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The Climate Convention: Unraveling the Kyoto Numbers

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The Climate Convention: Unraveling the Kyoto Numbers

Adil Najam and Thomas P. Page

The third meeting of the Conference of Parties (COP-3) of the UN Framework Convention on Climate Change (UNFCCC) concluded with the signing of the Kyoto Protocol (UNFCCC 1997). After much political wrangling and an extended all night negotiation session, delegates agreed to a Protocol that mandates specific emissions limits for industrialized countries and economies in transition (collectively listed as Annex I countries). The Protocol mandates that the average anthropogenic carbon dioxide (CO_2) equivalent emission of each Annex I country should be no more than its agreed allowance in the "first quantified emission limitation commitment period" which is defined as the five years between the beginning of 2008 and the end of 2012 (UNFCCC 1997: Article 3.7). The base-period for most countries in Annex I is 1990. The exceptions—granted during COP-2 (UNFCCC 1996, decision 9/CP.2)—are Bulgaria (1989), Hungary (1985-87), Poland (1988) and Romania (1989).

In more simple terms, this means that each Annex I country has accepted an emissions limit based on changes in equivalent carbon dioxide, relative to their base period emissions, which they are required to reach by around the year 2010. Moreover, different countries within Annex I have agreed to different limits. The fact that there is no apparent basis for this allocation except political wrangling and horse-trading is itself a source of some concern (Najam and Sagar, 1998). While major emitters, including the European Union, USA and Japan agreed to reduce their emissions in 2010 to 8%, 7% and 6% respectively below the 1990 levels other countries such as Iceland, Australia and Norway have been allowed to increase their emissions above the 1990 levels but by no more than 10%, 8% and 1% respectively. Yet others, including the Russian Federation, Ukraine and New Zealand have agreed to limit their 2010 emissions to no more than the 1990 levels.

Subsequent discussions of the Kyoto Protocol have been characterized by a decidedly partisan flavor. It seems as if those who believe that climate change is a serious and urgent problem feel somewhat duty-bound to come to the defence of the Protocol, often arguing that even though this may not be the best agreement possible, it is at least a step in the right direction. On the other hand, those who believe that the available scientific evidence does not justify the substantial economic costs that might be incurred seem equally compelled to attack the Protocol; not as much for what it contains but simply because it happened. Both sides appear to be reacting more out of conviction than analysis. In the midst of all the bickering, very little attention has been invested into analyzing the details of what was actually agreed at Kyoto.

Indeed, this lack of emphasis on the actual content of the agreement is somewhat justified by the fact that it is still doubtful whether key emitters will actually ratify the Protocol. Legally, the Kyoto Protocol will not become a binding document for anyone until after 90 days from the date that the following two conditions have been met: a) at least 55% of the parties to the Convention have ratified it; and b) the

parties that have ratified it account for at least 55% of the total Annex I emissions for 1990 (UNFCCC 1997, Article 24.1). Since USA accounts for around 38% of those emissions, the European Union for another 22%, and Japan for 8%, the Protocol is unlikely to come into force without ratification from these key industrialized countries (Bolin 1998, 330). Most analysts agree that it may be very difficult to get USA's Senate to ratify the Kyoto Protocol anytime soon. Other industrialized countries may, therefore, choose to delay their ratification until they are sure that USA will actually be joining the regime.

This paper focuses on the actual commitments made at COP-3, what they mean in practical policy terms, and how the situation in 2010 may differ from what it is today because of the decisions taken at Kyoto. The results should be a cause of concern, if not surprise, to both sides of the debate. Importantly, even if all Annex I countries were to live up to the commitments they made at Kyoto—which, as pointed out, remains a doubtful proposition—the total emissions from these countries in 2010 will, in fact, be nearly the same as they are today!

This fact, which may not be entirely surprising to those familiar with the numbers, has nonetheless slipped through the cracks of the debate. This is not to belittle the significance of the Kyoto Protocol. After all, a stabilization of emissions at current level is better than no stabilization at all. However, it does call for a more sobering assessment of Kyoto's ultimate importance. As governments finalize their positions for the next round of negotiations to be held in Buenos Aires in November and as analysts busy themselves with pondering on how developing countries might be incorporated into a commitments regime, they should pause to consider the real implications of this fact.

