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Climate Commitments to 2050: A Roadmap for China

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Climate Commitments to 2050: A Roadmap for China

BY ZHONGXIANG ZHANG

Representatives of countries around the world are scheduled to meet in Copenhagen in December 2009, to try to hammer out a new regime for attacking climate change problems. No one would deny that the United States is committed to cut its greenhouse gas emissions—an essential part of a global pact—or that President Obama wants to demonstrate U.S. leadership in the debate.

Obama's ability to move forward in international climate negotiations rests largely, however, with Congress, which is unlikely to commit the United States to specific emissions cuts, unless the legislation includes provisions related to imports. The targets would be products of major emerging economies, such as China and India, if they are not politically willing to agree to measurable, verifiable, and reportable goals for their emissions. *As long as China does not signal, well in advance, the time when it will impose its emissions caps, it will always face the threat of trade measures.*

Between 1980 and 2000, China's GDP quadrupled, whereas its energy consumption merely doubled. The trends of these two decades led the U.S. Energy Information Administration to estimate, as late as 2004, that China's CO_2 (carbon dioxide) emissions would not catch up with those of the United States (the world's

Prospects for International Climate Negotiations: Copenhagen and Beyond

BY GARY CLYDE HUFBAUER AND JISUN KIM

As the December 2009 deadline for Copenhagen approaches, observers have lowered their expectations. The Copenhagen talks are highly unlikely to wrap up the two-year process of climate negotiations on the post-Kyoto regime. Rather, their focus has shifted to key principles for building a framework of future accords. Negotiations will likely extend right up to December 2012—to the last minutes of the commitment phase of the Kyoto Protocol—if not beyond.

About 190 countries have participated in the negotiations under the UN Framework Convention on Climate Change (UNFCCC). In this process, countries that share similar interests have coalesced into groups, and negotiating positions differ over core issues, such as common responsibilities, technology transfers, financial support, trade subsidies, and sanctions. The United States and the European Union often find themselves in conflict over key issues. Developing countries generally work through the Group of 77 at the United Nations to establish common negotiating positions, and in general

largest carbon emitter) until 2030. From the turn of the century, however, China's energy use had begun to surge. Between 2000 and 2007, it nearly doubled—increasing at an annual average of 9.74 percent, which was more than twice the 4.25 percent average of the previous two decades. As a result, in 2007 China was already the world's largest carbon emitter.

China could argue, and legitimately so, that its high emissions levels are the combined effects of the world's largest population and a largely coal-fueled economy that has become "the workshop of the world" for export goods. The goods exported to industrialized countries embody a hefty share of China's emissions. Moreover, China's share of the world's cumulative energy-related CO_2 emissions from 1900 to 2005 was only 8 percent. That was far less than the U.S. share (30 percent) for the same period and will still be lower than the U.S. share up to 2030. On a per-capita basis, the Chinese currently emit only one-fifth as much CO_2 as Americans do, and in 2030 this ratio will still be less than one-half.

If the trend of the 1980s and 1990s had persisted, the position of China in the international climate debate would be very different from what it is today. But China's rapid and unforeseen shift into the world's number one position of absolute emissions threw the spotlight on China. This happened at just the moment when the world community was beginning, under the 2007 Bali Roadmap, to negotiate a climate regime for the period after 2012 (the ending date of the first five-year commitment period 2008–12, under the 1997 Kyoto Protocol). Hence interest in and debate about China's role in combating global climate change have heightened.

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they want the developed countries to provide support in money and technology, and to accept ambitious commitments expressed in binding mid-term and long-term targets. For their part, the developed countries do not view all devloping countries as look-alikes: they want some major emitters such as China and India (which signed their own bilateral climate-change agreement in October 2009) to accept emissions targets that are binding as a matter of international law.

