regulation of one large submarket can catalyze uniform regulation across national markets, as when California led the introduction of US auto emissions standards and appliance efficiency standards.

Interestingly, many successful “niche markets” have been created by non-market policy instruments. For example, the niche markets for automobile emission cut technologies were created by direct regulation. Wind power niche markets in many European

¹ While technology was an important part in the creation of the Montreal Protocol, it was rather a case of available technology making international cooperation possible, rather than international effort driving technology development.

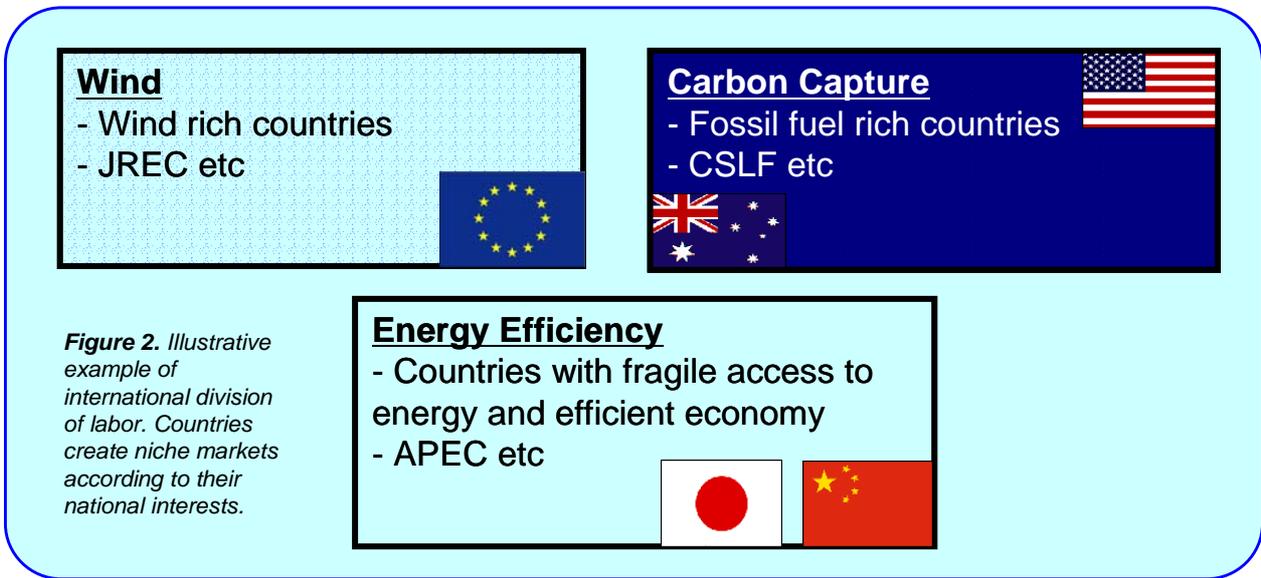


Figure 2. Illustrative example of international division of labor. Countries create niche markets according to their national interests.

Note: JREC: Johannesburg Renewable Energy Coalition; CSLF: Carbon Sequestration Leadership Forum; APEC: Asia Pacific Economic Cooperation

countries were created by subsidies. These successful policies incorporated stable and strong support for specific technologies. It is to be seen if emerging niche markets created by market policy instruments such as Renewable Portfolio Standards (RPS) are similarly effective. “Catch-all” GHG emission markets, if they are characterized by fluctuating and weak price signals, would not be helpful for such technological development.

Fourth, many international interplays of technologies and institutions have been successful, and there are also some success stories of intentionally enhancing this interplay through international coordination. Examples include the Collaborative Labeling and Appliance Standards Program (CLASP) and Promoting an Energy-Efficient Public Sector (PEPS) networks, which promote energy conservation as a common agenda among countries. Promoting such international arrangement to enhance technological and institutional interplay across countries, with mutual recognition of such activities, will contribute to the development of innovative technologies.

International division of labor for climate technology

The findings suggest that there is an opportunity for treaties among regional or like-minded partners to create niche markets for

technologies in their mutual national interests. Their technological choices may differ depending on their respective resource endowments and political concerns. Examples include cooperation on energy conservation among China, Japan, and other Asian countries, geological carbon storage among major fossil-fuel producers such as US, Canada, Norway, Australia, Russia and Saudi Arabia, and wind power among EU and other countries (Figure 2). Once technologies are developed in niche markets and the costs are brought down, they will diffuse to the rest of world through the international interplay of technologies and institutions. A complementary global framework may play a role in legitimizing these activities, to let them recognize each other, and to maintain high political salience

The role of development assistance and investment flows

Over the last ten to fifteen years of negotiations covering both the UNFCCC and the Kyoto Protocol, two things have become increasingly evident. First, development assistance and overall investment flows to developing countries will play a critical part in laying the foundation for any active global regime on climate change. Second, however, there has been very little progress in reaching any satisfactory agreements on these very same issues, particularly as they relate to technology transfer and addressing the

impacts of and actions on climate change.