Why should we worry about Kyoto?

Commentaries on the Kyoto Protocol typically peg their analysis around the fact that if all Annex I countries were to implement their mandated commitments, the overall carbon contribution of these countries in the year 2010 would be 5.2% less than what it was in 1990. This seems like an impressive number, especially when one considers the fact that USA had entered the negotiations insisting that the best it could do was to stabilize its 2010 emissions at 1990 levels. However, the celebration has been subdued and most scientists believe that this is unlikely to significantly slow the atmospheric accumulation of greenhouse gasses because a) the cuts are too small in comparison to the scale of the problem and b) any effort will remain insufficient without the active participation of the developing countries (Malakoff 1997).

In the rush to focus on the second of these factors, a third issue has been largely ignored. In practical policy terms, it is far more important to know how the mandated emissions in 2010 will compare to the situation *today* than how it might compare to the way things were in 1990. This single-minded focus on comparisons to 1990 numbers, while unfortunate, is understandable. 1990 has been consistently used as the comparative baseline in most discussions and all proposals. The original Climate Convention (UNFCCC 1992, Article 4.2b) itself called upon Annex I countries to voluntarily return to 1990 levels by 2000. However, it should be highlighted that the ultimate objective of the Convention is not necessarily tied to 1990 but aims more generally at the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system" (UNFCCC 1992, Article 2).

While it makes full sense to set a baseline in the past to which all future emissions can be compared, it makes equal sense to simultaneously gauge actions at any point in time with the situation at that point. We are not calling for a change in the baseline year but merely for the need to focus as much on comparisons with current emissions as with baseline year emissions. Policymakers cannot travel back in time to implement policies in years past. Policies have to be set in the context of *current* practice and the numbers coming out of Kyoto should also be interpreted in relation to *current* emissions. The relevant question for policy is how *where we want to be* relates to *where we are*; not how it relates to *where we were*.

An added twist is revealed when one considers the fact that the Annex I countries, *as a group*, are currently emitting less carbon dioxide than they were in 1990. It should be highlighted that this reduction has not transpired because of conscious policy efforts on the part of these countries. It has occurred, instead, *despite* their policy inaction and due to the unforeseen economic collapse in the former Eastern Bloc countries. The observed reduction does not, therefore, imply that Annex I countries as a group have actually done well in combating potential climate change. It merely means that because of events since then, 1990 may no longer be the best year to use as a yardstick for comparison.

Finally, it is important to note the distinction between the goal of the UNFCCC, which is the stabilization of the *atmospheric concentration* of greenhouse gases, and the focus of the Kyoto Protocol, which is solely on stabilizing the national *rates of annual emissions*. Although the two are related, they are not directly correlated. In failing to explicitly and clearly link the later to the former, the Kyoto Protocol may have done a great disservice to the Climate Convention. Two issues associated with this distinction should be highlighted.

First, the atmosphere is already overburdened and needs to be stabilized at some level significantly below current concentrations. Focussing only on the comparison with 1990 emissions, without highlighting the fact that this equates with current emission stabilization, is likely to lead to a sense of false complacency which would serve as a distraction from the more important goal of reducing the already existing burden on the atmosphere. Second, and more importantly, since the Kyoto Protocol does not specify any particular pathway to compliance between now and the commitment period, 2008-2012, it is possible and likely that countries could keep on increasing their emissions for many years still and then rapidly reduce in the last few years. The overall addition to the atmospheric concentration would thus be even greater than under an assumption of phased, gradual compliance between now and 2010 (this is the assumption of our analysis). Arguably, then, the Kyoto Protocol may not only distract from UNFCCC's ultimate goal but also have the perverse effect of working against it in the period between now and 2008.

Unraveling the Kyoto Commitments

A careful analysis of the Kyoto commitments suggests that in real terms, Kyoto did not actually usher in any real net reduction in Annex I emissions at all. It should realistically be understood merely as a call for stabilization at current—i.e. 1997—levels (Bolin 1998, 331). Ordinarily, this would not have posed a problem if each Annex I country were required to implement its commitment independent of other

countries. However, with a compliance regime structured around emissions trading the entire process can very easily degenerate into a game of creative accounting rather than blossoming into a vehicle for meaningful emissions reduction.