In this issue of the East-West Dialogue, Dr. ZhongXiang Zhang provides a reasoned exposition of the likely Chinese negotiating position. He envisions a long-term roadmap for China, with three transitional periods. In the first period starting 2013, China would increase efforts in energy conservation and the use of clean energy. In the second period starting 2018, China would pledge to achieve voluntary emission reduction targets under the "no-lose" idea, which allows countries to raise revenue by selling carbon credits (upon meeting designated goals), while not penalizing countries that fail to meet goals. In the third period starting 2023, China would adopt carbon intensity targets that are internationally binding. Absolute emissions caps would start in 2030.

Zhang's proposal probably accords with China's long-term strategy on climate change, but we doubt that it will satisfy U.S. negotiators or delay for very long U.S. trade and investment penalties aimed at China. Given this outlook, we doubt that the Copenhagen talks will lead to meaningful binding targets, although some countries may announce their own voluntary targets. In this note, we briefly discuss key issues in international climate talks and provide our own speculation on the prospects for the Copenhagen talks.

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(Zhang, "Climate Commitments," continued from page 3)

China is already the world's largest carbon emitter, and its emissions will continue to rise rapidly in line with its industrialization and urbanization. Given these facts, there is no question that China must eventually provide for binding greenhouse gas emissions caps. The key challenges are to decide when that change would take place and to determine the credible interim targets that would be needed during the transition period. These results will no doubt be a combination of China's own assessment of its responsibility, the economic and political benefits, and the climate change impacts, taking also into consideration the mounting diplomatic and international pressure and the give and take of international negotiations.

In response to these concerns and to put China in a positive position, I propose that China take the following negotiating position in Copenhagen. First, greenhouse gas emissions in the industrialized countries by 2050 should be cut by at least 80 percent of their respective 1990 levels. Second, the goal of all countries should be respective per-capita emissions that do not exceed the world average in 2050. Moreover, it would be in China's own best interests to indicate that China will take on binding absolute emission caps around the year 2030. Such a signal could be given at an appropriate time, such as a U.S. Senate debate about ratifying any global deal that may emerge from Copenhagen or later. Overall, this proposal is a balanced reflection of China's right to grow, as well as China's growing responsibility for the increase in greenhouse gas emissions as living standards increase over time.

> "The timing of China's commitment to quantified emissions cuts is more critical than the stringency of the caps themselves."

WHY 2030 FOR CHINA'S ABSOLUTE EMISSIONS CAP?

The timing of China's commitment to quantified emissions cuts is more critical than the stringency of the caps themselves. Regardless of climate change, China's government is determined to improve energy efficiency and to increase the use of clean energy, for reasons of energy security as well as addressing a range of environmental issues arising from the burning of fossil fuels. These efforts will lead to a significant reduction in the growth of CO_2 emissions and will drive them substantially below the business-as-usual levels.

Many factors must be taken into consideration in determining the timing for China to take on absolute emissions caps. The first of the five-year commitment periods under the 1997 Kyoto Protocol ends in 2012. It would not be unreasonable to expect China to take on absolute emissions caps around the year 2030, which would be in the fifth commitment period (2028–32). Although this date is later than the time frame that the United States and other industrialized countries would like to see, it would probably be still too soon from China's perspective. The fourth assessment report of the Intergovernment Panel of Climate Change recommends that global greenhouse gas emissions should peak by 2020 at the latest, and then turn downward, to avoid the dangerous consequences of climate change. With China already the

"Developing countries need reasonable time to develop and operate national climate policies and measures."

world's largest carbon emitter, the earlier China takes on emissions caps, the more likely that goal can be achieved. However, given China's relatively low development stage and its rapidly growing (and coal-fueled) economy, its carbon emissions will still be on a climbing trajectory well beyond 2030, even if some energy saving policies and measures have been factored into such projections.

There is, however, a precedent for a cap date. Under the UN Framework Convention on Climate Change, the Annex I countries (comprising the industrialized economies of the OECD and the economies in transition, such as Russia) agreed to individually or jointly stabilize greenhouse gas emissions at their 1990 levels. There was a grace period of 16 years, starting from the 1992 Earth Summit, before the commitments became legally binding. This precedent points to a first binding-commitment period for China starting around 2026.

