

Issues for Improving the IAT Modeling Effort

Summary of Reviewer Comments

Summary

The IAT draft report was a worthy first step in analyzing the impact of climate change policies on the US economy. This effort could be improved by using additional models and techniques, more adequately representing international and technological aspects, and by modeling the benefit side of policy options. There are also a number of second order details that could be dealt with in a more rigorous fashion.

First Order Issues

1. *Inadequate Models for the Purpose*

"The suite of models chosen for the analysis is simply inadequate." (Kopp) Specifically, they cannot deal sufficiently well with:

- current domestic policy options (a trading program)
- the effects of international flows on US trade balance and competitiveness
- technical progress and its costs

Reputable and more appropriate models do exist to address these issues, they should be used.

Specifics

- DRI -- This model is not adequate for the long-term economic forecasting being done. Furthermore, since its treatment of trade and savings is controversial, we should not be overly reliant on its results.

"This model is especially appropriate for projecting the impacts of monetary and fiscal policy over a time frame of approximately two or three years. For longer term projections, however, it is highly inappropriate and has some important limitations that are well known to the community of economic forecasters. For example, the DRI long term projections are extremely sensitive to assumptions about energy prices...." Furthermore, it uses a fixed-coefficient input-output model, which goes against the primary objectives of climate policies. (Nordhaus & Jorgenson)

"The entire issue of the effect of deficits on saving is controversial, to say the least, and there is no agreement among economists that the way these issues are handled in the DRI model is correct." The DRI results indicate the energy intensive Hydraulic Cement and Primary Aluminum industries are among those that will most benefit from emissions reductions -- a very skeptical result. (DeCanio)

- Markal Macro -- "Not an economic model, and suffers from many weaknesses..." Should consider using a more rigorously tested model -- MERGE. (Kopp)
- SGM -- "The biggest limitation of models like SGM is the representation of the energy-economy interface... In particular, the representation of the cost of abatement

as flowing primarily through specific energy sector investments will not capture the other costs arising from changes in the scale and composition of economic activity. In addition, models like SGM may fail to adequately capture the opportunity costs of technical substitution, thus understating the costs of abatement policies. These models are typically based on a careful characterization of potential technical options, but without a full recognition of the tradeoffs faced by real economic agents.” (?)

- “Understanding the long term consequences of GHG accumulation requires a focus on how economic agents respond to market and non-market signals. None of the models you have selected can address this issue... Equally important, an evaluation of the adjustment costs imposed by policy requires a model of short and long term substitution in response to a different set of policy induced market and non-market signals. In this case, as well, the models are incapable of addressing the question.” (Smith)

Next Steps

- Add a computable general equilibrium model -- candidates include models constructed by Jorgenson and Wilcoxon, Goulder, and Harrison and Rutherford; as well as models from EPA. (Kopp)
- Add a trade model -- “Until you employ a trade model that incorporates the effect of changing prices both within and across countries, [I recommend] that you drop the section on sectoral detail”. (Kopp?)

2. International Aspects

The analysis to date has ignored the possibly large effects of international flows resulting from an international carbon trading system. These could have a substantial impact on the US current account, which would require currency and/or capital adjustments. This needs to be factored into the analysis and cannot be done with the models currently being used.

Specifics:

- World Trade None of the models includes a sufficiently detailed representation of world trade to study the issue of international implementation and impacts. SGM, for example, models energy utilization in each of the regions included in the model. However trade in goods and services among the regions is not modeled.... This is another crippling deficiency of the analysis.” (N&J)
- Investment Diversion If only Annex 1 nations are included in an agreement, outsourcing and carbon leakage may be a problem. “If US firms move (or build new) factories in Mexico, rather than the U.S., this will reduce investment spending in the U.S. As a result, there will be less demand for investment goods and a smaller manufacturing sector overall. This effect needs to be examined carefully...” (Scott)
- International Emissions Permit Trading “I find it very implausible that allowing for international trades in emissions rights would reduce the price of permits by as much as predicted by the SGM model. Even if permit-selling countries initially have much lower costs of abatement... the marginal costs of abatement can be expected to rise

for the permit-selling countries as they undertake more abatement.” Does the SGM model capture this effect? (??)