The roots of the problem lay in the contradiction between overall levels of ODA funds, which have been declining for 20 years, and rising obligations to provide ODA. The commitments laid out in the Convention and the Protocol appear to many, particularly in the NGO and developing country communities, to formally oblige OECD countries to 'bankroll' climate-change-related activities in addition to the financing they are already providing through ODA. Moreover, it is unlikely that we will see any strong reversal in the decline in total ODA funding, even accounting for climate-change-related activities. The result has been an acrimonious negotiating dynamic with not much hope for reaching a satisfactory resolution on either side.

Nor has the issue of climate change been effectively integrated in the mainstream activities of development agencies. Developing countries have, for the most part, not identified climate change as an issue of concern to development agencies. A number of analyses have indicated that, while there have been some successful initiatives, particularly those related to supporting G-77 and China in their National Communications and, to a lesser extent, helping them develop National Adaptation Strategies, these successes have not spread into "normal" technical assistance. In other words, the strong linkages that do exist between the threat of climate change and poverty eradication and development are still not appreciated at the field level.

A challenge on the donor side is to engage finance and development planners effectively in the climate policy discussion, whereas recipients have to acknowledge that new funds can only be harnessed if their use is likely to be more effective than in the past. While developing countries have, for the most part, not identified climate change as an issue of concern to development agencies, in negotiating forums they have been badgering OECD countries for significant new and additional funds as a quid pro quo for cooperation on climate change. There are ways to fix these issues in ODA, and countries are

finally beginning to try and fix them. For example, there is an increasing number of initiatives looking at the issues of climate and development together (as the Brundtland report and many others since have advocated), and looking to engage finance and development planners in those discussions.

The mainstreaming of climate issues with development priorities means paying more attention to the 'co-benefits' of climate mitigation and local environments, integration of mitigation and adaptation at project and policy levels, realizing that in many respects, they can be complementary drivers. It also means broadening the scope of current market mechanisms, such as JI and the CDM, to cover sectoral, policy, and sub-national initiatives. It could also mean finding ways to include developing countries in emissions, or allowance-based, trading.

However, it is necessary to be cautious when addressing the challenge of mainstreaming. On both sides there are concerns that climate-change response is in competition with other development objectives for funding. Recipient nations are worried that existing aid budgets will be cut in order to fund the solution to a "developed country" problem, as the argument came to the fore during the negotiation of use of ODA for CDM. Since current ODA projects are targeted at areas that directly or indirectly support climate-change response, there could be ways to resolve these concerns in a constructive manner.

Still, even if these issues are resolved, ODA alone brings a limited benefit in the end. The opportunities for large-scale activities that will be significant in terms of mitigating climate change lie with private investment, including CDM in a structure that is more effective than its current overly bureaucratic state. Where progress really has to be made, and where it will make a difference, is in the maturation of these market opportunities and broadening participation through incentive-based mechanisms. This will not be easy. An immediate barrier is the limited willingness to pay by the developed countries. Our case studies for the existing international

environmental financial assistance showed that financial flows of more than a billion dollars have been extremely difficult to agree upon and to implement. It is not certain that developed countries will agree to and implement any scheme that finances the “additional” reductions that could easily sum up to several billion dollars annually. Things can move forward, but only if countries are open to being innovative.

Surely ODA and private financial resources can play effective complementary roles, with ODA focusing on capacity building and policy cooperation, while private funding could focus on project-level technology demonstration.

Finally, it is critical that attention be paid to domestic implementation mechanisms and priorities. In particular, institutionalization of climate-change issues in domestic government agencies would effectively create “champions” for mitigation and adaptation within governments of developing countries. This is a crucial step that would build a constituency for action, and help give domestic and foreign businesses and NGOs reliable points of contact to engage government on climate change.

It also means much more effective coordination between aid agencies and International Financial Institutions (IFIs) and enhanced coherence, in turn, with the FDI flows to developing countries. And finally, above all, for OECD countries, it means showing leadership at home. OECD countries must demonstrate that they are taking significant actions at home to mitigate climate change and that it is not compromising their economic objectives. Until developing countries can see that this is in fact the case, the prospects for bringing them aboard will always be challenging.

Concluding remarks

In the two-year project, four alternative scenarios for a future climate regime have been presented at workshops on three continents by a global partnership of researchers. Three key issues, i.e., extension of the cap-and-trade approach, focusing

agreements on technology, and the role development assistance, have been analysed in detail. The authors hope that their efforts have contributed to setting the scene for policymakers and stakeholders to debate and make decisions.

