

FOIA MARKER

**This is not a textual record. This is used as an
administrative marker by the William J. Clinton
Presidential Library Staff.**

Collection/Record Group: Clinton Presidential Records
Subgroup/Office of Origin: Council of Economic Advisers
Series/Staff Member: Michele Jolin
Subseries:

OA/ID Number: 23919
FolderID:

Folder Title:
Partial Staff Only Review Docs - [Climate Change] [1]

Stack:
S

Row:
21

Section:
1

Shelf:
11

Position:
2

Document	Schaefer to CEA	McIntosh(I) to OMB and CEQ	McIntosh(II) to OMB and CEQ	McIntosh(III) to NEC and Treasury	McIntosh(IV) to CEA	Talent to CEQ	Sensenbrenner (I) to CEQ	Sensenbrenner (II) to OSTP
Economic analysis that supports Yellen testimony	X	X				X	X	
Other economic analysis that produced different results	X							
Agency comments on drafts of Yellen testimony		X		X	X			
Economic analysis prepared for Administration and the US delegation in developing positions for Kyoto		X						
Economic analysis showing that FY 99 GCC budget proposal is necessary to prevent more drastic reductions later and all Ag comments		X						
Records indicating alternative policy options		X		X	X			
Comments by other federal agencies on alternative policy options		X		X	X			
Analysis of costs and benefits of binding targets and timetables		X			X			
Agency comments on cost/ benefit analysis		X						
Analysis of cost effectiveness of Administration proposal		X						
Document the opportunity costs of Administration proposal		X						

PARTIAL
DUPS of STAFF ONLY REVIEW

Provide all records of deliberations and all economic analysis and comments on whether emissions reductions would result in lower growth		X						
Provide analyses upon which Administration relied in deciding that emissions reductions below the 1990 baseline are acceptable		X						
Provide federal agency comments on any private sector analyses that Administration reviewed prior to Kyoto		X						
Document steps that the Administration has taken to comply with Byrd-Hagel Resolution		X						
Analyze whether the benefits of implementing the Protocol are justified by the costs		X			X			
Evaluate the effectiveness of the agreement by comparing marginal abatement costs of alternative scenarios (to be evaluated under specific conditions listed)		X			X			
Evaluate the opportunity costs of pursuing the Administration's strategy for the abatement of greenhouse gas emissions (to be evaluated under specific conditions listed)		X			X			

Evaluate how benefits and burdens of complying with Kyoto would be distributed on the national and household levels, describing the disparate regional and industrial sector impacts and the effects on different income levels (to be evaluated under specific conditions listed)		X			X			
Explain potential effects of Kyoto on GDP, per capita GDP, unemployment, income and real wages, trade competitiveness and energy prices		X			X			
All activities and/or plans for federal agency implementation of the Kyoto Protocol					X	X		
Document estimates of the percentage of US emissions reductions that might have to be purchased from other countries		X			X			
Legal and policy analysis re: applicability and availability of existing legislation to implement Kyoto				X	X			
Drafts of and comments on documents re: international emissions trading, joint implementation, Clean Development Mechanism				X				
Economic and legal analysis that US obligations under Kyoto can be met without constraining US economic growth and without imposing onerous and costly regulation		X						

Provide all drafts and analyses from any interagency effort on climate change since 1993 re: current or new legislation or rules, production or review of any environmental data and/or analyses, production or review of any cost-benefit data or analyses, production or review of any economic data and/or economic analyses, and any comments from your agency on any drafts				X	X			
Provide a copy of all data or analyses prepared or any comments by your agency on any environmental cost-benefit and/or economic data and analyses relating to the White House Initiative on Global Climate Change				X	X			
Identify and describe all initiatives to revise any existing rules or propose any new rules relating to climate change, including any cost-benefit analysis, and a timetable for their development and promulgation					X			
Provide any and all analyses that were prepared or considered of the cumulative effects on the US economy and/or energy system of all or any combination of regulations that were issued since 1992, that were proposed, and that are being developed that have or will have such effects				X	X			

Provide all analyses that support the Administration's conclusion that impacts on the US economy of complying with the terms of the Kyoto Protocol "are likely to be modest." and all records of comments from federal agencies					X			
Analyses that support the statement that US electricity restructuring "will offer approximately \$20 billion in cost savings." and all records of comments from other agencies.					X			
Analyses that support the statement that emissions trading among Annex I countries "can reduce the cost to the United States of achieving its targets for 2008-2012 emissions by about half" and all records of comments from other agencies					X			
Analyses that support the statement that emissions trading among a subset of Annex I countries "can reduce costs by an estimated 60-70 percent" and all records of comments from other agencies					X			

Explain and fully document how more limited trading among the subset of countries would produce greater cost reductions than from either trading among all Annex I countries or trading with the full participation of non-Annex I countries. And provide all records of comments from other agencies					X			
Analyses that supports the statement that the Clean Development Mechanism “might shave costs by roughly another 20 to 25 percent” and all records of comments from other agencies					X			
Analyses that supports the statement that overall costs “would reach roughly one tenth of one percent of projected GDP in 2010” and all records of comments from other agencies					X			
Analyses that supports the assumption that the rate of improvement in energy efficiency will be 1.0 percent per year and all records of comments from other agencies					X			
Analyses that supports the statement that the estimated effect on energy prices will range from \$14 to \$23 per ton of carbon equivalent” and all records of comments from other agencies					X			

Analyses that supports the statement that “in energy-intensive sectors some employment reductions could occur, although given the very small predicted change in energy prices, impacts in most such sectors are apt to be minimal. Furthermore, a large number of jobs will be created in other sectors-- many of them high-tech jobs paying high wages”, and all records of comments from other agencies					X			
Analyses that support the Administration’s estimate that the benefits relating to traffic congestion, highway accidents and air pollution unrelated to climate change “could offset approximately a quarter of the resources cost of climate change policy”, and all records of comments from other agencies.					X			
Specify all of the models and analytical tools that the Administration has used and describe in detail their strengths and weaknesses					X			

Specify all the Administration's estimates that were derived by the SGM model, indicate why many of the Administration's key estimates were derived from this model, and identify the corresponding estimates derived from each model that the Administration has used in assessing the impacts of the Kyoto Protocol					X			
Provide the 1990 baseline, the FY97-98 data, and the annual out-year estimates until 2012 for the following outcome performance measures: morbidity rates for some diseases, mortality rates for some causes, monetary damages from temperature increases, consequences from some catastrophes, traffic congestion, highway accidents and air pollution unrelated to climate change.					X			
For any analysis provided, identify and explain the basis for assumptions used regarding such factors as the rate of improvement in energy efficiency, the effectiveness of market incentives in increasing the market share of fuels that emit less carbon, and economic and demographic growth. And explain fully any assumptions on how emissions reductions will be achieved as, for example, through the early retirement of coal plants or nuclear plant life extensions.					X			

Evaluate the extent to which the Administration's climate change strategy will require the diversion of funds from savings and/or investments which would have provided other benefits, such as social security, or more funding for education, health care etc.					X			
Evaluate the potential offsetting negative effects of exempting developing countries		X			X			
Evaluate the impact that exempting developing countries will have on the ability of emerging countries with export markets to transition to more energy efficient technologies		X			X			
The rate that the Administration expects the economy to grow during the next 10 to 20 years with or without the Kyoto treaty					X			
Provide peer-reviewer comments on all drafts of cost-benefit analyses performed by the Administration					X			
Identify all private parties that are currently performing economic analysis of the Kyoto treaty, describe their work and provide all products of their work in draft of final form					X			

Copies of side agreements, memos, or other documents re: the Kyoto Protocol entered into or contemplated by executive branch and other nations or parties						X		
Scientific evidence documenting existence of global warming						X		
Copies of draft testimony since the State of the Union				X	X			
Agency comments on all draft testimony since the State of the Union				X	X			
Document the Administration's annual performance measures for its 5-year Climate Change Technology Initiative (CCTI)		X						
Provide analyses that supports claim that CCTI is a "no regrets" policy		X						
Data on actual emissions and projected emissions reductions for FY97-FY2003		X						
Copies of the US Climate Action Report		X						
EIS in connection with Administration request for tax incentives and research funding		X						
Materials re: IAT group		X						

Table with FY89-FY99 historical budget authority, on agency-by-agency basis, for President's "Climate Change Technology Initiative" (with requests to explain specific budget provisions)			X	X	X			
Table with FY89-FY99 historical budget authority, on an agency-by-agency basis, for "US Global Change Research Program." (With requests to explain specific budget provisions)			X	X	X			
Table with FY89-FY99 historical budget authority, on an agency-by-agency basis, for any other components of the Administration's climate change program. (With requests to explain specific budget provisions)			X	X	X			
Identify all government-wide and agency-specific performance measures for the Administration's Climate Change proposal, including data for at least FY97, FY98 and FY 99			X		X			
Table showing what part of FY99 request is funding to continue initiatives funded in FY98 or prior years.				X	X			
Table for FY93-FY97 identifying contract awards to non-profit and for-profit organizations for work on GCC				X	X			
NOAA Report							X	X

Goddard Institute for Space Studies/NASA confirmation							X	X
East Anglia Univ. confirmation							X	X
Lancet Article							X	
Studies showing costs reduced with flexible implementation							X	
Study estimating that climate change could double the number of weather-related deaths								X

HOUSE REQUESTS FOR CLIMATE CHANGE MATERIALS:
Requests for new analysis or existing documents

[checked with NEC, CEA, CEQ, OMB, OSTP, State, Treasury, Commerce, Energy]

Schaefer -- COMMERCE

to Yellen during Subcommittee Chair Schaefer's opening statement (due March 18)

- provide the complete analysis of the conclusions presented in Yellen's testimony and any other economic analysis that was done that reached different conclusions

McIntosh (I) -- GOVERNMENT REFORM AND OVERSIGHT

to OMB and CEQ from McIntosh (due March 20)

- all of the economic data and analyses upon which the Administration relied to determine that the President's FY99 budget proposal is necessary to place the US in a "position where we will be further down the road and won't have to make the kind of drastic reductions that otherwise might be called for" and provide all records containing comments by other federal agencies on the drafts.
- provide and document the Administration's annual performance measures for its 5-year Climate Change Technology Initiative (CCTI)... the 1990 US emissions level, data on actual emissions reductions for FY97, and then projected emissions reductions beginning in FY97 and then for each year up to and including FY2003.
- provide the environmental and economic data and analyses that support the claim that the CCTI is a "no regrets" policy
- produce all records indicating the alternative policy options that the Administration analyzed, such as integrated pollution prevention, performance-based regulation, and multi-media regulation.
- fully document the cost-effectiveness of the Administration's proposal when compared to other available options
- fully document the opportunity costs of committing such a significant amount of our nation's resources
- provide all records of comments by other federal agencies on analyses of alternative policy options, their cost-effectiveness and the opportunity costs
- provide any Environmental Impact Statement (EIS) that was prepared in connection with the Administration's requests for tax incentives and research funding to facilitate greenhouse gas

emissions.

