

**“The Kyoto Agreement on Mitigating Global Climate Change:
Gains to All from Participation by Developing Countries”**

Keynote speech

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I take particular pleasure in having this opportunity to speak to you, about the role of developing countries in policy to deal with global climate change. Seven months after Kyoto and four months before Buenos Aires, this is the right discussion at the right time.

Let me begin by saying a few words regarding the part played within the US government by the Council of Economic Advisers. Since the Fall of 1996, I believe that the CEA has spent more time on the economics of global climate change policy than on any other single issue. I personally have found it a fascinating topic.

It is self-serving to emphasize the importance of involvement of one’s own agency. But economic thinking has been an important determinant of the Clinton Administration’s policy on climate change. Our role has included explaining the benefits of market-based solutions, especially the benefits of emissions trading, both domestically and internationally. We have said in Senate testimony that under a well-designed international agreement and domestic implementation, that the costs to the United States of meeting the Kyoto obligations would be modest. Trading among industrialized countries alone could reduce the costs by about half, and trading with developing countries could bring total costs down by more than eighty percent of what the costs would be if all reductions in emissions had to be accomplished domestically.

I think there might be advantages of more involvement by economics agencies in policy-making in other countries as well, rather than just the environmental and foreign ministries that have had the issue primarily to themselves. If other countries had a greater appreciation for the benefits of market-based solutions, the gaps in the international negotiations might not be as large as they now are.

The importance of mitigating climate change

I won't go into great detail on the need to address the problem of global climate change; you have no doubt heard about the effects of global warming, including higher sea levels and risk of various catastrophes, from others. The biggest effects will come in developing countries, because they are more agricultural and because most are already located in hotter climates to begin with.

[It is important to recognize the costs and risks facing our planet should we fail to act. Current concentrations of greenhouse gases have reached levels well above those of preindustrial times. As a consequence, the Intergovernmental Panel on Climate Change estimates that global temperatures will increase by between 2 to 6 degrees Fahrenheit in the next 100 years, with a best guess of about 3.5 degrees Fahrenheit. The IPCC reports that a doubling of carbon dioxide levels would lead to approximately 10,000 additional deaths per year for the current U.S. population from higher summer temperatures, even after netting out the effects of warmer winters and acclimatization. The IPCC also predicts sea level increases of about 20 inches by 2100, with greater increases in subsequent years. Despite the difficulties of deriving quantitative assessments of the damages from climate change, researchers have nonetheless developed monetary estimates of damages that prompt substantial concern, and range in the tens of billions of dollars per year for temperature changes projected to occur in the next century. If left uncontrolled, disruption of the Earth's climate may thus pose substantial costs in terms of harm to commerce and the environment alike. In our investigation of various costs and benefits, we have found it impossible to put a single monetary number on the value of the Kyoto Agreement in mitigating global climate change. But these costs--and they are significant--provide the primary motivation for actions to reduce greenhouse gas emissions. Moreover, these estimates do not, and cannot, accurately reflect the value of reducing the unknown risk of large-scale and potentially irreversible events with potentially catastrophic consequences. There is a strong argument for the Kyoto Protocol as a form of insurance against a serious environmental threat.]

The importance of developing countries

I mentioned a number of political chasms that have to be bridged to arrive at successful approval and implementation of the Kyoto treaty. The one that I would like to address tonight concerns participation by developing countries.

We cannot solve the climate change problem without participation by developing countries. The U.S. Senate strongly opposes any agreement that does not include them. (Developing countries are here defined as those outside the 38 industrialized -- and transition -- countries, known as Annex I countries, that agreed to binding reductions in emissions of greenhouse gases at Kyoto.)

The Senate voted 95-0 for the Byrd-Hagel resolution, making LDC commitment to emission targets a pre-requisite for ratifying the Kyoto treaty. Senators use words like "competitiveness" and "fairness" to express why they insist on full developing country participation in any plans for emission reductions. As an economist, I am not entirely sure what these words mean. Paul Krugman has explained to us why competitiveness is "a dangerous obsession." And "fairness" is much in the eye of the beholder -- witness that developing countries argue that a fair distribution

of emission rights would be on an equal per capita basis. I believe it is indeed crucial that developing countries participate. Indeed, the President has said that he will not submit the treaty for Senate ratification until there is commitment to meaningful participation by developing countries in the first budget period (2008-2012). But we would phrase the reasons differently than does the Congress.