Under global trading in emissions rights, what is assumed about non Annex-1 emissions constraints? Modeling this behaviour “will require a model with some ‘look-ahead’ capability.” (Richels)

Next Steps:

- Add a model capable of representing world trade.
- Run an alternative set of scenarios to evaluate the effects of a border equalization tax which could be used to reduce the effects of the cap system on trade and investment flows. (Scott)

3. Technology Change

Most reviewers (6 of 9) were skeptical of the rates of autonomous technological change and the way the “announcement effect” was represented. While most thought these were too high and not justified by the historical evidence, one reviewer believed they are too conservative. There is also concern that none of the models used can represent industry response to government policies and “announcements.” Without such capability, the results are highly suspect. In all, there is little consensus among experts as to how technological change will affect the costs of emissions reduction policies, nor how to model that process.

Specifics:

- Representation in Models -- “None of the models is well suited to take account of the more rapid diffusion of existing technologies that would accompany a clear and unambiguous price-like signal in favor of energy efficiency.” (DeCanio)

“To my knowledge [none of the models used] has any behavioral equations that would permit an anticipated change in energy prices to affect diffusion rates or rates of technological progress. Moreover, to my knowledge, no model has such behavioral links.” (Kopp)

“How is the announcement effect modeled? Do people run an inter-temporal optimization with look ahead to see what people would do now if the cost of using carbon is substantially higher in 20 years?” (Weyant)

“There is considerable confusion as to how the specified E/GDP ratio is actually implemented in each model. How does it affect the definition of the base case in the 1.25 scenario? What is the impact on the base case carbon emissions? Is it uniform across models?” (Richels)

- Assumptions -- “The sets of assumptions regarding energy efficiency trends seem unsubstantiated and to cover only the high end of the distribution.” Work by a number of researchers suggest trends more like .5 to .7. (Weyant)

“...many reviewers will be interested in the empirical support for the values chosen” for the announcement effect. (Richels?)

- Issues of Analysis -- The analysis appears to hold implicitly that both the current level and the current allocation of R&D is optimal. If this is not the case (and several studies indicate we underinvest in R&D), then increasing aggregate R&D would improve welfare. (DeCanio)
- Costs of Technology "It is quite plausible that the announcement of the policy would stimulate greater R&D and an associated increase in energy efficiency. However, such an improvement involves a resources cost: in general, additional resources must be devoted to R&D to generate this improvement. Knowledge-generating resources usually are not unemployed resources that can be obtained at no cost.... The baseline seems to assume that additional technological progress in energy efficient technologies does not involve any resource cost. This seems overly optimistic." (Goulder)

Next Steps:

- Mechanism of the Announcement Effect The announcement effect should not lead to an immediate increase in the rate of improvement in energy intensity. The "starting point" scenario should begin with the 1.0% increase and gradually increase the rate to 1.25% over time. (Kopp)
- Energy Efficiency Trends Use .5 or .7 as baseline and go .5 up and down for optimistic/pessimistic cases. (Weyant)
- "One experiment you may wish to conduct with Markal Macro is to explore the technology assumptions required to produce energy intensity reductions of the magnitudes discussed..." (Richels)

4. Benefits

Nearly every reviewer highlighted the need to examine the benefits as well as the costs of policy options. "Since the overall goal of U.S. policy is fundamental to everything that follows, inattention to the goals of policies is in our view a crippling deficiency..." (N&J)

Specifics

- "None of the models addresses the overall goals of us policy in the international arena or measures the extent to which different policies attain these goals. (N&J)
- The effort should consider the key policy "end states" (ultimate objectives) and evaluate options according to their effect on those end states. (Smith)