- provide any economic and legal analyses that demonstrate that US obligations can be met without constraining U.S. economic growth and without imposing onerous and costly regulation
- provide all records of deliberations and all economic analysis and comments on whether emissions reductions would result in lower growth
- provide analyses upon which Administration relied in deciding that emissions reductions below the 1990 baseline are acceptable
- provide federal agency comments on any private sector analyses that Admin reviewed prior to Kyoto
- document steps that the Administration has taken to comply with Byrd-Hagel Resolution
- provide records of all meetings of the IAT group and information on any workshops conducted. Also produce all analyses performed by the group and provide all records of written or oral comments from other federal agencies on the IAT's analyses and advice.
- provide all economic analyses that were prepared for the Administration and the US delegation to review in developing its positions for Kyoto and provide all records containing comments from other agencies
- provide any and all analyses that the Administration or any Federal agency prepared (or is preparing) of the costs and benefits of imposing on the US the binding targets and timetables set forth in the Kyoto Protocol
- provide all records of written or oral comments from other federal agencies on each of the cost/benefit analyses that were performed
- analyze whether the benefits of implementing the Protocol are justified by the costs
- evaluate the effectiveness of the agreement by comparing marginal abatement costs of alternative scenarios (to be evaluated under specific conditions listed in Itr)
- evaluate the opportunity costs of pursuing the Admin's strategy for the abatement of greenhouse gas emissions (to be evaluated under specific conditions listed)
- evaluate how benefits and burdens of complying with this treaty would be distributed on the national and household levels, describing the disparate regional and industrial sector impacts and the effects on different income levels (to be evaluated under specific conditions listed)
- explain potential effects of Kyoto on GDP, per capita GDP, unemployment, income and real

wages, trade competitiveness and energy prices

- evaluate fully the potential offsetting negative effects on exempting developing countries and of “carbon leakage”
- evaluate the impact that this will have on the ability of emerging countries with export markets to transition to more energy-efficient technologies
- provide all records of comments submitted by federal agencies on Dr. Janet Yellen’s draft testimony about the economics of Kyoto
- provide and document estimates of the percentage of US emissions reductions that might have to be purchased from other countries to minimize the costs of reducing emissions

McIntosh (II) -- GOVERNMENT REFORM AND OVERSIGHT

to OMB and CEQ from McIntosh (due March 24)

- provide a table with FY 89 - FY 99 historical budget authority, on agency-by-agency basis, for the various components of the President’s “Climate Change Technology Initiative”... For each component, please indicate each specific budget account and a brief description of the program (with requests to explain specific budget provisions)
- provide a table with FY 89- FY99 historical budget authority, on an agency by agency basis, for the various components of the “US Global Change Research Program,” which were or are devoted exclusively to climate change R&D (with requests to explain specific budget provisions)
- provide a table with FY89-FY99 historical budget authority, on an agency by agency basis, for any other components of the Administration’s climate change program (with requests to explain specific budget provisions)

McIntosh (III) -- GOVERNMENT REFORM AND OVERSIGHT

to NEC and Treasury from McIntosh (due March 31)

- provide a table with FY 89 - FY 99 historical budget authority, on agency-by-agency basis, for the various components of the President’s “Climate Change Technology Initiative”... For each component, please indicate each specific budget account and a brief description of the program.
- provide a table with FY89-FY99 historical budget authority for your agency for the various components of the “US Global Change Research Program”
- provide a table with FY89-FY99 historical budget authority for your agency for any other components of the Administration’s climate change program
- provide a table showing what part of FY99 request is funding to continue initiatives funded in

FY 98 or prior years and what part is brand new activity.

- provide a table for FY93-FY97 identifying all assistance and contract awards to non-profit and for-profit organizations for any climate change activity. Provide a copy of any final report from these awards
- provide all drafts and analyses from any interagency effort since 1993 re: current or new legislation or rules, production or review of any environmental data and/or analyses, production or review of any cost-benefit data or analyses, production or review of any economic data and/or economic analyses, and any comments from your agency on any drafts
- provide a copy of all data or analyses prepared or any comments by your agency on any environmental cost-benefit and/or economic data and analyses relating to the White House Initiative on Global Climate Change
- provide a copy of any draft testimony on climate change by Administration witnesses since the President's 1998 State of the Union address and comments by your agency
- provide a copy of all drafts and supporting analyses and any comments from other Fed agencies on any alternative policy options for climate change that were suggested by your agency
- provide any and all legal and policy analyses regarding the applicability and availability of existing legislation to implement the Kyoto Protocol and any comments from other Federal agencies on the analyses
- provide any and all analyses that were prepared or considered of the cumulative effects on the US economy and/or energy system of all or any combination of regulations that were issued since 1992, that were proposed, and that are being developed that have or will have such effects
- provide copies of all drafts and any comments provided by your agency on documents relating to international emissions trading, joint implementation, and/or the Clean Development Mechanism

McIntosh (IV) -- GOVERNMENT REFORM AND OVERSIGHT

to CEA from McIntosh (due April 7)

- provide a table with FY 89 - FY 99 historical budget authority for your agency for the various components of the President's "Climate Change Technology Initiative"... For each component, please indicate each specific budget account and a brief description of the program.
- provide a table with FY 89- FY99 historical budget authority for your agency for the various components of the "US Global Change Research Program," which were or are devoted exclusively to climate change R&D.
- if funded in any of FY93-FY97, provide evidence of any accomplishments from these

dollars. Also, for requested funding in FY99, please indicate any program performance measures for the requested funding, and for each such measure, please provide data for the 1990 base year and annual data for the most recent 3-year period for which data are available.

- provide a table with FY89-FY99 historical budget authority for your agency for any other components of the Administration's climate change program
- provide a table showing what part of FY99 request is funding to continue initiatives funded in FY 98 or prior years and what part is brand new activity.
- identify the full set of your agency-specific performance measures for the Administration's Climate Change proposal, including data for at least the 1990 base year, FY97, FY98 and FY99. Also, please identify how any of your agency specific measures relate to those for any other Federal agency. Describe any interagency efforts to identify and relate the entire set of climate change performance measures, including which agencies are involved and the names of the agency representatives.
- provide a table for FY93-FY97 identifying all assistance and contract awards to non-profit and for-profit organizations for any climate change activity. Provide a copy of any final report from these awards
- provide all drafts and analyses from any interagency effort since 1993 re: current or new legislation or rules, production or review of any environmental data and/or analyses, production or review of any cost-benefit data or analyses, production or review of any economic data and/or economic analyses, and any comments from your agency on any drafts
- provide a copy of all data or analyses prepared or any comments by your agency on any environmental cost-benefit and/or economic data and analyses relating to the White House Initiative on Global Climate Change
- provide a copy of any draft testimony and comments by your agency on climate change by Administration witnesses since the President's 1998 State of the Union address
- provide a copy of all drafts and supporting analyses and any comments from other Fed agencies on any alternative policy options for climate change that were suggested by your agency
- identify and describe all agency initiatives to revise any existing legislation or propose any new legislation relating to climate change
- provide any and all legal and policy analyses regarding the applicability and availability of existing legislation to implement the Kyoto Protocol and any comments from other Federal agencies on the analyses
- identify and describe all such initiatives to revise any existing rules or propose any new rules

relating to climate change, including any cost-benefit analysis, and a timetable for their development and promulgation.

- provide any and all analyses that were prepared or considered of the cumulative effects on the US economy and/or energy system of all or any combination of regulations that were issued since 1992, that were proposed, and that are being developed that have or will have such effects

- provide copies of all drafts and any comments provided by your agency on documents relating to international emissions trading, joint implementation, and/or the Clean Development Mechanism.