Coal will continue to supply the bulk of China's energy for the next several decades. This dependence makes the commercialization and widespread deployment of carbon capture and storage (CCS) a crucial option for reducing China's CO_2 emissions. Thus far, CCS has not been commercialized anywhere in the world, and it is unlikely, given current trends, that this technology will find large-scale application either in China or elsewhere before 2030. Until CCS projects are developed, to the point of achieving economies of scale and bringing down costs, Chinese policymakers will not feel confident about committing to absolute emissions caps.

Developing countries need reasonable time to develop and operate national climate policies and measures. This is understood by knowledgeable U.S. politicians, such as Congressional representatives Henry Waxman and Edward Markey, the sponsors of the American Clean Energy and Security Act of 2009. Indeed, the original Waxman-Markey bill gave China, India, and other major developing nations time to enact climate-friendly measures. The bill did call for a "carbon tariff" on imports, but it framed that measure very much as a last resort, to be imposed at the discretion of the President, but not before 2025.

Another timing indicator is the lag between the date that a treaty is signed and the starting date of the country's first "emissions budget period" (fixing the total emissions during a specified number of years). For example, the Kyoto Protocol was signed in December 1997, and the first five-year emissions budget period started in 2008. Given this precedent, the earliest date to expect China to implement a binding commitment would not be before 2020. Moreover, the Montreal Protocol on Substances that Deplete the Ozone Layer came into force in 1989 but granted developing countries a grace period of 10 years. Given that the scope of economic activities affected by a climate regime is several orders of magnitude larger than the Montreal Protocol's, it is arguable

that developing countries should have a grace period much longer than 10 years, after the mandatory emissions targets for Annex I countries took effect in 2008.

It is not unreasonable to grant China a grace period before taking on emissions caps, but it would hardly be acceptable to delay the timing beyond 2030. China is already the world's largest carbon emitter and, in the next year or so, will overtake Japan as the world's second-largest economy, although its per-capita income and emissions are still very low. After another 20 years of rapid development, China's economy will approach that of the world's second-largest emitter (the United States) in size, whereas China's absolute emissions (11.73 billion tons) will be well above those of number two (6.4 billion tons). This gap could be even bigger, if U.S. emissions can be reduced to the levels proposed by the Obama administration and under the 2009 clean-energy Act. By then, China's per-capita income will reach a very reasonable level, whereas its per-capita emissions are projected to be well above the world average and about 5.7 times those of India. Also by then, the developed countries will have achieved significant emissions reductions. Under this business-as-usual scenario to 2030, while the world is facing ever-alarming climate-change threats, China will have lost ground by not taking on emissions caps.

THREE TRANSITIONAL PERIODS OF INCREASING CLIMATE OBLIGATIONS

It is hard to imagine how China could apply the brakes so sharply as to switch from rapid emissions growth to immediate emissions cuts, without passing through several intermediate phases. After all, China is still a developing country, no matter how rapidly it is growing. I envision that China needs three transitional periods of increasing climate obligations, before taking on absolute emissions caps.

> "These commitments would leave ample flexibility for China to work out the details as negotiations move onward"

First, further credible energy-conservation commitments starting in 2013. China has already committed itself to quantified targets on energy conservation and the use of clean energy. It needs to extend its level of ambition, making further, credible, quantified domestic commitments in these areas for the second commitment period. Such commitments would include energy-saving and pollutant-control goals in its successive national five-year economic blueprints; increasing investment in energy conservation and improving energy efficiency; significantly increasing renewable sources of energy and other low-carbon technologies, in particular wind power and nuclear power; and doubling or even quadrupling the current unit capacity, below which thousands of small, inefficient coal-fired plants need to be decommissioned.