The Kyoto numbers themselves are much better at telling this story. Our analysis is based on historic data of annual national emissions of anthropogenic CO_2 (carbon dioxide) which has recently been made available by the Oak Ridge National Laboratory and provides national emissions up to 1995 (Marland et al. 1998). Of all available sources, this data set is the most current, the most comparable between countries, and historically the most reliable. It includes CO_2 emissions from fossil fuel burning, cement manufacture and gas flaring, and excludes emissions from land-use change and forestry.

Our projections for 1997 are based on the observed trend for the period 1990-95 and projected emissions for 2010 assume that all countries will utilize the limits set by the Kyoto Protocol to their fullest extent. Our analysis here is based only on CO_2 emissions. We realize that the addition of other greenhouse gasses and the incorporation of sinks might make a difference for specific countries. However, CO_2 is by far the most significant greenhouse gas and a robust predictor of the larger trends. It is the implications of these trends, rather than the specific numbers, that this paper seeks to highlight.

It should also be noted that our 1997 projections assume that each country's emissions trend for 1990-95 can be reasonably extended to two more years. We understand that this may not necessarily be true for some individual countries (e.g., Germany and a few economies in transition where the economic recovery). However, we have confidence in our methodology because a) our numbers come out to be similar to other comparable estimates, and b) even if our assumption is questionable for individual countries it is fairly accurate for groups of countries and is a reasonable approximation. Moreover, our essential argument is supported equally well with 1995 numbers (the latest year for which Oak Ridge National Laboratory data are available) which is what we use in most of our discussion.

Table 1 presents the observed annual CO_2 emissions for all Annex I countries for 1990, 1991, 1993 and 1995, projected emissions for 1997 based on 1990-95 emissions growth, and projected emissions for 2010 based on the Kyoto commitments.

Table 1: Anthropogenic CO2 Emissions (Excluding Land Use Changes) and Kyoto Commitments for all Annex I Countries[a]
(Expressed in Millions of Metric Tons of Carbon)

Country	Kyoto Commitments[b]	Observed 1990	Observed 1991	Observed 1993	Observed 1995	Projected 1997[c]	Kyoto Limit for 2010[d]
Australia	108%	69.1	70.1	75.1	79.1	83.1	74.7
Austria	92%	15.4	16.1	15.1	16.2	16.3	14.2
Belgium	92%	26.8	27.9	26.7	28.3	28.7	24.6
Canada	94%	111.6	110.9	115.7	118.9	122.4	104.9
Denmark	92%	14.0	18.0	16.9	15.0	15.2	12.9
Finland	92%	14.5	14.7	13.2	13.9	13.7	13.3
France	92%	96.4	99.8	93.9	92.8	89.7	88.7
Germany[e]	92%	268.2	240.7	231.2	227.9	213.1	246.7
Greece	92%	19.9	18.4	20.3	20.8	21.6	18.3
Iceland	110%	0.6	0.5	0.6	0.5	0.5	0.6