- provide all analyses that support the Administration's conclusion that impacts on the US economy of complying with the terms of the Kyoto Protocol "are likely to be modest." and all records of comments from federal agencies

- analyses that support the statement that US electricity restructuring "will offer approximately \$20 billion in cost savings." and all records of comments from other agencies

- analyses that support the statement that emissions trading among Annex I countries "can reduce the cost to the United States of achieving its targets for 2008-2012 emissions by about half" and all records of comments from other agencies

- analyses that support the statement that emissions trading among a subset of Annex I countries "can reduce costs by an estimated 60-70 percent" and all records of comments from other agencies

- explain and fully document how more limited trading among the subset of countries would produce greater cost reductions than from either trading among all Annex I countries or trading with the full participation of non-Annex I countries. And provide all records of comments from other agencies

- analyses that supports the statement that the Clean Development Mechanism "might shave costs by roughly another 20 to 25 percent" and all records of comments from other agencies

- analyses that supports the statement that overall costs "would reach roughly one tenth of one percent of projected GDP in 2010" and all records of comments from other agencies

- analyses that supports the assumption that the rate of improvement in energy efficiency will be 1.0 percent per year and all records of comments from other agencies

- analyses that supports the statement that the estimated effect on energy prices will range from \$14 to \$23 per ton of carbon equivalent" and all records of comments from other agencies

- analyses that supports the statement that "in energy-intensive sectors some employment reduction could occur, although given the very small predicted change in energy prices, impacts

in most such sectors are apt to be minimal. Furthermore, a large number of jobs will be created in other sectors -- many of them high-tech jobs paying high wages", and all records of comments from other agencies

- analyses that support the Administration's estimate that benefits relating to traffic congestion, highway accidents and air pollution unrelated to climate change "could offset approximately a quarter of the resources cost of climate change policy", and all records of comments from other agencies

- specify all of the models and analytical tools that the Administration has used and describe in detail their strengths and weaknesses

- specify all the Administration's estimates that were derived by the SGM model, indicate why many of the Administration's key estimates were derived from this model, and identify the corresponding estimates derived from each model that the Administration has used in assessing the impacts of the Kyoto Protocol

- provide the 1990 baseline, the FY97-98 data, and the annual outyear estimates until 2012 for the following outcome performance measures: morbidity rates for some diseases, mortality rates for some causes, monetary damages from temperature increases, consequences from some catastrophes, traffic congestion, highway accidents and air pollution unrelated to climate change

- provide any and all analyses that the Administration or any Federal agency prepared (or is preparing or is having prepared) of the costs and benefits of imposing on the US the binding targets and timetables set forth in the Kyoto Protocol

- analyze whether the benefits of implementing the Protocol are justified by the costs

- evaluate the effectiveness of the agreement by comparing marginal abatement costs of alternative scenarios (to be evaluated under specific conditions listed)

- evaluate the opportunity costs of pursuing the Admin's strategy for the abatement of greenhouse gas emissions (to be evaluated under specific conditions listed)

- evaluate how benefits and burdens of complying with this treaty would be distributed on the national and household levels, describing the disparate regional and industrial sector impacts and the effects on different income levels (to be evaluated under specific conditions listed)

- for any analysis provided, identify and explain the basis for assumptions used regarding such factors as the rate of improvement in energy efficiency, the effectiveness of market incentives in increasing the market share of fuels that emit less carbon, and economic and demographic growth. And explain fully any assumptions on how emissions reductions will be achieved as, for example, through the early retirement of coal plants or nuclear plant life extensions.

- evaluate the extent to which the Administration's climate change strategy will require the

diversion of funds from savings and/or investments which would have provided other benefits , such as social security, or more funding for education, health care, etc.

- explain potential effects of Kyoto on GDP, per capita GDP, unemployment, income and real wages, trade competitiveness and energy prices
- evaluate the potential offsetting negative effects of exempting developing countries
- evaluate the impact that exempting developing countries will have on the ability of emerging countries with export markets to transition to more energy efficient technologies
- the rate that the Admin expects the economy to grow during the next 10 to 20 years with or without the Kyoto treaty
- provide peer-reviewer comments on all drafts of cost-benefit analyses performed by the Administration
- provide all records of written or oral comments from other federal agencies on each of the cost-benefit analyses that were performed
- provide all records of comments submitted by federal agencies on Yellen's testimony before the House Commerce Committee on March 4
- identify all private parties that are currently performing economic analysis of the Kyoto treaty, describe their work and provide all products of their work in draft of final form
- provide and document estimates of the percentage of US emissions reductions that might have to be purchased from other countries to minimize the costs of reducing emissions and which countries would be the beneficiaries

Talent -- SMALL BUSINESS

to CEQ from Talent (due March 18)

- any and all regulatory impact or economic analysis performed by federal agencies, contractors or grantees regarding implementation of the Kyoto Protocol
- any and all activities and/or plans for federal agency implementation of the Kyoto Protocol;
- any and all evidence, documentation or scientific bases for the existence of the phenomenon described as Global Warming
- copies of any side agreements, memoranda, protocols or other documents concerning the Kyoto Protocol entered into or contemplated between the Executive Branch and other nations, parties or non-governmental entities

Sensenbrenner (I) -- COMMITTEE ON SCIENCE

to CEQ from Sensenbrenner (due March 19)

- copy of NOAA report and accompanying data/statistics
- copy of Goddard Institute for Space Studies/NASA confirmation
- copy of East Anglia University confirmation
- copy of Lancet article
- a copy of the studies that suggest that the costs of compliance can be significantly reduced if flexible implementation is permitted
- a copy of the “more detailed economic analysis”

Sensenbrenner (II) -- COMMITTEE ON SCIENCE

to OSTP from Sensenbrenner (due March 19)

- copy of NOAA report and accompanying data/statistics
- copy of Goddard Institute for Space Studies/NASA confirmation
- copy of East Anglia University confirmation
- copy of study that estimates that climate change could double the number of weather-related deaths

HOUSE REQUESTS FOR CLIMATE CHANGE MATERIALS:**Requests for new analysis or existing documents**

[checked with NEC, CEA, CEQ, OMB, OSTP, State, Treasury, Commerce, Energy]

Schaefer -- COMMERCE

to Yellen during Subcommittee Chair Schaefer's opening statement (due March 18)

- provide the complete analysis of the conclusions presented in Yellen's testimony and any other economic analysis that was done that reached different conclusions

McIntosh (I) -- GOVERNMENT REFORM AND OVERSIGHT

to OMB and CEQ from McIntosh (due March 20)

- all of the economic data and analyses upon which the Administration relied to determine that the President's FY99 budget proposal is necessary to place the US in a "position where we will be further down the road and won't have to make the kind of drastic reductions that otherwise might be called for" and provide all records containing comments by other federal agencies on the drafts.
- provide and document the Administration's annual performance measures for its 5-year Climate Change Technology Initiative (CCTI)... the 1990 US emissions level, data on actual emissions reductions for FY97, and then projected emissions reductions beginning in FY97 and then for each year up to and including FY2003.
- provide the environmental and economic data and analyses that support the claim that the CCTI is a "no regrets" policy
- produce all records indicating the alternative policy options that the Administration analyzed, such as integrated pollution prevention, performance-based regulation, and multi-media regulation.
- fully document the cost-effectiveness of the Administration's proposal when compared to other available options
- fully document the opportunity costs of committing such a significant amount of our nation's resources
- provide all records of comments by other federal agencies on analyses of alternative policy options, their cost-effectiveness and the opportunity costs
- provide any Environmental Impact Statement (EIS) that was prepared in connection with the Administration's requests for tax incentives and research funding to facilitate greenhouse gas emissions.

- provide any economic and legal analyses that demonstrate that US obligations can be met without constraining U.S. economic growth and without imposing onerous and costly regulation
- provide all records of deliberations and all economic analysis and comments on whether emissions reductions would result in lower growth
- provide analyses upon which Administration relied in deciding that emissions reductions below the 1990 baseline are acceptable
- provide federal agency comments on any private sector analyses that Admin reviewed prior to Kyoto
- document steps that the Administration has taken to comply with Byrd-Hagel Resolution
- provide records of all meetings of the IAT group and information on any workshops conducted. Also produce all analyses performed by the group and provide all records of written or oral comments from other federal agencies on the IAT's analyses and advice.
- provide all economic analyses that were prepared for the Administration and the US delegation to review in developing its positions for Kyoto and provide all records containing comments from other agencies
- provide any and all analyses that the Administration or any Federal agency prepared (or is preparing) of the costs and benefits of imposing on the US the binding targets and timetables set forth in the Kyoto Protocol
- provide all records of written or oral comments from other federal agencies on each of the cost/benefit analyses that were performed
- analyze whether the benefits of implementing the Protocol are justified by the costs
- evaluate the effectiveness of the agreement by comparing marginal abatement costs of alternative scenarios (to be evaluated under specific conditions listed in ltr)
- evaluate the opportunity costs of pursuing the Admin's strategy for the abatement of greenhouse gas emissions (to be evaluated under specific conditions listed)
- evaluate how benefits and burdens of complying with this treaty would be distributed on the national and household levels, describing the disparate regional and industrial sector impacts and the effects on different income levels (to be evaluated under specific conditions listed)
- explain potential effects of Kyoto on GDP, per capita GDP, unemployment, income and real wages, trade competitiveness and energy prices

- evaluate fully the potential offsetting negative effects on exempting developing countries and of “carbon leakage”
- evaluate the impact that this will have on the ability of emerging countries with export markets to transition to more energy-efficient technologies
- provide all records of comments submitted by federal agencies on Dr. Janet Yellen’s draft testimony about the economics of Kyoto
- provide and document estimates of the percentage of US emissions reductions that might have to be purchased from other countries to minimize the costs of reducing emissions

McIntosh (II) -- GOVERNMENT REFORM AND OVERSIGHT

to OMB and CEQ from McIntosh (due March 24)

- provide a table with FY 89 - FY 99 historical budget authority, on agency-by-agency basis, for the various components of the President’s “Climate Change Technology Initiative”... For each component, please indicate each specific budget account and a brief description of the program (with requests to explain specific budget provisions)
- provide a table with FY 89- FY99 historical budget authority, on an agency by agency basis, for the various components of the “US Global Change Research Program,” which were or are devoted exclusively to climate change R&D (with requests to explain specific budget provisions)
- provide a table with FY89-FY99 historical budget authority, on an agency by agency basis, for any other components of the Administration’s climate change program (with requests to explain specific budget provisions)

McIntosh (III) -- GOVERNMENT REFORM AND OVERSIGHT

to NEC and Treasury from McIntosh (due March 31)

- provide a table with FY 89 - FY 99 historical budget authority, on agency-by-agency basis, for the various components of the President’s “Climate Change Technology Initiative”... For each component, please indicate each specific budget account and a brief description of the program.
- provide a table with FY89-FY99 historical budget authority for your agency for the various components of the “US Global Change Research Program”
- provide a table with FY89-FY99 historical budget authority for your agency for any other components of the Administration’s climate change program
- provide a table showing what part of FY99 request is funding to continue initiatives funded in FY 98 or prior years and what part is brand new activity.