Next Steps

- "Inclusion of [the risks of climate change] using probabilistic decision analysis is within the capability of modern econmic analysis, and such calculations are crucial to assessing the full magnitude of the climate problem." (DeCanio)
- "Every effort should be made to quantify the benefits of carbon abatement and to integrate these estimates into a modeling framework that leads to the identification of the target and timetable as well as the cost." (Kopp)

Second Order Issues

Assumptions

- Baseline estimates for energy use and carbon emissions could be improved by running several scenarios of likely growth, especially for the Former Soviet Union. (Kopp) Additionally, the base case carbon emissions growth seem to be on the low side. (Kopp) "Oil and gas prices are assumed to rise, in contrast with the history of declining real prices over the period 1990-95. Coal prices are assumed to fall more slowly than in recent history. What is the basis for assuming faster price increases or slower price reductions than in the past?" (Goulder)
- Price Elasticities for Energy Demand in the DRI model may be on the high side. (Richels)
- Role of Monetary Policy It seems that results are "extremely sensitive to assumptions about monetary policy. The plausibility of these assumptions need to be examined... Is the Fed really going to act as suggested... Can monetary policy have these kinds of permanent effects on the growth rate? What effect does the recent budget agreement have on all of this?" (Richels)
- Nonconventional oil resources "I am hearing more and more talk about the availability of huge supplies of low-cost shale oil and tar sands at prices in the \$15 and \$20 per barrel range. If this turns out to be the case, baseline carbon emissions will be higher than projected as will the cost of a carbon constraint." (Richels)

Next Steps:

- Considerably more sensitivity analysis is necessary to bound the range of costs. (Richels)
- Use more than one set of baseline assumptions. "We caution you... about the pitfalls in relying on a single set of assumptions for all the models. We recommend having a set of runs in which individual modelers use their own baseline assumptions for economic growth and energy utilization in order to describe the possible range of policy impacts." (N&J)

Energy predictions could be compared to the poll results of the 1997 International Energy Workshop published by the International Institute for Applied Systems Analysis.

Scope of Analysis

Current modeling runs and efforts have focused on a few limited scenarios. Several reviewers suggested a more comprehensive analysis be undertaken to answer questions of timing and the optimal reduction.

Specifics

- Analysis is insufficient to answer the timing debate. Specifically, "the issues of concern first involve a target later than 2010 and second the idea that it is better to abate later while enhancing technological knowledge now so that the cost of abatement later is lower." These are not dealt with in the current draft.

- Issues of intertemporal trading should be included in the analysis -- how many years should be in an emissions budget?
- "The [starting point scenario] may represent a reasonable starting point ... the degree to which you experiment with alternative emission constraints seems to be somewhat limited. ... you could examine what might constitute cost-effective strategies for limiting concentrations to alternative levels and *then* explore the implications for near-term mitigation decisions for Annex I nations... Alternatively, you could take an approach favored by many economists and employ cost benefit analysis as a guide to ... identify mitigation strategies that minimize the sum of costs and damages. ... I have seen very few economic analyses that suggest that stabilizing Annex 1 emissions at 1990 levels in 2010 or 2015 makes sense from the perspective of economic efficiency." (Richels)
- "Our reading of the evidence is that current assessments do not support the idea of focusing primarily on stabilizing emissions, particularly when stabilization is limited to the high-income countries. Indeed, some analyses indicate that stabilizing emissions is worse than doing nothing." Further analysis is needed to identify an "optimal" policy, which could serve as a benchmark for comparison. (N&J)

Next Steps

- "I urge those responsible for the IAT to take a careful look at the existing literature on this topic. Most particularly, I recommend the EMF-14 study which contains a wealth of useful information." (Richels)

Alternative Metrics

- Why the focus on GDP when the report states consumption may be a better measure of consumer welfare? Figures based on consumption look much less optimistic. (Richels) There are alternative metrics for measuring impacts, but their use is not facilitated by the models being used. (Kopp)
- "For ease of comparison, it would be helpful if results were also summarized in terms of discounted present value. Since most of the present values will be negative, this will give some indication of how large the benefits from a climate policy must be in order to outweigh the costs." (Richels)