There are several reasons why meaningful participation from developing countries is essential.

- First, a global problem requires a global solution. The problem is inherently one where individual countries can make little progress on their own. It can be thought of as an “international externality,” “the tragedy of the commons,” “free-riding,” or “global public goods.” Whatever you call the problem, a solution requires that all countries agree to participate together.
- The whole effort to address climate change will not succeed without the developing countries because they are the fastest-growing source of emissions, and will surpass the industrialized countries early in the century if everyone proceeds under “Business as Usual.” The crossover is projected to occur by 2020, according to the International Energy Outlook 1998 released recently by the U.S. Energy Information Agency. China is expected to surpass the United States as the largest single emitter by around 2015. Without the participation of developing economies, emissions reductions by the industrialized countries will therefore not achieve necessary protection from climate change.
- Indeed, if developing countries do not participate in the international regime, their emissions could potentially increase by *more* than under their business-as-usual baselines. This is the problem of *leakage*. One mechanism for such an unintended consequence of the Kyoto agreement is the relocation of carbon-intensive industries from participating to non-participating countries. Another mechanism is as follows. As Annex I countries comply with their targets, their demand for oil will fall, causing the price of oil to fall on world markets, and encouraging non-participating countries to use more oil and emit more carbon than they otherwise would have. The result would be that every ton of emission reductions in the North would be partially offset by an increase in the South.
- Finally, developing country participation is crucial because it would permit relatively low-cost emissions reductions to be internationally recognized in place of some high-cost reductions in the industrialized countries. Greenhouse gas emissions have the same basic impact on the climate regardless of where they occur. So reductions in developing countries have the same environmental benefit as reductions domestically, even though the reductions in developing countries are often much less costly. It thus makes sense, from both an environmental and an economic perspective, to incorporate emissions reductions in developing countries into the international system.

What about “competitiveness”? One of the difficulties in analyzing concerns related to

competitiveness is that the term itself is used to mean many different things. (I have seen at least one study that uses “loss of competitiveness” to refer to predictions of negative effects on the *aggregate* trade balance. As a professional economist, I do not accept the logic upon which that particular argument is predicated: the aggregate trade balance is determined by macroeconomic forces -- the difference between saving and investment -- and not by our environmental policies.

If competitiveness refers to adverse effects on a few specific manufacturing industries -- those that are especially energy-intensive, such as aluminum, paper, and chemicals -- the situation is more complicated. It is difficult to undergo a significant structural change in the economy without having the effect of expanding some sectors and contracting others. But to provide some perspective on this issue, we need to consider the following facts. First, on average, energy constitutes only 2.2 percent of total costs to U.S. industry. Second, energy prices already differ significantly between the U.S. and countries such as Venezuela (see Appendix for price differential), and yet U.S. industry is not generally fleeing to Venezuela. Third, two-thirds of all emissions are not in manufacturing at all, but in transportation and buildings.

I therefore believe it more accurate to say that we need developing country participation for the reasons I outlined above -- projected emission paths, the global nature of the public good, leakage, and cost-minimization -- than to say that we need it to avoid adverse effects on competitiveness.

The viewpoint from the South

Developing countries make several arguments on the other side.

- First, their duty is to their citizens.
 - (1a) Thus their priority must be raising their own economic standards of living.
 - (1b) This includes beginning to control local air and water pollution. Such pollution already is visible and is taking a large toll on health, and so must be higher priority than controlling greenhouse gases that are not visible and that may not have serious health effects until a century into the future.
- Second, the developing countries should not be required to take any step that entails economic sacrifice until the industrialized countries have done so. There are two reasons for this:
 - (2a) the industrialized countries created the problem, and
 - (2b) they are richer and can more readily afford to make sacrifices.