- provide a table for FY93-FY97 identifying all assistance and contract awards to non-profit and for-profit organizations for any climate change activity. Provide a copy of any final report from these awards
- provide all drafts and analyses from any interagency effort since 1993 re: current or new legislation or rules, production or review of any environmental data and/or analyses, production or review of any cost-benefit data or analyses, production or review of any economic data and/or economic analyses, and any comments from your agency on any drafts
- provide a copy of all data or analyses prepared or any comments by your agency on any environmental cost-benefit and/or economic data and analyses relating to the White House Initiative on Global Climate Change
- provide a copy of any draft testimony on climate change by Administration witnesses since the President's 1998 State of the Union address and comments by your agency
- provide a copy of all drafts and supporting analyses and any comments from other Fed agencies on any alternative policy options for climate change that were suggested by your agency
- provide any and all legal and policy analyses regarding the applicability and availability of existing legislation to implement the Kyoto Protocol and any comments from other Federal agencies on the analyses
- provide any and all analyses that were prepared or considered of the cumulative effects on the US economy and/or energy system of all or any combination of regulations that were issued since 1992, that were proposed, and that are being developed that have or will have such effects
- provide copies of all drafts and any comments provided by your agency on documents relating to international emissions trading, joint implementation, and/or the Clean Development Mechanism

McIntosh (IV) -- GOVERNMENT REFORM AND OVERSIGHT
to CEA from McIntosh (due April 7)

- provide a table with FY 89 - FY 99 historical budget authority for your agency for the various components of the President's "Climate Change Technology Initiative"... For each component, please indicate each specific budget account and a brief description of the program.
- provide a table with FY 89- FY99 historical budget authority for your agency for the various components of the "US Global Change Research Program," which were or are devoted exclusively to climate change R&D.
 - if funded in any of FY93-FY97, provide evidence of any accomplishments from these dollars. Also, for requested funding in FY99, please indicate any program performance

measures for the requested funding, and for each such measure, please provide data for the 1990 base year and annual data for the most recent 3-year period for which data are available.

- provide a table with FY89-FY99 historical budget authority for your agency for any other components of the Administration's climate change program
- provide a table showing what part of FY99 request is funding to continue initiatives funded in FY 98 or prior years and what part is brand new activity.
- identify the full set of your agency-specific performance measures for the Administration's Climate Change proposal, including data for at least the 1990 base year, FY97, FY98 and FY99. Also, please identify how any of your agency specific measures relate to those for any other Federal agency. Describe any interagency efforts to identify and relate the entire set of climate change performance measures, including which agencies are involved and the names of the agency representatives.
- provide a table for FY93-FY97 identifying all assistance and contract awards to non-profit and for-profit organizations for any climate change activity. Provide a copy of any final report from these awards
- provide all drafts and analyses from any interagency effort since 1993 re: current or new legislation or rules, production or review of any environmental data and/or analyses, production or review of any cost-benefit data or analyses, production or review of any economic data and/or economic analyses, and any comments from your agency on any drafts
- provide a copy of all data or analyses prepared or any comments by your agency on any environmental cost-benefit and/or economic data and analyses relating to the White House Initiative on Global Climate Change
- provide a copy of any draft testimony and comments by your agency on climate change by Administration witnesses since the President's 1998 State of the Union address
- provide a copy of all drafts and supporting analyses and any comments from other Fed agencies on any alternative policy options for climate change that were suggested by your agency
- identify and describe all agency initiatives to revise any existing legislation or propose any new legislation relating to climate change
- provide any and all legal and policy analyses regarding the applicability and availability of existing legislation to implement the Kyoto Protocol and any comments from other Federal agencies on the analyses
- identify and describe all such initiatives to revise any existing rules or propose any new rules relating to climate change, including any cost-benefit analysis, and a timetable for their

development and promulgation.

- provide any and all analyses that were prepared or considered of the cumulative effects on the US economy and/or energy system of all or any combination of regulations that were issued since 1992, that were proposed, and that are being developed that have or will have such effects

- provide copies of all drafts and any comments provided by your agency on documents relating to international emissions trading, joint implementation, and/or the Clean Development Mechanism.

- provide all analyses that support the Administration's conclusion that impacts on the US economy of complying with the terms of the Kyoto Protocol "are likely to be modest." and all records of comments from federal agencies

- analyses that support the statement that US electricity restructuring "will offer approximately \$20 billion in cost savings." and all records of comments from other agencies

- analyses that support the statement that emissions trading among Annex I countries "can reduce the cost to the United States of achieving its targets for 2008-2012 emissions by about half" and all records of comments from other agencies

- analyses that support the statement that emissions trading among a subset of Annex I countries "can reduce costs by an estimated 60-70 percent" and all records of comments from other agencies

- explain and fully document how more limited trading among the subset of countries would produce greater cost reductions than from either trading among all Annex I countries or trading with the full participation of non-Annex I countries. And provide all records of comments from other agencies

- analyses that supports the statement that the Clean Development Mechanism "might shave costs by roughly another 20 to 25 percent" and all records of comments from other agencies

- analyses that supports the statement that overall costs "would reach roughly one tenth of one percent of projected GDP in 2010" and all records of comments from other agencies

- analyses that supports the assumption that the rate of improvement in energy efficiency will be 1.0 percent per year and all records of comments from other agencies

- analyses that supports the statement that the estimated effect on energy prices will range from \$14 to \$23 per ton of carbon equivalent" and all records of comments from other agencies

- analyses that supports the statement that "in energy-intensive sectors some employment reduction could occur, although given the very small predicted change in energy prices, impacts in most such sectors are apt to be minimal. Furthermore, a large number of jobs will be created in

other sectors -- many of them high-tech jobs paying high wages", and all records of comments from other agencies

- analyses that support the Administration's estimate that benefits relating to traffic congestion, highway accidents and air pollution unrelated to climate change "could offset approximately a quarter of the resources cost of climate change policy", and all records of comments from other agencies

- specify all of the models and analytical tools that the Administration has used and describe in detail their strengths and weaknesses

- specify all the Administration's estimates that were derived by the SGM model, indicate why many of the Administration's key estimates were derived from this model, and identify the corresponding estimates derived from each model that the Administration has used in assessing the impacts of the Kyoto Protocol

- provide the 1990 baseline, the FY97-98 data, and the annual outyear estimates until 2012 for the following outcome performance measures: morbidity rates for some diseases, mortality rates for some causes, monetary damages from temperature increases, consequences from some catastrophes, traffic congestion, highway accidents and air pollution unrelated to climate change

- provide any and all analyses that the Administration or any Federal agency prepared (or is preparing or is having prepared) of the costs and benefits of imposing on the US the binding targets and timetables set forth in the Kyoto Protocol

- analyze whether the benefits of implementing the Protocol are justified by the costs

- evaluate the effectiveness of the agreement by comparing marginal abatement costs of alternative scenarios (to be evaluated under specific conditions listed)

- evaluate the opportunity costs of pursuing the Admin's strategy for the abatement of greenhouse gas emissions (to be evaluated under specific conditions listed)

- evaluate how benefits and burdens of complying with this treaty would be distributed on the national and household levels, describing the disparate regional and industrial sector impacts and the effects on different income levels (to be evaluated under specific conditions listed)

- for any analysis provided, identify and explain the basis for assumptions used regarding such factors as the rate of improvement in energy efficiency, the effectiveness of market incentives in increasing the market share of fuels that emit less carbon, and economic and demographic growth. And explain fully any assumptions on how emissions reductions will be achieved as, for example, through the early retirement of coal plants or nuclear plant life extensions.

- evaluate the extent to which the Administration's climate change strategy will require the diversion of funds from savings and/or investments which would have provided other benefits ,

such as social security, or more funding for education, health care, etc.

- explain potential effects of Kyoto on GDP, per capita GDP, unemployment, income and real wages, trade competitiveness and energy prices
- evaluate the potential offsetting negative effects of exempting developing countries
- evaluate the impact that exempting developing countries will have on the ability of emerging countries with export markets to transition to more energy efficient technologies
- the rate that the Admin expects the economy to grow during the next 10 to 20 years with or without the Kyoto treaty
- provide peer-reviewer comments on all drafts of cost-benefit analyses performed by the Administration
- provide all records of written or oral comments from other federal agencies on each of the cost-benefit analyses that were performed
- provide all records of comments submitted by federal agencies on Yellen's testimony before the House Commerce Committee on March 4
- identify all private parties that are currently performing economic analysis of the Kyoto treaty, describe their work and provide all products of their work in draft of final form
- provide and document estimates of the percentage of US emissions reductions that might have to be purchased from other countries to minimize the costs of reducing emissions and which countries would be the beneficiaries

Talent -- SMALL BUSINESS

to CEQ from Talent (due March 18)

- any and all regulatory impact or economic analysis performed by federal agencies, contractors or grantees regarding implementation of the Kyoto Protocol
- any and all activities and/or plans for federal agency implementation of the Kyoto Protocol;
- any and all evidence, documentation or scientific bases for the existence of the phenomenon described as Global Warming
- copies of any side agreements, memoranda, protocols or other documents concerning the Kyoto Protocol entered into or contemplated between the Executive Branch and other nations, parties or non-governmental entities