Second, voluntary "no lose" emissions targets starting in 2018. During this transition period, China could commit to adopting voluntary emissions-reduction targets, with the provision that China would suffer no net economic loss by adhering to them. Emissions reductions achieved beyond these "no lose" targets would then be eligible

for sale through carbon trading at world market prices. These prices would be the same as those of developed countries whose emissions are already capped, in contrast to the lower prices that China currently receives for carbon credits generated from clean development projects.

Third, binding carbon intensity targets starting in 2023, leading to emissions caps around 2030. While China is already expected to adopt a carbon intensity target as a domestic commitment in 2011, China could take a significant step toward committing to absolute emissions caps during subsequent commitment periods by making an international commitment to adopt binding carbon intensity targets starting in 2023. At that juncture, having been granted three transition periods, China could then be expected to take on binding emissions caps, starting around 2030, and to aim for the global convergence of per-capita emissions by 2050.

The commitments outlined here for China are basic principles. They leave ample flexibility for China to work out the details, as international climate change negotiations move onward. The value of this proposal lies in the format and time frame under which China would be included in a post-2012 climate-change regime, not in the numerical details. It should not be taken for granted that China can take on such increasingly stringent commitments, because that would entail significant efforts to cut projected emissions below China's baselines. To enable China and other developing countries to do that, the United States should significantly scale up its technology transfer and deployment, financing, and capacity building. The United States can and should take these steps, at the least, even though political reality may limit U.S. ability to take on the significant emissions cuts that developing countries are calling for by 2020.

In the meantime, commitments by China, as outlined above, would send a signal well in advance, of a serious commitment to address climate change issues—a signal that the world has long awaited from China. They will also alleviate, if not completely remove, concern in the United States and other industrialized countries about when China will join them. And they will help the United States to take on long-expected emissions commitments, thereby paving the way for an international climate agreement at Copenhagen and beyond. ■

China Is Willing, but on What Terms?

BY RAEKWON CHUNG

I would like to comment on the politics and feasibility for the practical and academic proposition made by Dr. ZhongXiang Zhang to be accepted by the Chinese government, as well as on legal issues for this idea to be integrated into an international agreement for the future climate regime.

Uncertainty of emissions trajectory, not political will

A critical factor underlying the question of whether the Chinese government could accept Zhang's proposal is the credibility and the certainty of the projected emissions trajectory of China. As pointed out by Zhang himself, an estimate made as recently as 2004 was completely wrong in predicting the time when China would become

> "Committing to an emissions cap is not a matter of political will. Rather it is a matter of the difficulty of predicting future emissions trajectories."

the world's largest emitter. The U.S. Energy Information Administration in 2004 predicted that China's CO_2 emissions would not catch up with those of the world's largest carbon emitter until 2030. But by 2007 China had already become the largest emitter.

Zhang predicts that by 2030 "China's per-capita income will reach a very reasonable level, whereas its per-capita emissions are predicted to be well above the world's average." If this projection is credible with reasonable certainty, the Chinese government would be willing to consider accepting an absolute emissions cap by 2030. However, in most cases, projections carry a considerable degree of uncertainty.

The uncertainty of emissions trajectories makes it difficult to commit to any binding target—not only for the government of China but for almost all governments of developing countries where emissions are growing rapidly. The Chinese government will probably prefer to retain flexibility in its growth path rather than tie its hands by committing to a cap based on a uncertain projection of its emission trajectory and growth path.

Thus committing to an emissions cap is not a matter of political will. Rather it is a matter of the technical difficulty of predicting the future emissions trajectories of rapidly growing, developing economies. The governments of many developing countries, including China, do have strong political will to take ambitious mitigation actions. But it is the uncertainty of the emissions trajectory that prevents them from committing to a target, not the lack of political will. It is a complete misunderstanding, on the part of developed countries, to believe that developing countries are not committed to binding targets due to lack of political commitment. To the contrary, developing countries are willing to take ambitious mitigation actions. However, they simply want to reserve their flexibility due to the uncertainty of projecting their future emissions and growth path.