You might expect me to present counterarguments to these points. But the fact is, I don't disagree with them. The Clinton Administration is not asking poor countries to forego their economic development. “Meaningful participation during the period 2008-2012” need not entail economic sacrifice by developing countries. The argument is not based on diplomatic or political “happy talk”, but on sound economic logic, which I would like to explain.

For developing countries to join the system of targets-with-trading would not only have environmental and economic advantages for the rest of the world; it could also have important environmental and economic advantages for the developing countries themselves. For the sake of concreteness, let us consider a plan under which developing countries commit to their “business-as-usual” emission paths in 2008-2012. [I cannot promise that the US government would necessarily support this precise plan at the present time. The Administration has discussed “growth targets;” some have in mind that these targets constitute rates of increase in emissions that are slightly less than the BAU paths. But I personally am willing to say that I would support targets equal to the BAU path. In any case, let us consider the implications of such a proposal.]

The gains from trade

The first thing you should notice is that this system is not going to hurt you. You have the right in the budget period to emit whatever you would have emitted anyway. You need not undertake emission reductions during the budget period unless a foreign government or foreign corporation in the future offers to pay you enough to persuade you voluntarily to do so.

We would anticipate that foreign governments and foreign corporations would indeed offer to pay you enough in the budget period to persuade you voluntarily to reduce emissions below your BAU paths. It could get expensive for the United States, Europe, and Japan to reduce emissions below 1990 levels over the next ten-to-fourteen years if the reductions are made only domestically. The cost of reductions is far less in developing countries. Thus governments and corporations in industrialized countries will be able to offer terms that make it economically attractive to make the reductions. The economic theory behind the gains from trading emission rights is analogous to the economic theory behind the gains from trading commodities. By doing what they do most cheaply, both sides win. In Ricardo’s classic trade example, Portugal specialized in producing wine and England in producing textiles. In the current context, developing countries specialize, for example, in installing clean power-generation capacity, while industrialized countries specialize in producing the capital goods that go into those plants.

Why is it so much cheaper to make reductions in developing countries than in rich countries? One major reason is that in industrialized countries, one would have to scrap coal-fired power plants far in advance of their 40-year useful life, in order to replace them with natural gas facilities or other cleaner technologies. This would be very expensive to do, because it would mean wasting a huge existing capital stock. In rapidly-growing developing countries, on the other hand, it is more a matter of choosing to build cleaner power-generating plants to begin with, in place of building coal-fired plants. In general, when contemplating large increases in future demand for energy, it is good to learn from the mistakes of others that have gone before, and to take advantage of their technological advances.

The gains from trade can be made more concrete with some estimated magnitudes. We have estimated (using the SGM model) that if Mexico were to join the target-and-trade system, the gains would be roughly \$1 billion per year, each, for Mexico and the United States. If India were to join, it would gain almost \$2 billion per year (and the United States slightly more). If China

were to join, it would gain almost \$4 billion a year (and the U.S. almost \$12 billion a year; the worldwide price of emission permits falls by half, relative to trading among Annex I countries alone).¹

An extreme example of how measures to reduce carbon emissions have low costs in developing countries is the case of fossil fuel subsidies, especially coal. Eliminating such subsidies would create substantial immediate benefits -- fiscal, economic, and environmental -- even before counting any benefits under a global climate change agreement. Coal, the most carbon-polluting form of fuel, supplies the majority of energy in China, for example.² A major reason for the heavy use of coal is that it has historically been heavily subsidized. I have seen estimates that coal subsidies outside the OECD totaled \$37-\$51 billion worth in 1991-92. [The figure is \$11 billion in the OECD]. Total fossil fuel subsidies are much greater -- well over \$200 billion in the early 1990s, though smaller now. A 1994 study estimated that removing them would reduce global emissions by 7%. A 1995 study estimated that energy subsidies currently act as a negative carbon tax of about \$40 per ton, and that global CO₂ emissions would be reduced by 4-5 % if all energy subsidies were removed. Some countries like China (and other Asian countries, Argentina, Brazil, South Africa, and some oil-producing countries) have already reduced the dollar value of such subsidies substantially in recent years. Non-OECD countries have cut fossil fuel subsidies by half between 1990-91 and 1995-96 [a more rapid rate than Annex I countries]. But more progress needs to be made. Such reductions would pay developing-country governments twice over -- once in the form of the money that is saved by eliminating wasteful expenditure, and then again in the form of the money that an Annex I country would be willing to pay for the resulting emission reductions.