Sensenbrenner (I) -- COMMITTEE ON SCIENCE*to CEQ from Sensenbrenner (due March 19)*

- copy of NOAA report and accompanying data/statistics
- copy of Goddard Institute for Space Studies/NASA confirmation
- copy of East Anglia University confirmation
- copy of Lancet article
- a copy of the studies that suggest that the costs of compliance can be significantly reduced if flexible implementation is permitted
- a copy of the "more detailed economic analysis"

Sensenbrenner (II) -- COMMITTEE ON SCIENCE*to OSTP from Sensenbrenner (due March 19)*

- copy of NOAA report and accompanying data/statistics
- copy of Goddard Institute for Space Studies/NASA confirmation
- copy of East Anglia University confirmation
- copy of study that estimates that climate change could double the number of weather-related deaths

SENATE REQUESTS FOR CLIMATE CHANGE MATERIALS:
Requests for new analysis or existing documents

[checked w/ NEC, CEA, CEQ, OMB, OSTP, State, Treasury, Commerce, Energy]

Lugar, Harkin, Cochran, Daschle, et al -- AGRICULTURE

to Vice President from 14 Senate Agriculture Committee Members

- analysis of the potential effects of climate change on US agriculture and livestock production
- analysis of the estimated greenhouse gas emissions resulting from the production of crops and livestock in the US
- analysis of the net contribution of US forests and crops in the sequestration of greenhouse gases
- analysis of the actions or controls necessary to reduce agricultural greenhouse gas emissions to comply with obligations that may arise under the treaty and an economic analysis of their impact on US farmers and ranchers
- analysis of whether and to what extent greenhouse gas emission controls would disadvantage agricultural producers in this country compared to producers in other countries with less stringent emission controls or no controls at all.

Hagel/Helms -- FOREIGN RELATIONS

to Eizenstat from Hagel/Helms

- provide a list of all climate change programs in the Executive Branch, with a description of each program and how they relate to the Kyoto Protocol
- provide the US global greenhouse gas inventory used by negotiators in Kyoto, on a country-by-country specific basis, for the six greenhouse gases listed in Annex A of the Kyoto Protocol
- provide the 1990 baseline and projections at least through 2030 for carbon dioxide , methane and nitrous oxide
- provide the 1995 baseline and projections at least through 2030 for hydrofluorocarbons, perfluorocarbons and sulphur hexafluoride
- provide the assumptions, data and calculation methodology that support the Administration's assertion that the impact of carbon sinks on the US greenhouse gas reduction commitment will reduce the actual reduction to 2 or 3 percent below 1990 levels, rather than 7 percent.

McINTOSH REQUESTS FOR CLIMATE CHANGE MATERIALS:

1. Economic Analyses

- all documents related to economic analyses of climate change policies or the Kyoto Protocol

2. Cost-Benefit Analyses

- all documents related to the production or review of any cost-benefit analyses

3. IAT

- records of all meetings of the IAT group and information on any workshops conducted.
- all analyses performed by the group and all records of written or oral comments from other federal agencies on the IAT's analyses and advice

4. Budget Proposals

- all of the economic data and analyses upon which the Administration relied to determine that the President's FY99 budget proposal is necessary to place the US in a "position where we will be further down the road and won't have to make the kind of drastic reductions that otherwise might be called for" and provide all records containing comments by other federal agencies on the drafts
- the environmental and economic data and analyses that support the claim that the CCTI is a "no regrets" policy

5. Budget Information

- provide a table with FY 89 - FY 99 historical budget authority, on agency-by-agency basis, for the various components of the President's "Climate Change Technology Initiative"... For each component, please indicate each specific budget account and a brief description of the program (with requests to explain specific budget provisions)
- provide a table with FY 89- FY99 historical budget authority, on an agency by agency basis, for the various components of the "US Global Change Research Program," which were or are devoted exclusively to climate change R&D (with requests to explain specific budget provision)
- provide a table with FY89-FY99 historical budget authority, on an agency by agency basis, for any other components of the Administration's climate change program (with requests to explain specific budget provisions)

- provide a table showing what part of FY99 request is funding to continue initiatives funded in FY 98 or prior years and what part is brand new activity

6. Performance Measures

- identify the full set of your agency-specific performance measures for the Administration's Climate Change proposal, including data for at least the 1990 base year, FY97, FY98 and FY99. Also, please identify how any of your agency specific measures relate to those for any other Federal agency. Describe any interagency efforts to identify and relate the entire set of climate change performance measures, including which agencies are involved and the names of the agency representatives
- provide and document the Administration's annual performance measures for its 5-year Climate Change Technology Initiative (CCTI)... the 1990 US emissions level, data on actual emissions reductions for FY97, and then projected emissions reductions beginning in FY97 and then for each year up to and including FY2003.

7. Alternative Policy Options

- all records indicating the alternative policy options that the Administration analyzed, such as integrated pollution prevention, performance-based regulation, and multi-media regulation.
- all records of comments by other federal agencies on analyses of alternative policy options, their cost-effectiveness and the opportunity costs
- all drafts and supporting analyses and any comments from other Fed agencies on any alternative policy options for climate change that were suggested by your agency

8. International Trading

- provide and document estimates of the percentage of US emissions reductions that might have to be purchased from other countries to minimize the costs of reducing emissions
- all drafts and any comments provided by your agency on documents relating to international emissions trading, joint implementation, and/or the Clean Development Mechanism

9. Developing Countries

- document steps that the Administration has taken to comply with Byrd-Hagel Resolution
- evaluate fully the potential offsetting negative effects on exempting developing countries and of “carbon leakage”
- evaluate the impact that this will have on the ability of emerging countries with export markets to transition to more energy-efficient technologies
- evaluate the potential offsetting negative effects of exempting developing countries
- evaluate the impact that exempting developing countries will have on the ability of emerging countries with export markets to transition to more energy efficient technologies

10. Implementation of Kyoto Protocol

- all legal and policy analyses regarding the applicability and availability of existing legislation to implement the Kyoto Protocol and any comments from other Federal agencies on the analyses

11. Environmental Data

- since 1993, all drafts and analyses from any interagency effort on climate change re: the production or review of any environmental data and/or analyses

12. Legislation/ Rules

- since 1993, all drafts and analyses from any interagency effort on climate change re: current or new legislation or rules
- identify and describe all agency initiatives to revise any existing legislation or propose any new legislation relating to climate change
- identify and describe all initiatives to revise any existing rules or propose any new rules relating to climate change, including any cost-benefit analysis, and a timetable for their development and promulgation

13. Testimony

- copies of any draft testimony on climate change by Administration witnesses since the President’s 1998 State of the Union address and comments by your agency

14. Yellen Testimony

- all records of comments submitted by federal agencies on Dr. Janet Yellen's draft testimony about the economics of Kyoto

15. Other

- provide any Environmental Impact Statement (EIS) that was prepared in connection with the Administration's requests for tax incentives and research funding to facilitate greenhouse gas emissions. (McIntosh I)

- provide a table for FY93-FY97 identifying all assistance and contract awards to non-profit and for-profit organizations for any climate change activity. Provide a copy of any final report from these awards (McIntosh III, IV)

Possible Criteria:

Make best case possible

Best case possible that is consistent with approach in studies/memos written over 10/96-10/97.

Release studies/memos written over 10/96-10/97.

Release no numbers.

What kind of number is most useful bottom-line?

Cost-benefit estimate

Cost estimate in % of GDP

Cost estimate (e.g., in terms of price per ton of carbon)

Possible margins on which to work, in a cost-benefit type analysis (while emphasizing uncertainties in any case)

Reduce costs by international trading:

With some limits

Among all Annex I countries -- no limits

Among Annex I countries excluding EU (umbrella)

Among all countries including LDCs (could call it "ideal JT" or "full LDC participation")

Among all countries including LDCs (excluding EU)

Generate revenues from auction of emission permits, and recycle revenues by cutting taxes on capital and other distorting taxes

Optimistic assumptions about response of technology and consumption patterns to prices

Optimistic assumption about response to R&D spending/tax cuts.

Estimates of probability and cost of future climate disasters, and rate at which they are discounted

Non-climate benefits: reduced air pollution, congestion, etc.

The Effects of Purchasing Constraints on International Trading

One proposal discussed at Kyoto would require Annex I countries to make at least one-half of their emissions reductions domestically. To assess the effect of a required 50% domestic emissions reduction restriction, U.S. permit price and abatement cost estimates were calculated for several different permit trading blocs (full Annex I and two Umbrella variants).¹ While these trading blocs result in different selling prices on the international market, they all result in the same U.S. domestic permit price given a comparable sinks assumption, since the 50% restriction is binding. Further, any restricted trading scenario that includes Annex I trading and JI with developing countries would result in the same U.S. permit price.

Table 1. U.S. Permit Prices under Restricted International Trade

Scenario	U.S. Sinks ¹ (MMTCE)	U.S. Permit Price	Domestic Reductions	Permits Purchased Abroad	Domestic Abatement Cost
Annex I Trading, No Restrictions	0	\$48/ton	281	319	\$6.7 b
Umbrella - EU, EE, No Restrictions	0	\$43/ton	258	342	\$5.5 b
Umbrella - EU, No Restrictions	0	\$26/ton	187	413	\$2.4 b
Annex I Trading, 50% Restriction ²	0	\$52/ton	300	300	\$7.8 b
Annex I Trading, No Restrictions	52	\$26/ton	187	361	\$2.4 b
Umbrella - EU, EE, No Restrictions	52	\$20/ton	157	391	\$1.6 b
Umbrella - EU, No Restrictions	52	\$11/ton	95	453	\$0.5 b
Annex I Trading, 50% Restriction	52	\$41/ton	248	300	\$5.1 b
Annex I Trading, No Restrictions	104	\$11/ton	95	401	\$0.5 b
Umbrella - EU, EE, No Restrictions	104	\$5/ton	51	445	\$0.1 b
Umbrella - EU, No Restrictions	104	paper tons > demand	n/a	n/a	n/a
Annex I Trading, 50% Restriction	104	\$28/ton	196	300	\$2.7 b

¹ Three sink estimates are used. The first, to provide an upper bound on permit price and cost, assumes that all countries' sinks yield a net zero under the Kyoto sinks definition. The last value reflects EPA estimates of above-ground sequestration and wood in use and in landfills. Corresponding estimates for other countries are based on their land use change and forestry activities estimates in the national communications. The middle value is simply half of the last value for all countries.