Ireland	92%	7.8	8.9	8.7	8.8	9.1	7.2
Italy	92%	107.7	111.3	107.6	111.9	112.0	99.1
Japan	94%	287.1	292.4	289.0	307.5	314.6	269.9
Luxembourg	92%	2.6	2.8	2.9	2.5	2.5	2.4
Netherlands	92%	37.9	37.6	37.2	37.1	36.7	34.9
New Zealand	100%	6.6	6.9	6.9	7.5	7.8	6.6
Norway	101%	14.3	16.0	10.2	19.8	20.3	14.4
Portugal	92%	11.3	11.5	12.4	14.2	15.2	10.4
Spain	92%	57.9	60.3	56.1	63.2	64.3	53.3
Sweden	92%	13.3	14.4	13.1	12.2	11.6	12.3
Switzerland	92%	11.8	11.2	11.8	10.6	10.2	10.9
United Kingdom	92%	154.7	154.3	149.6	148.0	144.9	142.3
United States	93%	1,289.0	1,306.3	1,332.1	1,407.3	1,453.4	1,198.8
SUBTOTAL		2,638.5	2,650.9	2,646.1	2,764.0	2,806.8	2,461.3
ECONOMIES IN TRANSITION							
Bulgaria	92%	21.3	16.1	18.4	15.5	13.8	21.3
Croatia[f]	95%	7.4	5.0	4.3	4.6	3.8	7.0
Czech Republic[f]	92%	43.9	39.9	32.8	30.6	25.2	40.4
Estonia[f]	92%	6.6	6.4	5.0	4.5	3.6	6.1
Hungary	94%	18.1	17.8	15.2	15.3	13.9	20.2
Latvia[f]	92%	3.9	3.8	3.4	2.5	2.0	3.6
Lithuania[f]	92%	6.7	6.5	4.9	4.0	2.8	6.2
Poland	94%	93.9	93.0	97.0	92.3	91.9	114.3
Romania	92%	41.9	37.9	33.4	33.0	29.4	52.7
Russian Federation[f]	100%	600.2	579.3	512.4	496.2	441.6	600.2
Slovakia[f]	92%	14.3	12.9	10.7	10.4	8.7	13.1
Slovenia[f]	92%	4.9	3.3	3.0	3.2	2.6	4.5
Ukraine[f]	100%	191.3	184.6	141.0	119.6	85.2	191.3
SUBTOTAL		1,054.4	1,006.4	881.5	831.7	724.5	1,080.9
All Annex I Countries		3,692.9	3,657.3	3,527.6	3,595.7	3,531.3	3,542.2

Source: Based on Marland et al. (1998)

Note:

a Liechtenstein is not included in this table because Marland et al. (1998) do not provide data for it. Monaco's emissions are included as part of France's.

b Expressed as the percentage of the base-period emissions. For most Parties the base-period is defined as 1990 emissions. The exceptions include Bulgaria (1989), Hungary (1985-87), Poland (1988) and Romania (1989).

c 1997 projections are based on emission changes in each Party during the period 1990-95.

d The projected 2010 emissions are based on the assumption that each Party will be fulfilling its Kyoto commitments and emitting its maximum allowance thereunder.

e Germany's total emissions prior to 1992 were calculated by adding the emissions from former East and West Germany.