Some specifics

I would not deny that there are possible practical difficulties with my target-and-trade proposal.

One problem is the uncertainty of the BAU path. It is difficult to forecast ten years ahead what a country's emissions would be in the absence of policy change. This is particularly true because it is difficult to forecast ten years ahead what a country's GDP will be. In 1990, one would have forecasted that Thailand would be growing very rapidly for the subsequent two decades; with the rapid growth in output comes rapid growth in BAU emissions. [In a log-linear regression of emissions against GDP, the coefficient is __, and the level of statistical significance __ %.] Meanwhile, in 1990 one would have forecasted that Poland would have questionable prospects [the Polish economy contracted by 12 % that year]. Today, in 1998, these two countries have switched places. Forecasts of Thai growth are sharply reduced, while Poland is growing

¹ Emissions abated would be roughly 19% of Mexico's BAU. India is estimated to abate about 18% of BAU. China abates about 20 % of BAU. The estimated gain in each case is the area under the marginal cost of abatement curve.

² 76% of commercial traded fuels, including nuclear and hydro. The figures are 57 % in India and 36% in Africa. Other statistics are given in a March 1997 World Bank study.

strongly.³ In truth, nobody knows what the future will bring for these two countries or any others.

Such uncertainty means that a good-faith attempt to forecast the BAU path could produce a given series of numbers for future emissions that, while looking reasonable today, turn out in 2008-2012 to be inadvertently stringent, imposing unanticipated economic cost on the country ex post (or, on the other hand, to be inadvertently lax, allowing the country to get paid for emission reductions that it would have made anyway -- what we call creating “tropical hot air” or “paper tons”). If countries’ future growth rates turn out to be very different from what was anticipated when a binding BAU path was established, they will simply refuse to abide by them.

I have a possible response to this problem. It is a suggestion to *index* the emissions target, to such variables as GDP in the year 2007. Although this will not eliminate the uncertainty associated with the BAU path, it will reduce it substantially. Thus it will reduce the probability of inadvertent stringency (or, on the other hand, of inadvertent “tropical hot air”). Such a formula would constitute tangible proof that we are not seeking to inhibit developing countries from growing rapidly. Furthermore, compared to pragmatic alternative approaches that determine future targets from past emissions, a formula that puts less weight on past emissions minimizes the incentive for countries to maximize emissions in the near term in order to have a higher base allocation in the future.

This indexation proposal is only one possibility, which I offer for the sake of illustration. Other possibilities include formulas, with the specifics determined by

- an international body of “objective experts”
- statistical estimates of the relationship between emissions and such variables as GDP, population, and 1990 emission levels, using past data
- negotiated common formula
- negotiation of different formulas for different countries .

Summary of the argument

I said at the outset that a target-and-trade system that includes developing countries has advantages for them as well as for rich countries, and that these advantages are both economic and environmental. Let me now recap the four kinds of advantages. The economic and environmental rationale include:

- **Economic benefits to developing countries:** With targets at BAU, developing countries would enjoy net gains of many billions of dollars through the international sale of emission reductions achieved at costs below the world price.
- **Cost savings to the U.S.:** Participation by developing countries in international permit markets would greatly lower the costs to the U.S. of meeting its Kyoto target, as CEA

³ 5 % annual, on average from 1992 to 1996; IMF forecasts: 1997 - 6.9% and 1998 - 5.5%.

testimony has shown. In particular, it is estimated that trading with developing countries, if it were fully accepted and successfully implemented, would lower U.S. costs by 80-87 percent (as compared to 57 percent savings from trading among Annex I countries alone).

The explanation, again, is that it is far cheaper to pay for some reductions in developing countries than to undertake all reductions at home.