Revenue Recycling

- "It is not generally accepted... that it is possible to tax ourselves into prosperity... The balance of evidence suggests that although recycling of pollution tax revenues through reducing other taxes is better than simply imposing the pollution taxes, the pollution taxes are justified only if they do ... produce environmental benefits." (DeCanio)
- "Most of the policy analysis in the report assume that revenues [will be used to reduce the deficit]. This implicitly assumes that congress will agree to impose a huge tax on the economy... along with the restriction on emissions... For this reason, the best estimates of the effects of the most likely policies is provided in the "auction, 100% returned to consumers" case..." (?) This case, therefore, deserves more attention. Furthermore, to isolate the effect of the carbon emissions restriction

policies, the deficit reduction effect (from the personal income tax case) should be subtracted from the 1990 level case. (Scott)

- More information is needed to evaluate the way revenue recycling was modeled. "The effect of the policy depends critically on which taxes are reduced in the future in the same way that the effect of a policy involving current tax reductions depends critically on which taxes are lowered today." Assumptions about future tax reductions should be made clearer. (Goulder)
- Theoretical and empirical work [indicates that grandfathered permit] policies are considerably more costly to the economy than if revenues are returned through cuts in other taxes. Yet the results in figure 13 are contrary. "I find this very implausible." (Goulder)

Other

- The current modeling effort should be placed into the broader spectrum of other modeling being done (Stanford's Energy Modeling Forum and others)
- "It should be pointed out that delayed implementation implies a smaller reduction in cumulative emissions." (Goulder)
- "The time frame of analysis is unnecessarily short. The adverse effects of increasing atmospheric concentrations of GHGs occur primarily in the long run, so ending the analysis in the year 2020 necessarily cannot capture these effects." (DeCanio)
- The models "omit feedbacks from conventional pollutants to the economy... Though far from definitive, modeling work by Jorgenson, Goulder, Boyd and Viscusi suggest that such feedbacks are quantitatively significant relative to other net economic impacts of climate policies." (Repetto)

Peter R. Orszag

07/28/97 09:57:19

PM

Record Type: Record

To: Todd Stern/WHO/EOP, David B Sandalow/CEQ/EOP

CC:

Subject: Paragraphs 3, 4, and 5 of Article 4 of the FCCC

You can get the whole document at <http://www.unfccc.de/...>

3....The developed country Parties and other developed Parties included in Annex II shall provide new and additional financial resources to meet the agreed full costs incurred by developing country Parties in complying with their obligations under Article 12, paragraph 1. They shall also provide such financial resources, including for the transfer of technology, needed by the developing country Parties to meet the agreed full incremental costs of implementing measures that are covered by paragraph 1 of this Article and that are agreed between a developing country Party and the international entity or entities referred to in Article 11, in accordance with that Article. The implementation of these commitments shall take into account the need for adequacy and predictability in the flow of funds and the importance of appropriate burden sharing among the developed country Parties.

4....The developed country Parties and other developed Parties included in Annex II shall also assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects.

5....The developed country Parties and other developed Parties included in Annex II shall take all practicable steps to promote, facilitate and finance, as appropriate, the transfer of, or access to, environmentally sound technologies and know-how to other Parties, particularly developing country Parties, to enable them to implement the provisions of the Convention. In this process, the developed country Parties shall support the development and enhancement of endogenous capacities and technologies of developing country Parties. Other Parties and organizations in a position to do so may also assist in facilitating the transfer of such technologies.

*Working
Draft Protocol*

*Todd-
I am obtaining the
rest of the document*

DETERMINED TO BE AN ADMINISTRATIVE

MARKING INITIALS: *M*DATE: *12/2/14***SCENARIO 1: POSSIBLE AGREEMENT IN KYOTO**

Issue	Kyoto position
Developing economies	Existing U.S. position (no hard targets)
U.S. target and timetable	Medium-term (e.g., 1990 levels by 2010 or 2020)
Domestic implementation	Tradeable permits

Elements

- U.S. does not alter its negotiating position very much: fights for joint implementation and evolution for developing economies, with a voluntary Annex B.
- U.S. adopts medium-term target (e.g., 1990 levels by 2010 or 2020).
- U.S. pursues international trading system among Annex I countries.