The story is told that when two disciples asked Confucius if they should immediately do what they thought to be good, he answered, “Yes, do it,” to the timid one and, “No, consult your father first,” to the arrogant one. He always gave different answers to different disciples based upon his analysis of their characters. In our view, the Kyoto Protocol is a significant first, bold step. The wiser second step should now be undertaken with careful analysis of the characteristics of the myriad alternative paths for international climate policy.

This project has gone some way down that road. Our starting point was that we saw that the international climate negotiations were facing high and maybe fatal barriers; the risk for stalemate was – and still is - imminent. Hence, in the first year of the project we boldly set out to investigate possible scenarios for the future development climate regime. In the second year we have devoted our time and energy to spell out in greater detail the implementation of the regimes described in these scenarios.

Within a couple of decades, nations will have to reach the goal of an all-inclusive climate policy framework. This will require a climate institutional design which includes cap and trade, technology development, and an assistance package. While these issues are already addressed in the Kyoto Protocol to a certain extent, there are needs for institutional improvement or innovation, either within or out of the Kyoto type architecture. Our research has identified several alternative steps that will help us towards this goal, and we hope our findings can provide input to the coming negotiations on the future of the climate regime.

About the authors

Taishi Sugiyama is the Leader of Climate Policy Project at the Central Research Institute

of Electric Power Industry (CRIEPI), Japan. He is a member of Future Framework Committee that makes recommendation to Japanese government on post-2012 issues. He serves as a member of the IPCC 4th Assessment Report, and Scientific Steering Committee of the International Human Dimension Program (IHDP)/ Institutional Dimensions of Global Environmental Change (IDGEC). He also serves as a member of the Future Framework Committee that made recommendation on Post-2012 framework to the Japanese government. He has also served to Small Scale CDM Panel of Executive Board of CDM. in 2002. E-mail: sugiyama@criepi.denken.or.jp

Kristian Tangen is the CEO of Point Carbon and Associate Fellow at the Fridtjof Nansen Institute (FNI), Norway. He is recognised as a leading international expert in the field of climate change policy, and has in-depth knowledge of the international negotiation process, domestic policies, and the distributional effects of implementation of climate change related policies. His current research focuses in particular on the use of the flexibility mechanisms in climate change policies. He has published several articles and books on climate policies in Russia and China, and is an active participant in several networks on international climate change policy research. Through Point Carbon Kristian holds a finger on the pulse of the international carbon markets, and his insight into the functioning of these markets is unequalled.

Axel Michaelowa is head of the Programme for International Climate Policy at the Hamburg Institute of International Economics, Germany. He has been doing research on international flexibility mechanisms in climate policy for the last decade and has published more than 50 articles and studies, commissioned by inter alia the UNFCCC Secretariat, UNDP, UNEP, the German Federal Government and the German Agency of Technical Cooperation. He is a lead author for the IPCC Fourth Assessment Report, active in German capacity development for the Clean Development Mechanism in major host countries (India, Indonesia and China) and serves as reviewer of baseline methodologies for the CDM Executive Board. Moreover, he

has been looking at the role of interest groups on the different levels of climate policy, particularly the EU. Since COP 1 (1995), he has participated as a UN- accredited observer (NGO) at the international climate negotiations, regularly organizing side events, and disposes over numerous contacts in governmental delegations, NGOs and enterprises.

Jiahua Pan is Senior Fellow and Executive Director of the Research Centre for Sustainable Development at the Chinese Academy of Social Sciences (CASS), China. He has published extensively on the economics of sustainable development and climate change issues. He is a co-editor of IPCC's Third Assessment Report on Climate Change Mitigation. He has been involved in IPCC AR4 (4th Assessment report on climate change) scoping meetings and a lead author of AR4 chapter on sustainable development and mitigation, UNFCCC expert meetings on climate change mitigation, UNFCCC review of national communications, and World Bank project on China CDM Studies. His understanding of human development needs brings a crucial developing country perspective. Recent projects at CASS include a UDDP study on China CDM policy issues and further development of post-Kyoto Scenario of human development with emphasis on quantitative understandings.

Henrik Hasselknippe is Senior Analyst at Point Carbon and Associate Fellow at the Fridtjof Nansen Institute (FNI), Norway. He has conducted research in the field of energy and environment since 1997 and on international climate change policy since 1999. His main research focus is on the future climate regime, in particular the development of emission trading markets and the policy steps needed to link these markets. Through his work at Point Carbon he has considerable insight into the global carbon markets and their functioning. Besides contributing to single chapters, Hasselknippe has acted as the coordinator for the project.

John Drexhage is Director of the Climate Change and Energy Program with the International Institute for Sustainable

Development, based in Canada. He was a senior negotiator with the Canadian government on climate change for some six years, focusing on the Kyoto Mechanisms. Having joined IISD in 2001, Mr. Drexhage focuses his time on domestic implementation issues, the Kyoto Mechanisms, post-Kyoto regimes and vulnerabilities of developing countries to the impacts of climate change, particularly in Africa.