The legal nature of commitment: what do we mean by "binding"?

Climate negotiators and politicians are all using the word "binding" without clearly defining the legal interpretation of the word. Will or should China face a sanction if it does not comply with its target after 2030? Many experts believe that developed countries should face certain consequences, such as paying for the carbon credit to offset noncompliance. However, many think that, in the case of developing countries, there should be no sanction even in the case of noncompliance. I think this may be part of the reason Zhang proposes that China set a "domestic" commitment of energy efficiency from 2013 to 2018, since a domestic commitment is not supposed to entail "international" sanctions.

Climate negotiators from developed countries are demanding that developing countries make "internationally" binding commitments, not "domestically" binding ones. Developing country negotiators resist this idea of "internationally" binding commitments, as they do not agree with the notion that their countries should be penalized in case they do not meet the target. For Zhang's proposal to be accepted into an international agreement for the future climate regime, the legal nature of the word "binding" has to be clearly defined and understood by the negotiators and politicians, from both the developed and developing countries.

Many developing countries are already undertaking mitigation actions on a domestic basis. One example is China's aggressive goal to improve energy intensity by 20 percent during the 2006–2010 five-year plan. Political will is not lacking, but countries are wary of making binding commitments under the existing international legal architecture. Innovative and creative ideas are needed to internationalize domestic actions while, at the same time, diminishing the fear of international obligations. One such idea is South Korea 's proposal for an International Registry, in which developing countries can voluntarily register their domestic actions. When combined with an international verification process, a Registry would provide the needed international recognition of these actions, without the burdens of a compliance mechanism. And if strict sanctions are not imposed on developed countries for noncompliance of their commitments, there is not much difference between the two formulas. The Registry idea is now being negotiated intensely as a powerful proposal that can gain consensus from both developed and developing countries. ■

Common Ground Must Be Found, and Fast

BY STEPHEN HOWES

Though Dr. ZhongXiang Zhang, who has long provided a distinguished and useful commentary on Chinese climate change policy, focuses mainly on his proposal for what should happen in 2030, in my view his proposal for 2013 is his most important, simply because it is the closest. In climate change, as in many other areas, it is one step at a time. Unless we can reach an agreement for the climate change architecture post-2012, and that is by no means a guarantee, we will not need to worry about 2018, 2023, or 2030.

In my view, Zhang's proposal for 2013 is on the right lines, but does not go far enough, for two reasons. First, the Chinese President Hu Jintao signalled in his September 2009 address to the United Nations that China would target emissions intensity with the aim of bringing about a "notable" decline by 2020. In Zhang's proposal, emissions intensity is not introduced as a target until 2023, when it is to become a binding target. President Hu's speech suggests that it is likely that emissions intensity will play a more prominent role from 2013 onward, albeit, as I explain below, not as a binding target.

Second, and related to this, Zhang proposes that for the 2013 agreement China only make "credible quantified domestic commitments." One of the most important issues confronting the current climate change negotiations is the nature of the international commitments

> "The longer the waiting game goes on, the worse the environmental outcomes for all."

developing countries such as China will enter into, if any. I'm not sure whether, by "domestic commitments," Zhang implies that China should not enter into any international commitments. No developed country is asking any developing country to submit to economy-wide emissions caps. But the middle-income developing countries are being asked to bind themselves internationally in some form to their climate change policies. Giving formal, international visibility to developing country policies to reduce emissions (below what they would otherwise have been) is important for two reasons. First, it will increase confidence that the policies will actually be implemented. Second, it will help developed countries sell any international agreement back home. This is particularly important for the United States, where the principal reason for the non-ratification of the Kyoto Protocol was the fact that it placed obligations only on one set of countries, namely the rich ones.