International reaction/potential for Kyoto agreement

- Kyoto agreement may be feasible, albeit not guaranteed. The U.S. position on developing economies is already seen as beyond the acceptable range by other countries.
- Some criticism of U.S. from Europeans and other countries, for not showing bold leadership on critical issue (failing to propose a more aggressive U.S. target).

Possible domestic policy packages

- Domestic emissions trading system. Achieving 1990 emission levels by 2010 through a domestic emissions trading system is likely to imply an increase in the price of carbon of between [\$80 and \$140] per ton by 2010.
 - In terms of coal prices, the shift is equivalent to a BTU tax of somewhere between [\$2 and \$4.50] per million BTUs. In 1993, the Administration proposed a tax of \$0.26 per million BTUs plus a \$0.34 per million BTUs tax on oil.
 - Gasoline prices would be expected to rise [between 20 and 40 cents].
 - The annual value of domestic emissions permits would be [approximately \$60 to \$70 billion] in 2010. If those permits were auctioned, the funds

could be used to reduce other distortionary taxes, to raise national saving, and/or to provide transitional assistance to affected workers and firms.

[Achieving 1990 levels by 2020; other options.]

- Domestic permits plus trading with other OECD (Annex I) countries. In addition to trading permits domestically, it may be possible to agree in Kyoto to a regime for trading permits across participating countries -- potentially offering a somewhat more efficient approach to emissions reduction. Achieving 1990 emission levels by 2010 through a domestic emissions permit trading system coupled with an OECD-wide international trading system would imply an increase in the price of carbon of [about \$50] in 2010.

-- In terms of coal prices, that is equivalent to a tax of about [\$1.50] per million BTUs. Gas prices would rise by an estimated [10 to 15 cents].

-- Under an international trading system that includes the former Soviet Union (FSU) and Eastern Europe, U.S. imports of permits from the FSU and Eastern Europe could amount to [about \$5 billion per year] by 2010.

[Achieving 1990 levels by 2020; other options.]

- Technology. The increase in energy prices implied by a domestic permits system would be likely to induce significant energy-saving technological advances. But your advisers have sharp disagreements about how much we can reasonably expect of technological advances without the spur of a price increase. Some believe that even without an increase in the price of energy, there are numerous opportunities for energy-saving technologies to be developed and applied. For example, your science advisers believe that spending [\$1] billion per year on energy R&D could achieve [XX] percent of the reductions off the business-as-usual baseline required to reach a 1990 by 2010 target. Your economic advisers strongly disagree, believing that technological advances will clearly be one of the conduits for meeting the target, but that significant energy price increases are necessary to induce the requisite technological advances.

[Flesh out using document from Rosina et. al.]

Environmental impact

- Under business-as-usual, concentration levels of carbon are expected to rise from approximately 360 parts per million by volume (ppmv) to about [700] ppmv by 2100 -- the highest in more than 50 million years. The increase in

carbon concentrations is expected to produce an increase in mean global temperature of approximately 2.0 degrees Celsius by 2100.

- If all OECD (Annex I) countries reduced emissions to 1990 levels by 2010, carbon concentration would be expected to rise from 360 ppmv to approximately [650 ppmv], rather than 700 ppmv as under the business-as-usual baseline. Carbon concentrations would not reach double pre-industrial levels until 2075, rather than 2068 as under the business-as-usual baseline. The central estimate of the increase in mean global temperature under a 1990 by 2010 target is [1.8 degrees Celsius], rather than the 2.0 degrees Celsius under the business-as-usual baseline.

[Achieving 1990 levels by 2020; other options.]