Jonathan Sinton is a Scientist with the Environmental Energy Technologies Division of the Lawrence Berkeley National Laboratory, USA, which he joined in 1990. He has worked on a range of interdisciplinary topics, mainly collaborative efforts with researchers in Asia, on energy and environmental policy, from energy efficiency to climate change to rural household stoves, with a particular focus on China (<http://china.lbl.gov>).

Arild Moe is Deputy Director at the Fridtjof Nansen Institute (FNI) in Norway. In addition to studies on climate change policies Arild has extensive insight into aspects of the Russian energy sector, in particular the oil and gas industry and the reorganisation of these industries.

Acknowledgements

This project has benefited greatly from the input of many individuals around the world. We would especially like to thank the enthusiastic audience at the workshops we have carried out. Without their input our work would have been poorer. We also thank CRIEPI and the Norwegian Ministry of Foreign Affairs for providing funding for the project.

More information

We would especially like to direct your attention to the forthcoming special issue of the journal *International Environmental Agreements* entitled "Scenarios for the Global Climate Regime", where we publish findings from our project. The journal is planned for release in early 2005.

For further questions and information on coming publications, please contact:

Henrik Hasselknippe
Senior Analyst, Point Carbon
Email: hha@pointcarbon.com

References

Banuri, T., Weyant, J., Akum, G., Najam, A., Rosa, L., Rayner, S., Sachs, W., Sharma, R., Yohe, G.: 2001, Setting the stage: climate change and sustainable development. In Metz, B., Davidson, O., Swart, R. and Pan, J. (eds.) *Climate Change 2001: mitigation*. Cambridge: Cambridge University Press. Pp.73-114.

Baumert, K. A. (editor): 2002, Hoehne, N *Building on the Kyoto Protocol: options for protecting the climate*. World Resources Institute, October 2002.

Collaborative Labeling and Appliance Standards Program (CLASP): 2004, Standards and Labels Online Information Clearinghouse – The CLASP website, <<http://www.clasponline.org/main.php3>>.

Gallagher, K. S.: 2001, "US-China Energy Cooperation – A Review of Joint Activities Related to Chinese Energy Development Since 1980", BCSIA Discussion Paper 2001-21, Energy Technology Innovation Project, Kennedy School of Government, Harvard University.

Hoehne, N., Galleguillos, C., Blok, K., Harnisch, J., and Phylipsen, D. : 2003, *Evolution of Commitments under the UNFCCC: involving newly industrialised economies and developing countries*, ECOFYS GmbH, on behalf of the German Federal Environmental Agency. February 2003.

IEA (International energy Agency): 2003: *CO2 Emissions from Fuel Combustion, 1971 – 2001*. Paris: Organisation for Economic Cooperation and Development (2003 edition).

IPCC (Intergovernmental Panel on Climate Change): 2000. *Special Report on Emissions Scenarios*. Cambridge: Cambridge University Press.

Michaelowa, Axel (2004): The German wind energy lobby, HWWA Discussion Paper No.

296, Hamburg Institute of International Economics.

Ott, H E, Winkler, H, Brouns, B, Kartha, S, Mace, M, Huq, S, Kameyama, Y, Sari, A P, Pan, J, Sokona, Y, Bhandari, P M, Kassenberg, A, La Rovere, E L & Rahman, A 2004. South-North dialogue on equity in the greenhouse. A proposal for an adequate and equitable global climate agreement. Eschborn, GTZ.

Pan, J.: 2002, 'An analytical framework for human development, with empirical data', *Social Sciences in China*, No. 6 (in Chinese), pp. 9–17. 2002.

Pan, J.: 2003, 'Emissions rights and their transferability: equity concerns over climate change mitigation', *International Environmental Agreements: Politics, Law and Economics*, 2003 vol .3(1): pp. 1–16.

Ohshita, S. B. : 2002, *Japan's Cleaner Coal Technology Transfer to China: The Implementation of MITI's Green Aid Plan*, Ph. D Dissertation.

Promoting an Energy-efficient Public Sector (PePS): 2004, The PePS website, <<http://www.pepsonline.org/>>.

Sugiyama, Tangen, Michaelowa, Pan and Hasselknippe, 2003. Scenarios for the Global Climate Regime. Briefing paper. http://www.fni.no/post2012/briefing_paper.pdf

Sugiyama *et.al.* 2005. Scenarios for the Global Climate Reime. *International Environmental Agreements* Special Issue.

Zhou, D., Dai, Y. Yi, C., Guo, Y. and Zhu, Y.: 2003, *China's Sustainable Energy Scenarios in 2020*, China Environmental Science Press, Beijing, August 2003.