It is not clear what agreement will be reached, or when, for how developing countries commitments will be represented in any international agreement. There are various proposals, including a registry of developing country commitments put forward by South Korea and a system of country-specific schedules put forward by Australia. But at the moment, there seems to be more deadlock than common ground. Agreement on this issue, as for many others, seems unlikely to be reached at Copenhagen.

Writing in the middle of this year, I suggested that China might be prepared to make an international commitment to an emissions intensity target, possibly one of halving emissions intensity by 2020. Such a commitment would be aspirational rather than binding: there would be no penalties for noncompliance. But it would be a significant step forward along the road to agreement on an international architecture.

So far, China has taken only the first of three steps needed to move down this road. As noted earlier, it has indicated that it will adopt an emissions intensity target. But it has not yet put a number to that target, nor has it indicated whether it would be prepared to include the target (in some form) in an international agreement.

I remain reasonably confident that China will take the second and third of these steps, but when it will do so is much less clear, and no doubt hangs in large part on the progress of U.S. domestic climate-change legislation, without which the U.S. administration is unwilling to bring to the negotiating table its own emissions reduction targets.

The longer this waiting game goes on, the worse the environmental outcomes for all. One can only hope for the sake of global welfare that the United States moves sooner rather than later to firm up its climate change policy, and that China moves sooner rather than later to indicate its willingness to translate its domestic policies into international commitments. Without both super-

powers and major emitters taking these steps, it is very hard to see how any post-2012 international agreement on climate change can be reached. ■

(Hufbauer and Kim, "Prospects," continued from page 3)

MITIGATION ACTION: SETTING BINDING TARGETS

The 2 degrees Celsius (°C) cap above pre-industrial levels is a target widely supported by experts as insurance against catastrophic effects of climate change. Developed and developing countries alike endorsed this cap at the L'Aquila summit of the Group of Eight (G8, the world's eight richest countries) and the Major Economies Forum (MEF), both held in July 2009. To limit the global average temperature rise to the 2°C target, the level of greenhouse gas concentration needs to be stabilized at or below 450 parts per million (ppm) of carbon dioxide equivalent.

To meet this goal, the G8 leaders at L'Aquila supported a prescription that greenhouse gas emissions should be cut by 80 percent for developed countries and by 50 percent for all countries by 2050, compared with 1990 (or a more recent year). In October 2009, the European Union endorsed the long-term target to reduce greenhouse gas emissions of developed countries by 80 to 95 percent below 1990 levels by 2050. Some developed countries and most developing countries have not yet endorsed these targets.

One stumbling block is that countries are reluctant to make binding commitments on the mid-term 2020 target, a logical corollary of the long-term 2050 target. Many experts argue that developed countries as a whole should cut their greenhouse gas emissions by between 25 and 40 percent below the 1990 levels by 2020. Few political leaders are that ambitious.

Some developed countries have instead proposed their own more modest 2020 targets. Under its post-2012 energy and climate change package, the European Union has set a reduction target of greenhouse gas emissions at least 20 percent below 1990 levels by 2020—or even 30 percent if a post-Kyoto regime is agreed. The new Japanese Prime Minister Yukio Hatoyama has proposed a 2020 target of 25 percent below 1990 levels, but conditioned on a successful Copenhagen outcome. The Waxman-Markey bill, passed by the U.S. House of Representatives in June 2009, aims to reduce U.S. greenhouse gas emissions by 17 percent (for covered entities) below 2005 levels by 2020. For major emitting developing countries such as China and India, the European Union has suggested that emissions be slowed by 15 to 30 percent below the current business-as-usual projections by 2020.

While these 2020 targets are better than nothing, they are criticized by many experts. Moreover, the comparability of commitments becomes an issue among Annex I parties. Some countries have proposed alternatives such as the use of different base years and the expression of targets in terms of absolute tons of emissions. For example, the 2020 target envisaged by the Waxman-Markey bill uses 2005 as a base year instead of 1990, the benchmark year used in the Kyoto Protocol, the UNFCCC, and most other countries. The Pew Center

in 2009 estimated that a 17 percent cut from the 2005 levels by 2020, as set under the Waxman-Markey bill, equates to less than 5 percent compared with 1990 levels.