² The U.S. permit price and domestic abatement cost are the same for an Umbrella that excludes the E.U. and an Umbrella that excludes the E.U. and Eastern European countries.

¹ The methodology for constructing the new baselines under the Kyoto Protocol will be discussed in the baselines meeting. Refer to the next page for a brief overview.

- Under this 50% restriction, the clearing price in the international market is much lower than the U.S. price, and in many cases paper tons exceed the amount of emissions rights all buying countries are allowed to buy.
- The 50% restriction has more significant consequences on U.S. abatement costs with larger estimates of sinks, especially under the Umbrella trading blocs, since sinks may play a key role in driving down the international permit price.
- Since the U.S. is modeled as the low-cost abater, the 50% constraint, while it is binding on the U.S., has much stronger effects on other countries. For example, in the no sinks case, under restricted Annex I trading, the Japanese domestic permit price jumps threefold relative to an unconstrained Annex I trading regime.
- Finally, constructing the baseline, to identify "half" of emissions reductions, is important.

Methodology

The baselines group is in the process of reviewing the data inputs and the methodology used for calculating these permit prices and resource costs. Future modifications will be made based on the suggestions of this group.

U.S. Baseline: Kyoto mandates that the U.S. reduces its emissions (through domestic abatement, international trading, and joint implementation) to -7% of its 1990 levels for six categories of gases, net of the effects of certain sinks. Not accounting for carbon sinks, the U.S. will need to abate an annual average of about 600 MMTCE over the 2008-2012 commitment period. The following chart illustrates this target relative to business as usual.²

Table 2. U.S. Greenhouse Gas Emissions, 1990/95 Baseline and 2010 BAU (MMTCE)

Gas/Sinks	1990/95 Emissions	-7% of 1990/95	2010 BAU Emissions
CO ₂	1374		1838
CH ₄	181		152
N ₂ O	38		34
HFCs, PFCs, SF ₆	36		91
Kyoto Sinks	n/a		?

² The 1990 and 1995 numbers reflect EIA data, and thus differ some from those provided in the 1997 Climate Action Report.

Total	1629	1515	2115
-------	------	------	------

Sources: AEO98, 1997 Climate Action Report

Other Countries' Baselines: Baselines for other Annex I countries were constructed from SGM BAU projections of carbon dioxide, greenhouse gas and sinks inventories and projections in national communications, Climate Change 1995 (IPCC 1996), and CEA projections.

Abatement Cost Curves: For carbon dioxide, model outputs from SGM were used to construct marginal abatement cost curves for each country. In addition, a marginal cost curve for the other five categories of gases and sinks developed by EPA was used to construct the U.S. greenhouse gas abatement cost curve. For all other countries, their carbon dioxide cost curves proxied as greenhouse gas cost curves (resulting in a slight upward bias on the market clearing price for permits). Total abatement costs are calculated assuming a linear cost curve.

ADVANTAGES / DISADVANTAGES OF VARIOUS POSSIBLE ECONOMIC TRIGGERS

Desirable characteristics of a trigger:

- related to cost of limiting emissions
- built-in stabilizer for macro-economy
- simplicity/conducive to public salesmanship

Yet to be discussed:

- (i) Would this go in the treaty?
- (ii) What is it that would be "triggered on"? If the response is to be the sale of additional emission permits, what would be the quantity and price?

First-best trigger:

- **Price of Carbon Permit**

Advantages:

- (1) Specifically addresses the possibility that emissions reductions would result in high costs, and thus insures against uncertainty in an economically desirable way;
- (2) Once the price level of the trigger is set, then the answer to item (ii) above is clear.

Disadvantage:

The price of carbon emission permits may not be a widely understood concept.

(The possibilities that follow are economic triggers *other* than the price of carbon. Ranking is preliminary; principals may not agree.)

Second-best trigger:

- **Permit price*Quantity-of-permits/GDP**

Advantage: The formula contains the carbon price, and thereby responds to the onerousness of emission limitations per se.

Disadvantage: it is more complicated than some of the other possibilities, and does not allow the President to say "I promise that if X [an easily-understood bad thing] happens, the constraint will be loosened."

Third-best trigger

- **growth below 2%**

Advantages: (1) Acts as an automatic stabilizer (as do the others).
(2) Encompasses both the possibility of slowdown in long-term growth and the possibility of cyclical downturns. Both are relevant: (i) slow growth of either sort could be the result of onerous emissions restrictions, (ii) slow growth of either sort, even if the result of standard macroeconomic factors, might still lead one to choose less aggressive emissions reductions (assuming environmental benefits are a "normal" good).

Disadvantages: (1) a measure of GDP will not fully reflect the economic costs of the policy because declines in consumption will be masked by some increases in investment, (2) the trigger does not address situations where climate policy negatively impacts high economic growth years (e.g., imagine that under climate policy, GDP grows at 2.2%, but under the counterfactual, GDP would have grown at 3%), (3) the shadow price of the quantitative emissions constraint is lower if growth falls, not higher.

Fourth-best triggers:

- **recession**

Advantage: Very easily explained and understood.

Disadvantages: (1) Doesn't get at slow long-term growth. (2) Unlikely to be triggered often. (3) In the year following a recession, output gap is usually still high.

- **output gap above 1%**

Advantage: May address short-term cyclical conditions better than a recession trigger.

Disadvantages: (1) Doesn't get at long-term growth. (2) Not explainable to public. (3) Partly subjective even within economists' paradigm.

- **unemployment above 7%**

Advantage: easily explained and understood

Disadvantages: (1) Unrelated to long-term growth. (2) An imperfect measure even of short-term cyclical conditions: the natural rate of unemployment moves around. (3) Probably bears the least connection to emissions of any of the measures.

- **a committee (Sec. Treas, Chair Fed. Res., etc.) judges "economic distress"**

Disadvantage: very subjective/political/ad hoc.

- **some attempt to judge whether economic slowdown is attributable to climate change policy**

Disadvantage: even more subjective/political/ad hoc.

ESCAPE CLAUSE

9/17/97

- **"Price-trigger" escape clause** would focus on the price of energy per ton of carbon: If the price rises to level P, then government(s) are prepared to sell at P however many emission permits are demanded (beyond the shares already allocated to countries, and to citizens by their governments). The effect would be to convert the quantity limit into a price instrument under circumstances when the burden would otherwise be too burdensome.
- **Analogies from trade policy:**
 - Safeguards: GATT Article 19 (seems to work, despite its admitted vagueness)
 - Tariff-Rate Quotas: imports free up to a pre-assigned quota; additional imports allowed under a pre-set penalty rate.
- **Insurance version:** P would be set at "best-guess," say \$100/ton. Or perhaps "best guess plus one standard deviation," e.g., \$150. The intent is to safeguard against unexpectedly large economic costs of emissions reductions -- costs that could turn out to be unexpectedly large if the economic growth rate turned out higher than expected, or if unrealistic estimates regarding the ease of reducing emissions were built into treaty targets
- **Political version:** The price could be set low, e.g., \$25. The effect would be to assure constituents that the program will not be too costly. Such a price could be justified:
 - (I) if one believes claims of the wishful-thinking free-lunch technology optimists
 - (ii) conditioned on the U.S. obtaining international agreement on all our demands, including not only international trading but also some serious participation by developing countries, or
 - (iii) even knowing that conditions (I) and (ii) are unlikely to be met. Then the escape clause could be explicitly acknowledged as probably converting a quantity target into a price target.
- **Technical points:**
 - Who would sell permits? Could be:
 - (i) national governments (in countries with domestic emissions-trading schemes) or
 - (ii) a supra-national authority (in which case would have to decide how to split the proceeds).
 - What is time path? Would have to pre-set one price for 2010 and another for 2020. (Could also interpolate more points along the path; but banking and borrowing should have the same effect.)
- **Scholarly references:** Nordhaus (1997), McKibbin and Wilcoxon (1997) and Pizer (1996) have proposed plans under which there is a cap on how much the price of carbon can rise and argued that it has a number of desirable properties.

McKibbin, Warwick, and Peter Wilcoxon, 1997, "A Better Way to Slow Global Climate Change," The Brookings Institution, Washington, DC, March.

Nordhaus, Bill, 1997, "Climate Allowances Protocol (CAP): Comparison of Alternative Global Tradable Emissions Regimes," Yale University, June 17.

Pizer, William A, 1996, "Optimal Choice of Policy Instrument and Stringency Under Uncertainty: The Case of Climate Change," Resources for the Future, Discussion Paper 97-17, Dec.

ESCAPE CLAUSE: INTERNATIONAL ASPECTS

Multilateral version:

- A supranational authority, presumably the same one that is to monitor countries' emission levels under any sort of agreement, stands ready to sell permits (beyond the basic agreed-to target levels) to whatever *national governments* wish to purchase them at a pre-determined price P.
- In the basic agreement, countries agree to emission targets, but reserve the right to whatever manner of domestic implementation they desire (as in current US position against "common policies and measures").
- Parties would have to agree in advance how to divide up the revenue.
- International trade in permits is superfluous in this case, but would do no harm.