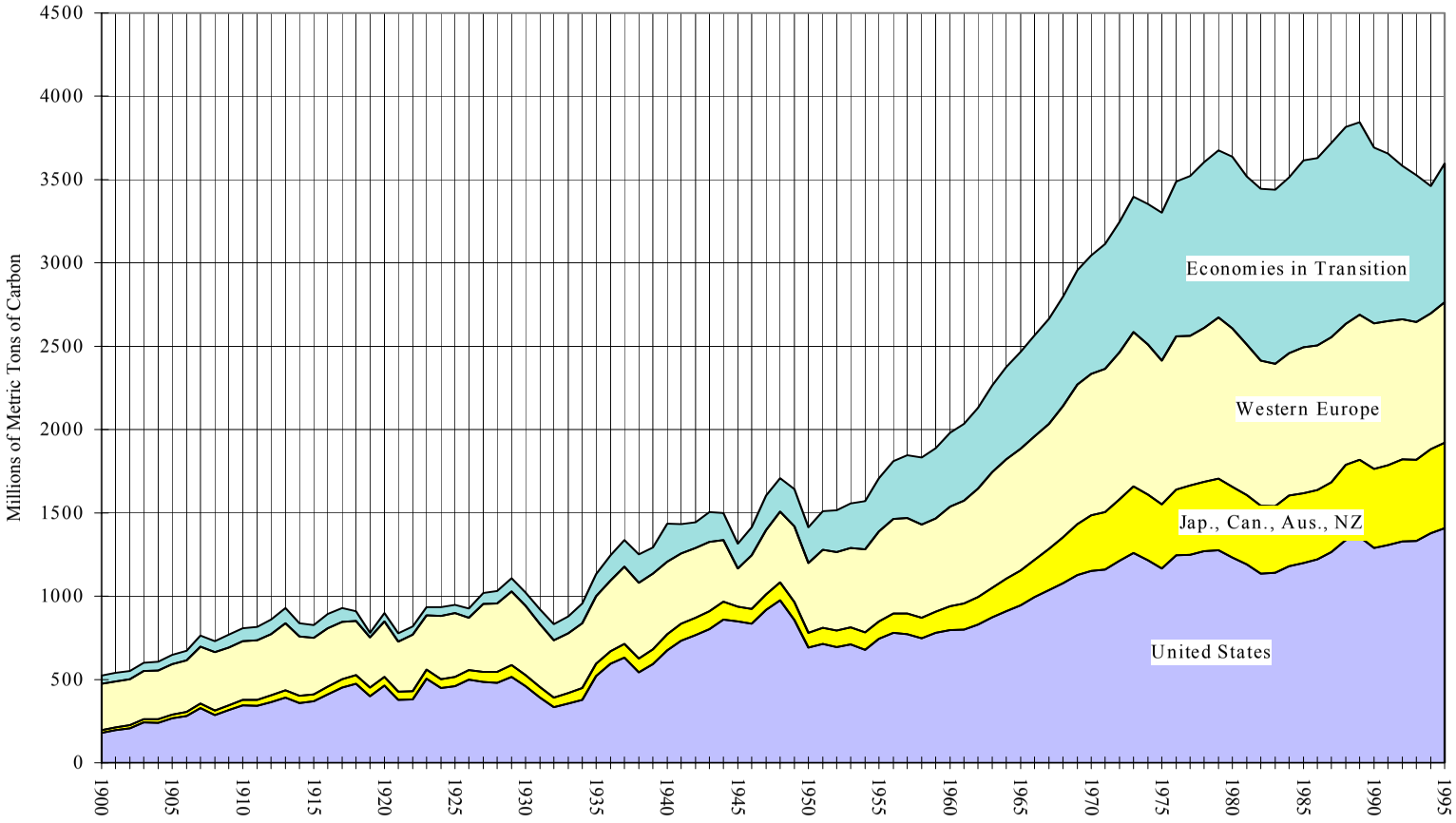
f For years prior to 1992, the emissions from the former Yugoslavia were distributed proportionally (based on their 1992 emissions) between its breakup states including Croatia (20.67%) and Slovenia (13.75%). A similar process was used to distribute the pre-1992 emissions of former Czechoslovakia between the Czech Republic (75.51%) and Slovakia (24.49%). Emissions from the former USSR were similarly assigned to the Russian Federation (59.34%), Lithuania (0.67%), Estonia (0.65%) and Latvia (0.39%).

Figure 1 seeks to add historical depth to the analysis by plotting the observed annual CO_2 emissions of what are now called Annex I countries from 1900 to 1995. Annex I countries have been divided here into four obvious groups. USA, because of its extraordinarily high annual emissions, is designated as a group unto itself. Western Europe is lumped together as another separate group, as are economies in transition. The fourth group (Other Annex I countries) includes Japan, Canada, Australia and New Zealand.

Between Table 1 and Figure 1, the most strikingly aspect of the data is that Annex I countries, as a group, are currently—and have been for every year since then—below their total emissions level in 1990. It is obvious why this is so. There has been a precipitous drop in emissions from the former Eastern Bloc due to the crumbling of these economies during transition to a market system. This group of countries, which accounted for 28.5% of the overall Annex I emissions in 1990 accounted for only 23% in 1995. By our estimation the Russian Federation, Romania, the Czech Republic and Ukraine, which are amongst the biggest emitters in this group, may already have witnessed drops of around 26%, 30%, 43% and 55% respectively over the last seven years (*also see* Flavin and Dunn 1997, 15).

As a group, Western Europe is also below its 1990 emissions largely due to the closure of many inefficient factories in the former East Germany (following German reunification) and energy-mix changes in United Kingdom and France. In fact, in 1995 (the latest year for which data from the Oak Ridge National Laboratory is available) the total emissions from Annex I countries in Western Europe were the lowest they had been in over 25 years while the total emissions for Annex I countries in Eastern Europe were the lowest they had been in more than 20 years.