- **Environmental benefits to developing countries:** When permits are sold, reductions in carbon dioxide emissions generate ancillary air quality benefits in the developing countries through lower particulate matter, sulfur dioxide, and nitrogen oxides emissions. The emission reductions that I mentioned before -- as estimates for how much it would be profitable to sell -- imply avoidance in 2010 of an estimated 19,700 deaths from reduced particulate matter in Mexico, 105,300 in India, and 136,700 in China.⁴
- **Environmental benefits for the whole world:** Targets slightly below business as usual would lower global emissions relative to a world with only Annex I targets. *Even targets without cuts would forestall leakage* [increases over BAU in response to Annex I cuts] and would thus result in a lower level of global greenhouse gas concentrations than otherwise.

Advantages from participation by developing countries in target-and-trade system

| Advantages | for industrialized countries: | for developing countries: |
|---------------|---|---|
| economic | Cheaper to buy some reductions abroad, than to do them all at home. | Will be paid to make reductions below BAU path voluntarily. |
| environmental | Forestall leakage of emissions to poor countries. | Reduced emissions will improve air quality. |

The fifth advantage does not appear in the table. Without meaningful participation by developing countries, the President will not submit the treaty, the Senate will not ratify it, it will not come into force anywhere, and we will have missed the chance to begin to address the global warming problem while there is still time.

⁴ This back-of-the-envelope calculation treats each of the three in turn as the one country to trade with Annex I. It draws on a recent study published in Lancet, which also projected that by 2020 a climate change policy that reduced developing country emissions 10 % below BAU could produce an annual reduction of 563,000 statistical deaths.

To repeat: *It is understandable that poorer countries feel that they should not have to sacrifice their economic well-being to deal with the problem of global climate change. But we are not asking them to do so.* Rather, we are looking for a cooperative effort, in which poor countries are not asked to make economic sacrifices, until such time as they have reached the income levels where it is appropriate to treat them like rich countries.

**Appendix 1:
Possible thresholds for full participation by developing countries**

- Membership in the OECD
- GDP/capita above \$3,000/year (or \$7,000 on a PPP basis),
- emissions per capita of 1 metric ton per year

**Appendix 2:
Participation by developing countries and concerns regarding U.S. “competitiveness”**

There exist concerns that attempts to reduce carbon emissions will cause a marked deterioration in U.S. competitiveness. The “competitiveness” argument has at least two versions:

- Without specific developing country targets, U.S. industry will relocate abroad.
- Without specific developing country targets, the demand for U.S. energy-intensive goods will decline and the trade balance will deteriorate.

It is important to recognize factors that tend to militate against significant location or trade effects:

- Non-tradeable sectors account for a substantial share of carbon emissions. Transportation and buildings, for example, account for roughly two-thirds of U.S. emissions. For these sectors, the “competitiveness” argument seems largely irrelevant.
- In most manufacturing sectors, energy costs are a small percentage of total costs. According to the 1995 Annual Census of Manufactures, energy costs for manufacturing industries averaged just 2.2 percent of total costs. In electronic equipment (SIC code 36), for example, energy accounts for 1.2 percent of total costs. In instruments and related products (SIC code 38), energy also accounts for 1.2 percent of total costs. Given the small share of energy in total costs in most industries, differential shifts in the relative price of energy across countries are unlikely to have substantial effects on location decisions and trade flows. Another form of this argument notes that significant differentials in existing energy prices across countries do not seem to cause substantial movements in industries. The price of a barrel of heavy fuel oil in 1994, for example, was \$13.65 in the United States and \$5.06 in Venezuela.⁵ Yet firms have not generally fled the United States for Venezuela.
- The burden of meeting an emission reduction target will be partially borne by non-participating countries because of changes mediated through international trade. For example, Annex I nations can be expected to demand less oil, shifting the terms of trade against oil-producing countries, and thereby forcing them to bear some of the costs of reducing greenhouse gases -- even if they do not formally participate in the international emissions reduction agreement.

Thus, although we believe that it is important to have developing countries as full participants, it is for the reasons stated above, and not for “competitiveness” concerns per se.

⁵ *Statistical Abstract 1996*, Table 1359, Page 848.