Why couldn't individual firms also buy permits from the supra-national authority? In the multilateral version, it is suggested that only national governments be allowed to buy permits from the supra-national authority. Only they can be held internationally responsible for meeting their countries' aggregate emissions commitment. If permits could be purchased by individual firms, the government might be able to explain away any exceedence of its target by claiming that domestic firms might have paid for the extra permits in private transactions.. (This is also an argument why, aside from escape clauses, international trading probably needs to be done via national governments.) It might work for governments to act as the agents for individual firms in making international purchases.

National version:

- National governments stand ready to sell additional permits *to their own citizens* at a predetermined price P.
- In the basic agreement, countries agree to a common plan for domestic implementation: a scheme of tradable permits.
- It does not matter whether the initial allocation of permits in a particular country is done by auction or arbitrary allocation, insofar as the workability of the escape clause is concerned. All that matters is that the initial allocation is the quantity agreed to in the treaty.
- Each government would get to keep the revenue raised.
- International trade in permits is again superfluous in this case. Indeed, it might be necessary to rule it out. Otherwise an irresponsible government (think "transition

economies") could flood the market with permits, which it prints at the cost of the paper while receiving real money for them. (Of course such a country would be grossly out of compliance with the international treaty. But one does not wish to structure a treaty in such a way that a single irresponsible government can result in the breaching of intended emission limits, not just by its own economy, but worldwide.)

Why couldn't countries retain their own domestic implementation schemes? If some countries implemented their emission limits by means other than tradable permits, whether taxes or regulation, then it would be difficult to enforce the principle that the country's total emissions are to be limited by their initial allocation plus those demanded at the marginal cost P . The "marginality" becomes suspect. There would be nothing to stop a country from abolishing its existing energy taxes and regulations (or even adding energy subsidies!) and selling a lot of permits to its citizens because the true marginal cost of emission overruns would be far below P .

Wimp versions

The two versions described above pre-suppose a desire for an honest and workable system. It is possible that the multilateral version would be viewed as unacceptable because of aversion to supra-national authorities, and the national version as unacceptable because of aversion to insistence on a common domestic implementation measures. Is there some other way that the U.S. could tell its businesses they will be protected against a price higher than P ?

- (1) The U.S. could insist that the U.S. government be the only one with the right to sell additional permits at price P . If this were accepted, it would have the desirable efficiency properties, while simultaneously transferring potentially huge amounts of money from other countries to the U.S. It is hard to see why any other country would be willing to consider this.
- (2) The U.S. (and other countries if they wished) could assure its citizens that if the price were to rise above P , with scope for buying emission permits internationally already having been exploited, then *the country would borrow, as agreed to internationally, however many permits were necessary* to keep the domestic (and world) price from rising above P . This is perfectly workable institutionally. But it is hard to see why it would be any easier to attain quantity targets in 2015, and simultaneously pay back past borrowings, if the 2010 targets have turned out to be prohibitively expensive to meet.

SAFETY VALVE

Alternative 1: An explicit safety valve in the treaty

International treaty

- This alternative would include the safety valve in the international treaty. In other words, our binding international obligation would be defined as "1990 by XX *unless* the economic costs are excessive." Our submission would define "excessive" economic costs as a permit price above \$Y.

-- A possible permutation of this approach would be to require all countries that invoke the safety valve clause to devote an amount equal to an agreed price (e.g., \$Y) multiplied by the excess emissions to carbon-reducing activities (e.g., tax cuts for energy-efficiency and R&D, government investments in R&D, purchases of permits internationally, investments in projects abroad, etc.).

This approach effectively moves from a binding *target* to a binding *obligation* (1990 by XX *or* \$Y per ton). In making this shift, we could note that President Clinton has always emphasized the need for a binding and *realistic* target.

Public stance

- "Climate change is the premier environmental challenge of the 21st century, and President Clinton has therefore committed this nation to reducing our greenhouse gas emissions to 1990 levels by XX. But we have to be realistic: If it turns out that this goal is just too expensive, we have to protect the economy while still taking a solid first step in addressing climate change. So our international obligation also includes a safety valve that limits the permit price to \$Y per ton (y-cents per gallon of gasoline).

Some will say that it is impossible to meet our target of 1990 by XX without the permit price exceeding the ceiling. But the President believes that with our R&D effort, our tax cuts, and most importantly with the ingenuity of the American people and businesses, we can do it. And whatever happens, we will have made a *moderate but disciplined* first step in reducing greenhouse gas emissions while continuing to grow the economy.

This proposal allows us to balance the need for a binding target with the need for a realistic one. The honest answer is that given the uncertainty involved -- for example, over the likely role of technology -- we can't know what's realistic until we get started."

Q: Is the target binding?

A: Yes, but our international obligation clearly also states that the costs of meeting that target must be reasonable. So we're bound to a credible first step, not to economic suicide. What's important here is that we take a moderate but disciplined first step in addressing climate change.

Alternative 2: No safety valve in treaty, but regular reviews

International treaty

- This alternative would *not* include the safety valve explicitly in the Kyoto treaty. Rather, it would only include the safety valve in our domestic implementing legislation.
- International obligations would be re-evaluated every few years, in light of new information about the costs and benefits of addressing climate change.

Public stance

- "President Clinton has committed to reducing our greenhouse gas emissions to 1990 levels by XXX. But mindful of the need to avoid undue economic harm, he has also proposed a safety valve in case the costs of meeting that target are excessive. There is substantial uncertainty surrounding how quickly the economy will grow, how rapidly technology will develop and diffuse, and how easily industry will adapt to the need to reduce greenhouse gases. Given this uncertainty, the only way to have a realistic approach is to re-evaluate our obligations on a regular basis."

Q: Is the target binding?

A: Yes, but our obligations will be re-evaluated on a regular basis as we learn more about the science and economics of climate change.

Alternative 3: No safety valve in treaty, stress that many actions are available for us to make the target

International treaty

- This alternative would *not* include the safety valve explicitly in the Kyoto treaty. Rather, it would only include the safety valve in our domestic implementing legislation.

Public stance

- "Climate change is the premier environmental challenge of the 21st century, and President Clinton has therefore committed this nation to a binding target of reducing our greenhouse gas emissions to 1990 levels by XX.

With our R&D effort, our tax cut package, and our Federal energy efficiency efforts, we believe that we can make this target while continuing to grow the economy.

But no one would expect this President, any future President, or any future Congress to impose excessive costs on the economy. If it turns out that this goal is just too expensive, we have to protect the economy while still taking a solid first step in addressing climate change. So the President has also proposed a safety valve, that will limit the economic costs involved by allowing more permits to be sold."

Q: Is the target binding?

A: Yes. And with our tradeable permits system, our R&D effort, our tax cut plan, and our Federal energy efficiency plan, we believe that we can meet our target without imposing undue harm on the economy. But just to be safe, the President has also proposed a safety valve to ensure that the permit price does not rise above a certain level.

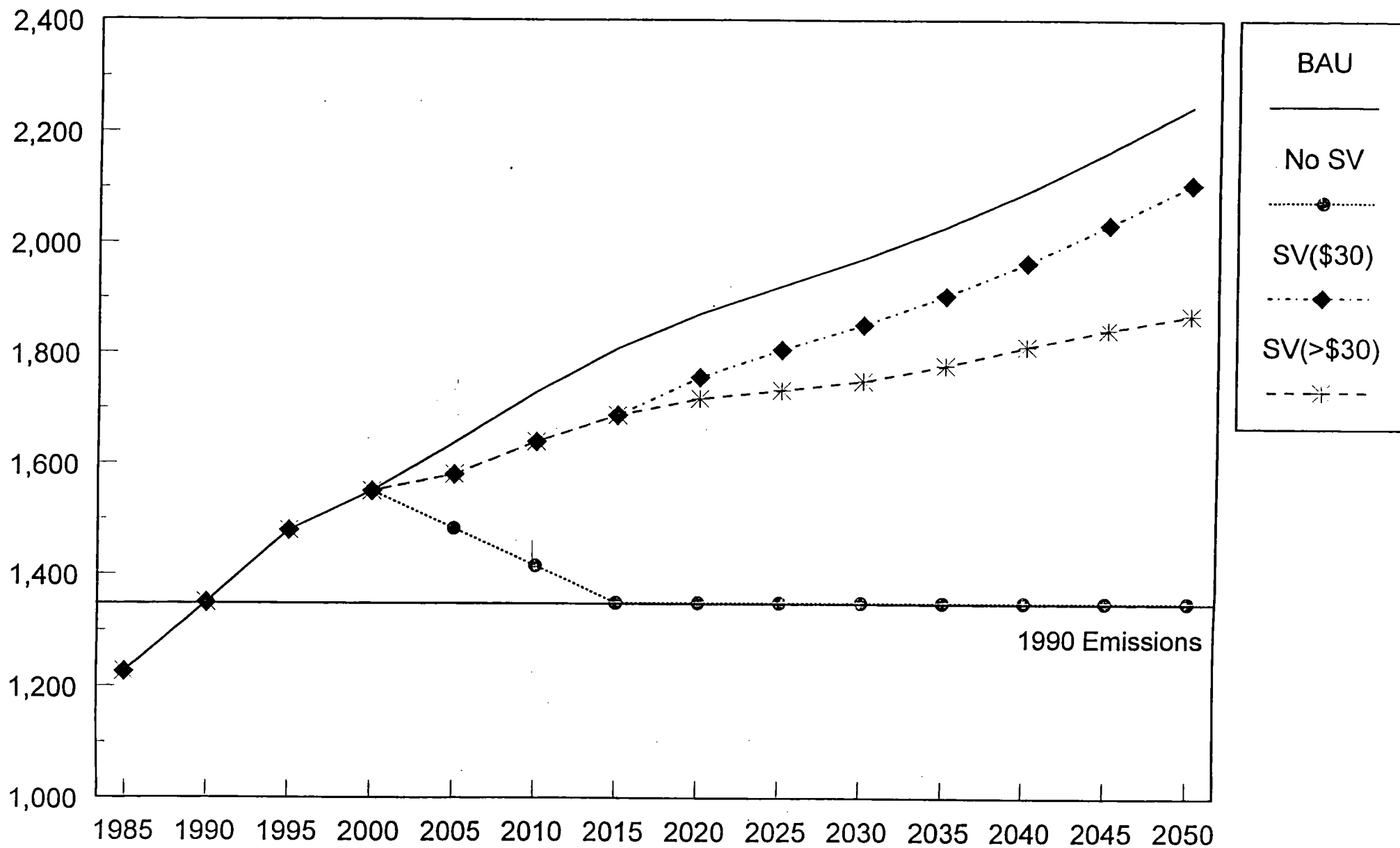


DEVELOPING COUNTRIES

The Steinberg Doctrine: "The United States will not assume binding obligations until developing countries make adequate commitments in terms of their own obligations."