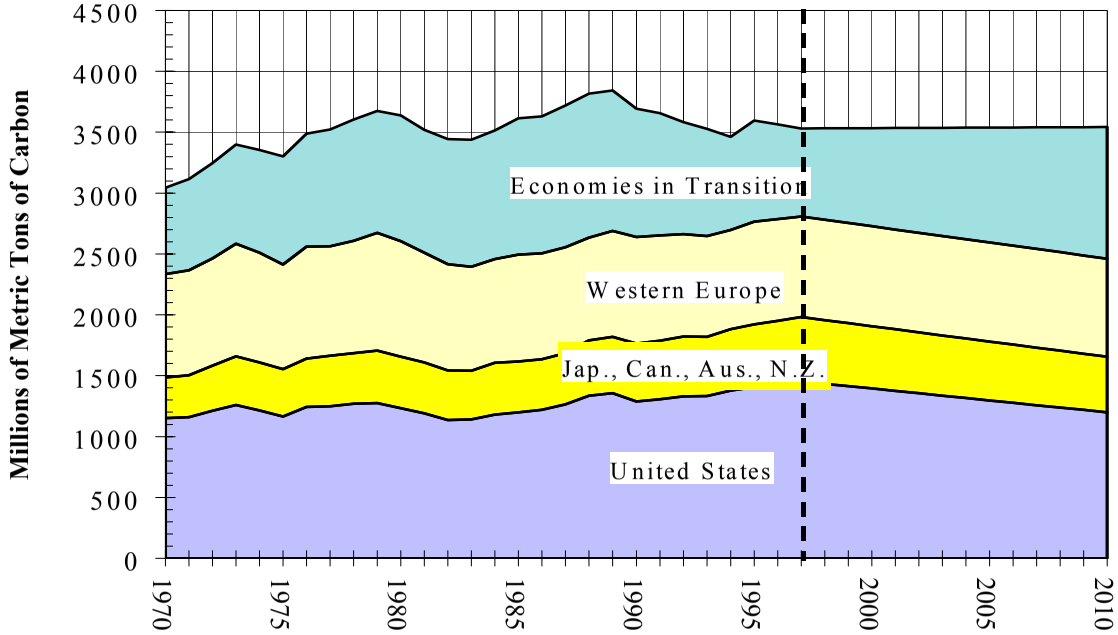
Figure1: **Annual Anthropogenic CO2 Emissions (Excluding Land Use Changes) for Annual I Countries (1900-1995)**



The above, however, is no reason for complacency, much less for celebration. The unforeseen gains have been significantly offset by the unchecked growth in emissions from USA, Japan, Canada and Australia all of whom have increased their emissions to the tune of around 10% over 1990 levels. The magnitude of this increase is substantial because all these countries are major emitters and USA alone contributes some 40% of Annex I emissions. The importance of such increases is highlighted by Flavin and Dunn (1997, 13) who point out that "in the United States [of America], the increase in emissions between 1990 and 1996 is above the total combined annual emissions of Brazil and Indonesia, two of the largest developing countries."

Figure 2: Anuual Anthropogenic CO2 Emissions (Excluding Land Use Changes) for Annex I Countries (1970-2010)

Figure 2 focuses more on the impact that the Kyoto commitments are likely to have on future emissions from Annex 1 countries. It also



zooms in on past emissions data to provide more texture to the current picture of regional emissions. The dotted line signifies estimated 1997 emissions at the time the Kyoto Protocol was negotiated. In charting Annex I emissions between 1970 and projected 2010, it powerfully highlights the point that the commitments agreed at Kyoto, if implemented to their fullest, will effectively do no more than freeze the current emissions level into the future.

However, it is also obvious from the graph that the steepest cuts (from current levels) have been mandated for USA, which has also had the steepest rise in emissions in recent years. In fact, since US emissions are already so much higher than its 1990 levels, it would have to come down by some 15% from its 1995 level if it were to achieve its Kyoto commitments on its own. The economies in transition, on the other hand, have been granted emissions limits near to or equaling their base-period emissions which, due to the recent collapse of their industrial base, implies a possible increase of around 30% over their 1995 levels and possibly even more over their current levels.