While the U.S. role is seen as critical, American negotiators are still haunted by the experience of the Kyoto Protocol. They are taking a very cautious approach, and Stuart Eizenstat, a former U.S. diplomat, argues that U.S. negotiators will not be able to negotiate "something in Copenhagen beyond that which Congress will give the administration in domestic cap-and-trade legislation."

The United States has in fact advocated a new style of international treaty: each country should decide unilaterally how to meet its target but without any legal obligation to the international community. By contrast, most developing countries and the European Union want to retain the basic structure set up under the Kyoto Protocol, which lays primary and legal responsibility for action at the doorstep of developed countries. Despite strong pressure from other countries, the U.S. commitment will probably fall short of expectations. This is one more reason why China, India, and other major developing-country emitters are not likely to accept binding targets.

Zhang gives an articulate exposition of China's position which comes down to a veto against mid-term binding commitments. He suggests 2023 as the first year for a binding commitment, and "best efforts" in the meantime. The Bali Roadmap calls for "nationally appropriate mitigation actions (NAMAs) by developing country Parties in the context of sustainable development, supported and enabled by technology, financing and capacity-building, in a measurable, reportable and verifiable manner." At the UN summit on climate change held in New York in September 2009, Chinese President Hu Jintao said that, by 2020, China would reduce greenhouse gas emissions per unit of GDP by a notable margin from 2005 levels, but he also made it clear that developing countries "should not be asked to take on obligations that go beyond their development stage, responsibility and capabilities."

> "If anything is agreed in the Copenhagen process, it is likely to be a deal that blurs the boundary between 'best efforts' and 'binding targets.'"

Proposals have been tabled to elicit stronger action by the United States and China. For example, Australia's "binding schedule" proposal has gained attention. Australia proposed that developing countries should submit their own "binding schedule" of how and where reductions would be made, but not make an international commitment to binding targets. Under this scenario, developing countries would have more flexibility to set "schedules" using a wide range of options such as emission intensity targets, renewable energy targets, and reduced deforestation targets. While China and India have been allergic to any formulation that includes the word "binding," if anything is agreed in the Copenhagen

process, it is likely to be along these lines—a deal that blurs the boundary between "best efforts" and "binding targets" and contains no international penalty for shortcomings by either developed or developing countries.

MAKING PROGRESS IN RELATED AREAS

Even if a final compromise is not achieved in Copenhagen, progress could be made on several important related issues. A fundamental element in international climate talks is to rebuild trust, which was badly damaged by the U.S. failure to ratify the Kyoto Protocol. Looking forward, measurement, reporting, and verification (MRV) are essential foundations for rebuilding international trust and cooperation. Under the current UNFCCC and the Kyoto Protocol, MRV requirements differ substantially: they are stringent for Annex I parties, but weak for non-Annex-I parties. While the Bali Roadmap called for upgrading MRV standards worldwide, India and other developing countries have urged that MRV requirements should be applied only to mitigation actions that are supported by international finance and technology, not to purely domestic mitigation actions. China and Brazil have proposed that MRV should be undertaken nationally in accordance with UNFCCC guidelines. Some developing countries have taken a middle-ground approach, such as different MRV rules for different types of NAMAs. We believe that strong MRV standards, under international auspices, are essential to build trust. The standards should apply to all major emitters and cover mitigation, adaptation, technology transfer, and financial support. Given the level of resistance from developing countries, this is a tall order. But without strong MRV standards, progress on financial support will be elusive, and agreement on targets, either at a national level or for individual sectors, will be that much more difficult.