Domestic reaction

- **Hill:** Two major arguments -- competitiveness and taxes. The first argument is likely to be that U.S. industry will flee the country as a result of the agreement, with its weak developing economy provisions. The second is that the permits, if they are auctioned, would be the largest energy tax increase in history. (If the revenues are recycled by reducing other taxes, we may be able to argue that the program was a tax shift -- tax waste, not work -- rather than a tax hike.) The fact that the Byrd resolution had clearly warned (by a vote of 95-0) against this first scenario would stoke the fires.
- **Moderate firms:** Perhaps some support, but major concerns over developing economy stance may mean overall opposition. Firms in the aluminum, steel, chemicals, petroleum refining, paper and allied products, and cement industries will be strongly opposed, and argue that their operations will flee the United States for other countries. Moderate support may be likely from agricultural interests, insurance companies, natural gas interests, some appliance manufacturers, and financial firms (if auctions are traded). Strong support is likely from renewable energy and energy-efficiency firms.
- **Environmental groups:** Many environmental groups will support a 1990 by 2010 target, but would prefer a more aggressive path (e.g., 20 percent below 1990 by 2010). The environmental community is split on the issues of emissions trading and joint implementation: some (e.g., Environmental Defense Fund) are supportive, others (e.g., Sierra Club) oppose.
- **Elite media:** Likely to be support for tackling issue.

Potential next steps and ramifications

- Potentially becomes large issue against Administration supporters during

1998 elections.

- Ratification process not likely until 1998 or 1999. But Kyoto agreement *extremely* unlikely to be ratified.

- Perhaps evolve into new round of negotiations, although U.S. will be seen as bad actor for failing to ratify.

- Even without ratification vote, funding for U.S. negotiators could be curtailed or Congressional anger could manifest itself in other ways.

SCENARIO 2: NO AGREEMENT IN KYOTO

Issue	Kyoto position
Developing economies	Specific targets/hard evolution
U.S. target and timetable	Medium-term (e.g., 1990 levels by 2010 or 2020)
Domestic implementation	Tradeable permits

Elements:

- U.S. insists on developing country participation
 - One possibility is generalization of evolution concept: Once per capita GDP or total emissions cross some threshold, targets are mandatory. Targets could be linked to energy intensity, or to a formula that adjusts for growth, population, and starting income.
 - Another possibility would be to try to split the developing economy bloc by focussing efforts primarily on China. Perhaps use other leverage (WTO, trade, UN) to get China to agree to targets. Clarify our intentions during Chinese visit pre-Kyoto.
- U.S. adopts medium-term target (e.g., 1990 levels by 2010 or 2020). May be necessary to adopt a somewhat stricter U.S. target (e.g., 2010) to even have a hope of a deal in Kyoto.

International reaction/potential for Kyoto agreement:

- Kyoto agreement seems very unlikely, even with U.S. target of, say, 1990 by 2010. Criticism for violating 6-month rule (making new proposals less than 6 months before final meeting).
- Given Berlin mandate, U.S. likely to be blamed for blowing up negotiations.

Domestic policy package and impact:

- Domestic emissions trading. Same as above.
- Domestic emissions trading with international component including both developed and developing economies. Achieving 1990 emission levels by 2010 through a domestic emissions trading system with trading among Annex I countries *and* developing countries is likely to imply an increase in the price of carbon of [approximately \$20 per ton]. Such an increase in the price of carbon is equivalent to a tax of approximately [50 cents] per million

BTUs or so.

- Technology. Same as above.

Environmental impact

- If the developed countries reduced emissions to 1990 levels by 2010, and the developing countries reduced emissions to 1990 levels by 2040 (which is far beyond what they plausibly agree to), carbon concentration would rise from 360 ppmv to approximately 450 ppmv, rather than 700 ppmv as under the business-as-usual baseline. The central estimate of the increase in mean global temperature would be about [1 degree] Celsius, rather than the 2 degrees Celsius under the business-as-usual baseline.

Domestic reaction

- Hill: Failure of agreement may make domestic implementation package less of a political issue. But there still could be false accusations that we proposed "the largest energy tax hike in history." The inclusion of China and a few other developing economies may split the Byrd bloc into those who are truly opposed to acting, and those who are truly concerned about the important developing economies. But in general, unlikely to be strong opposition, and perhaps some muted, private support.
- Moderate firms: Could perhaps support, depending on which developing economies are included.
- Environmental groups: Likely to blame the President for failure to get an agreement.