Figure 2 also highlights the fact that it is now theoretically possible for the richer countries in Annex I to simply 'trade' their way into compliance without making any actual reductions. For example, the Kyoto protocol requires USA to *reduce* its emissions by some 255 million metric tons of carbon between now and 2010. At the same time, according to our projection, the Protocol allows economies in transition to *increase* their emissions over this period by as much as 350 million metric tons (using the observed data for 1995, USA is required to reduce by some 210 million metric tons of carbon by 2010 while the economies in transition are allowed to increase by some 250 million metric tons over the same period.). In fact, the increases allowed to the Russian Federation and Ukraine (265 million metric tons over projected 1997 emissions) alone could cover the entire reduction required of USA. It should be no surprise, then, that the Russian Federation and USA were the two most active proponents of placing trading provisions within the Kyoto Protocol.

Realistically speaking, it is highly unlikely that USA and others could meet their commitments entirely through trading. However, the numbers do point ominously towards the danger inherent in unbridled enthusiasm for unrestrained emissions trading among Annex I countries.

Policy Implications

The above discussion should not distract from the fact that Kyoto is a step in the right direction. It does, however, confirm that it is a modest and tentative step. More importantly, it is a step that can very easily falter in the absence of strong support and follow-up action from Annex I countries. Importantly, our analysis highlights two related policy implications. The first relates to the yet undefined, but already accepted, emissions trading provisions in the Climate Convention and the second to the ultimate inclusion of the developing countries within a climate change commitments regime.

If, indeed, each country had been required to meet its commitments through domestic actions alone then the above results would be much less a cause for concern. Annex I countries that have the largest emissions and have shown the largest emissions growth have, in fact, been mandated to make the severest cuts. Moreover, even though the permissible additional emissions for economies in transition are very large in real as well as percentage terms it is unlikely that their domestic emissions will rebound to such a level by 2010. This is so partly because of technological advances and partly because of their changing economic structure. One could plausibly argue, therefore, that if all Annex I countries were required to meet their commitments on their own, the total emissions of these countries would be below what they are today and significantly less than the much touted '5.2% of their 1990 total emissions'. However, the provision for emissions trading can place more than a wrinkle on this assessment.

Although the Kyoto Protocol makes repeated references to emissions trading the exact modalities of how this may be carried out has been left open (UNFCCC 1997, Article 16 bis). The final shape of the trading regime remains far from clear. For example, many developing countries still view a trading mechanism based on per capita emissions to be the most fair approach (Agarwal and Narain 1989; Najam 1997) while most industrialized countries reject such a proposition outright.

As delegates begin pondering upon the exact shape that the trading system might ultimately take they would be well advised to carefully analyze the danger of camouflaging policy inaction by creative accounting under the guise of emissions trading. A provision can, for example, be included for limiting the total amount of credit that a country can claim from such trades to an agreed percentage of its overall commitment. This would force countries to at least begin steering long-term policies in the right direction even as they buy their way to short-term compliance. Any trading scheme should serve as a primer for action rather than as its motor. While emissions trading is a good idea in principle, the tendency to rush into it should be resisted. Moreover, the implications of any trading mechanism will become even murkier as developing countries are also brought into the fold of the UNFCCC commitments regime.

This brings us to a second, potentially thornier, issue. As the clamor demanding more action from the developing countries increases it is unlikely that they will overlook the real implications of the Kyoto numbers. It has long been accepted that the industrialized countries of the North will have to demonstrate their earnestness in combating climate change well before anything could reasonably be asked of the developing nations of the South (Cutajar 1997). Much of the post-Kyoto discussion seems to assume that in signing the Protocol the North has done its job; or at least taken a first important step. The South can now justifiably claim that the North has, in fact, not agreed to real reductions at all but merely to a stabilization of the status quo. This will only lead to another unfortunate, but very familiar, bout of finger-pointing (Najam 1995).

The only way out of the quagmire is for the North to agree to begin its second step at the same time as it asks the South to make its first. Instead of letting the opportunity provided by the unplanned reductions in the formerly planned economies of Eastern Europe slip by—or used merely to postpone further real net reductions—Annex I countries should commit to build on this momentum. Annex I countries are now scheduled to revisit their commitments sometime around 2003-05; if they seriously want the developing countries to join the effort, they will have to demonstrate real policy action and a willingness to make their own commitments more stringent well before that. If, on the other hand, the compliance of the Kyoto Protocol degenerates into a charade of creative accounting maneuvers masquerading as emissions trading—as it well can—then we can bid good bye to any hope of developing country participation.

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