Technological innovation holds great appeal since scientific breakthroughs could deliver a huge reduction in greenhouse gas emissions at low cost. Unfortunately, most known remedial options are very expensive, and strong incentives will be necessary to elicit a bounty of new technology. In the past, developing countries have asserted that technology transfer, either free or on bargain terms, is an essential prerequisite for their action. Today, developing countries may be softening that stance—which was not encouraging for breakthrough technologies—and leaning more toward collaboration with developed countries, which have acknowledged the importance of technology transfer. The European Union reportedly has plans for technology transfer that would take place along country-specific roadmaps, to be supervised by an international panel of experts. Needless to say, multinational firms that create green technology are allergic to statements that border on compulsory licensing of patented know-how. This is just as true of Brazilian, Chinese, and Indian multinationals as their U.S. and EU counterparts. In our view, compulsory licensing would spark the same sort of counterproductive friction as import penalties based on carbon footprint calculations.

Developing countries have called on developed countries to set aside money: a "climate fund" (our term) equivalent to 0.5–1.0 percent of annual GDP (which would amount to $200–400 billion annually in current dollars for the 30 members of the Organisation for Economic Co-operation and Development). There is a rough convergence (at $100–200 billion per year) in the various cost estimations of climate change mitigation and adaptation for developing countries. A number of multilateral and bilateral financing initiatives are already in place, though the scale is much smaller than the numbers just mentioned. Financial flows should be augmented through various channels, including the UNFCCC, the

World Bank, bilateral overseas development assistance, future carbon markets, and other "climate funds." We support a new international climate fund that envisages contribution by all countries based on three components: (1) historical emissions between 1990 and the current year; (2) any failure to meet binding greenhouse gas emission commitments; and (3) offsets purchased through the clean development mechanism (CDM). In particular, we believe that there is great potential in the CDM system, with appropriate reforms and strong MRV standards. Strong MRV standards would determine compliance with national caps, and MRV standards should be applied to evaluate individual CDM projects. Based on a foundation of rigorous standards, the CDM could become a major channel for financial support and technology transfer.

The *Financial Times* (November 3, 2009) has argued that emission rights should be assigned to the world's 6.8 billion people on an equal per-capita basis, and that rich countries should purchase rights for their excess emissions from poor countries. In the Copenhagen talks, countries will wrestle with this suggestion and other criteria for supplying and allocating funds. However, we suspect that large-scale financial support will come only if it is tightly connected to significant greenhouse gas reduction in major developing countries, verified by rigorous MRV standards.

The compliance mechanisms of the Kyoto Protocol consist of a facilitative branch (to provide advice and assistance to parties) and an enforcement branch (to determine consequences for parties that do not meet their commitments). If the enforcement branch declares an Annex I party in noncompliance, it can in theory require the party to make up the difference between its emissions and its assigned amount during the second commitment period, plus a penalty of 30 percent. However, the dispute settlement provisions in the UNFCCC are very weak, and there is little chance that penalties will be enforced. Most Annex I parties will fail to meet their targets under the Kyoto Protocol. Given the emphasis on voluntary action and good will between parties, there is a practical limit to strong enforcement. We doubt that the post-Kyoto regime will devise still stronger compliance and dispute settlement mechanisms. Over the next decade, if they are applied at all, penalties will be imposed through trade and investment sanctions aimed by one sovereign state against another, not by a multilateral body.

LOOKING AHEAD

A post-Kyoto era will likely emphasize voluntary obligations, leaving countries great flexibility to choose their own greenhouse gas control measures. Principles may be advanced on financial support and technology transfer. In parallel with the UNFCCC process, regional and bilateral accords may address certain issues in coming years, especially mitigation targets and financial support.

Countries will continue to enact helpful domestic measures at the national, provincial, state, and city levels, seeking a path to a low-carbon future. This trend will spell more demand for alternative energy sources and less demand for fossil fuels. Seeing an opportunity, many private firms are already investing in low-carbon technologies. A big challenge is to maintain the momentum of subfederal and private initiatives, especially if UNFCCC negotiations are prolonged and inconclusive. ■

For Further Reading

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