Potential next steps and ramifications:

- Work to get agreement in Conference of Parties during 1998 or later, while insisting on developing economy participation.
- Could encourage more voluntary and Federal efforts, but may not be able to counter impression of undermining Kyoto.

SCENARIO 3: PARTIAL AGREEMENT IN KYOTO, DON'T SUBMIT FOR RATIFICATION

Issue	Kyoto position
Developing economies	Current U.S. negotiating position, but clarify that we will be pushing for more in Annex reviews in 1998 and will not ratify agreement without assurances on developing economy issue
U.S. target and timetable	Medium-term (e.g., 1990 levels by 2010)
Domestic implementation	Tradeable permits

Elements

- Seek new developing economy commitments outside Kyoto agreement, so that (at least technically) Berlin Mandate would not be contravened. Possibilities include getting key countries to join Annex 1 under the Convention (during "review of annexes" in 1998), amending the Convention to include Annex B rather than doing so in Kyoto agreement, or including Annex B in Kyoto agreement but getting key countries to sign on afterwards.
- The U.S. could either adopt a minimally accepted package in Kyoto, but not submit it for ratification until further progress is made, or push for general adoption of Kyoto agreement to occur at COP 4 in 1998 -- after such progress was cemented.
- Another possibility, if it were obvious that we could not achieve a domestically acceptable package in Kyoto, would be to try to delay the Kyoto meetings themselves. This approach would generate very strong international criticism.

Domestic implementation

- Depending on final agreement, same as either #1 or #2 above.

International reaction/potential for Kyoto agreement:

- U.S. is still likely to be criticized sharply for its position.

Domestic reaction

- Hill: Muted support for tough U.S. approach to developing economies, although there may be substantial frustration if the Kyoto agreement is

adopted but not submitted for ratification. May be seen as playing games.

- Moderate firms: Probably no strong opposition.
- Environmental groups: Strong criticism for delaying agreement until developing economies accept what would be called an unfair burden.

Potential next steps and ramifications:

SCENARIO 4: GO SLOW, WITH MODEST DOMESTIC EFFORT AND DEVELOPING ECONOMY COMMITMENTS

Issue	Kyoto position
Developing economies	Existing U.S. position
U.S. target and timetable	Longer-term
Domestic implementation	Aggressive technology effort combined with voluntary corporate programs

Elements:

- U.S. adopts longer-term target, and does not necessarily rely on an increase in the relative price of carbon to achieve objectives. Instead, we could attempt to adopt aggressive technology effort combined with voluntary corporate programs to meet target. *However, there is strong disagreement among your advisers about the role of technology. See discussion in domestic implementation section of Scenario 1 above.*

Domestic policy package and impact

- Major technology initiative. The major policy initiative under this approach would be to accelerate R&D funding for "home run" technologies -- such as those identified in the PCAST/11-Labs studies. A [\$XX] billion per year R&D effort would [XXX].
- Voluntary corporate program. We could try to more aggressively develop voluntary corporate programs.

International reaction/potential for Kyoto agreement:

- "Rio II": U.S. position sharply criticized as being completely inadequate to issue at hand.
- Kyoto agreement may be possible, albeit with much criticism of weak U.S. position.

Domestic reaction:

- Hill: Opposition from those who are truly concerned about problem. Perhaps some muted, private support from those who are more concerned with mitigation costs.
- Moderate firms: Support from renewable energy and high-tech firms.

Others?

- Environmental groups: Charges that President broke promise to address this problem with real, credible steps.
- Economists and elite media attack plan as lacking in credibility, not attacking the problem, and being overly rosy on technology assumptions.

Potential next steps and ramifications:

- Develop technology program, start to make some progress regardless of Kyoto outcome.
- As scientific evidence accumulates, press for stricter international regime.