Emissions Paths for 1990 in 2015 Case, with and without Safety Valve

Carbon Emissions (MMTCE)





MEMORANDUM

DATE: October 9, 1997

RE: An assessment of the economic effects and emissions reductions under 1990 in 2015 and 2020, with and without a safety valve

An analysis of a proposal to stabilize emissions at the 1990 level in either 2015 or 2020 with a low price safety valve indicates that the price schedule under consideration is incompatible with these targets and timetables. According to SGM, employing safety valve prices between \$10 and \$30 results in minor economic effects (measured in terms of lost GDP relative to business as usual). However, these permit price ceilings also result in carbon emissions reductions that are roughly a quarter of what is necessary to achieve the specified targets and timetables.

Proposal

Target and Timetable	Domestic Implementation	Safety Valve (ramp up between start and target years)
1990 by 2015 <i>or</i> 1990 by 2020	tradeable carbon permit system starting in 2005	Prices -- 2005: \$10/ton 2015 <i>or</i> 2020: \$30/ton

Assessment

To assess the effects of these targets and timetables on the economy and on carbon emissions, we had the following scenarios modeled with SGM.

Scenario	T&T	Domestic Implementation	Safety Valve
2015, no SV	1990 by 2015	2005: permit system	none
2015, SV(30)	1990 by 2015	2005: permit system	2005: \$10; 2015: \$30; >2015: \$30
2015, SV(>30)	1990 by 2015	2005: permit system	2005: \$10; 2015: \$30; >2015: ↑\$2/year
2020, no SV	1990 by 2020	2005: permit system	none
2020, SV(30)	1990 by 2020	2005: permit system	2005: \$10; 2020: \$30; >2020: \$30
2020, SV(>30)	1990 by 2020	2005: permit system	2005: \$10; 2020: \$30; >2020: ↑\$1.3/year



Results

The following chart indicates that safety valve prices set at low levels (e.g., \$10-\$30) results in carbon emissions reductions of much smaller magnitudes than would be expected under the same targets and timetables without safety valves. The safety valve scenarios do result in much smaller losses in GDP, but the trade-off is clear: substantially fewer emissions reductions are the cost of less economic pain.

Scenario	2015 Emissions ¹	2020 Emissions ¹	2015 Permit Price	2020 Permit Price	2015 GDP Loss ²	2020 GDP Loss ²
2015, no SV	1350 (-25%)	1350 (-28%)	\$145	\$172	\$29 billion	\$34 billion
2015, SV(30)	1687 (-7%)	1756 (-6%)	\$31	\$31	\$3 billion	\$2 billion
2015, SV(>30)	1687 (-7%)	1717 (-8%)	\$31	\$40	\$3 billion	\$4 billion
2020, no SV	1400 (-23%)	1350 (-28%)	\$122	\$173	\$23 billion	\$34 billion
2020, SV(30)	1722 (-5%)	1757 (-6%)	\$23	\$31	\$1 billion	\$1 billion
2020, SV(>30)	1722 (-5%)	1757 (-6%) —	\$23	\$31	\$1 billion	\$1 billion

model: SGM

Scenario	2015 Emissions	2020 Emissions	2015 GDP	2020 GDP
BAU	1808	1871	\$9.880 trillion	\$10.591 trillion

model: SGM

¹ The percent changes are relative to business as usual in that year.

² The GDP losses are calculated relative to business as usual GDP in that year.



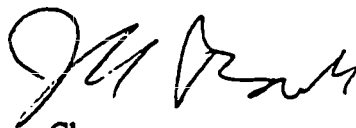
EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS
WASHINGTON, D.C. 20500

JAF

MEMBER

August 26, 1997

MEMORANDUM FOR VICTORIA GREENFIELD, STATE

FROM: JEFF FRANKEL 
SUBJECT: Comments on Escape Clause papers

Overall, I think that the escape clause idea might turn out to be very important (notwithstanding that the U.S. has not yet brought it up in the international negotiations, if I am not mistaken). I am glad that you are working on the escape clause, and I look forward to continuing to exchange thoughts on it.

First comments on the paper "Climate Change: "Escape Clause"

I think that the focus on the examples of "competitiveness and national security" in paragraph 2 of page 1, and also pages 2 and 3, is misplaced. Most importantly, serious concerns about "competitiveness" per se properly apply only to a small number of (energy-intensive) industries that may be adversely affected in international competition. This point came out clearly in an interagency paper reviewing the literature on competitiveness written and circulated by Peter Orszag, drawing on Janet Yellen's remarks at a Principals meeting on developing country participation. (The point is somewhat related to Paul Krugman's "Competitiveness: A Dangerous Obsession.") Rather than saying "competitiveness", I think what you want to say is "adverse effects on the economy." These are effects on the entire economy of higher energy prices (or, if a more inefficient means of implementation is chosen, the effects of regulation) that would be virtually as worrisome regardless which foreign countries participated and regardless whether international trade existed.

A less important point is that I am not sure why national security is mentioned so many times. The major implication of climate change policy for national security that I can think of is that reducing US use of fossil fuels would mean reducing dependence on Mideast oil, and would thereby *enhance* national security.

As I have mentioned to you by telephone, I also think it might be useful to consider adding some other escape clauses, in addition to the principal one triggered by unexpectedly severe adverse economic effects or energy price increases. My guess is that this paper is the place to enter these ideas (rather than the other paper, for example). Three possibilities:

- An escape clause that would be triggered in the future if continued **scientific research** determined that the dangers from GHG concentrations and climate change were much less than feared. (Presumably the treaty would be renegotiated in such a case anyway. But the arguments for putting this language in now are three: (1) to facilitate the change, should this come to pass, (2) so that we don't look foolish in the eyes of history if this should come to pass, and most importantly, (3) to help allay the fears of today's skeptics.)
- An escape clause that would be triggered in the future if **developing country accession** turned out to be less than we expect after Kyoto.
- An escape clause that would be triggered if other Annex I countries fail to abide by their commitments.

Each of these might be important.

Comments on the paper **Climate Change: Permit Prices "Too High"**

I have seen Treasury's comments. I agree with all six of them, and would have liked to make most of the same points myself. So consider that two votes for their suggestions.

A note under their item 5: your words on the possibility of an international mandate for common policies and measures runs against good economics if common "standards" is the sort of thing contemplated. But those words would instead be consistent with good economics if the proposal by Treasury regarding a possible U.S. implementation (measures to raise the price of carbon directly) were interpreted as the common policy/measure.

I approve the focus in the paper on "permit prices too high" even if, as Treasury suggests, you were to change the title. I think the triggering condition, permit prices above some level "+x%", needs to be clarified in the longest paragraph on page 4. Also, in the preceding bullet, I don't like the phrase "competitiveness /national security" for the reasons indicated toward the beginning of this memo.

ESCAPE CLAUSE

9/17/97

Gene asked me to ^{open} ~~prepare~~ a discussion of ^{escape clause} ~~as a component of a policy~~. This is ^{surely} ~~not~~ ^{unfamiliar} ~~to~~ ^{the} ~~public~~ ^{purposes} ~~of~~ ^{is to provide} ~~the~~ ^{an escape} ~~clause~~ ^{policy}.

- "Price-trigger" escape clause would focus on the price of energy per ton of carbon. If the price rises to level P, then government(s) are prepared to sell at P however many emission permits are demanded (beyond the shares already allocated to countries, and to citizens by their governments). The effect would be to convert the quantity limit into a price instrument under circumstances when the burden would otherwise be too burdensome.

Analogies from trade policy:

- Safeguards: GATT Article 19 (seems to work, despite its admitted vagueness) Developing countries are permitted to impose quotas and Qrs in the event of balance of payments disruption.
- Tariff-Rate Quotas: imports free up to a pre-assigned quota; additional imports allowed under a pre-set penalty rate.

- ^{The Logic of the Escape Clause} ~~Insurance-version:~~ A great advantage of having an escape clause is that it provides a form of insurance against unexpectedly and disastrously large economic costs if things turn out to be very different that we anticipate--for example, if economic growth is unexpectedly large, we would not want to have such a hard constraint that we would end up having a surge in growth choked off through a spiking of carbon emissions prices. It would cap the economic cost we need to bear. To obtain this insurance, we would set the trigger price for the escape clause (say one standard deviation) above our best guess price under our chosen target and timetable--say \$125-150 for a 1990 by 2010 policy or 30-50 for a policy of peaking by 2010 and reducing emissions-growth to 1990 levels by 2040. An escape clause to guard against undue economic damage could be incorporated in any proposal for targets and timetables.

^{Don't} ~~Political-version:~~ As we think about adding an escape clause to a U.S. proposal we need to be careful because what we have here is a device that suggests a means to make the various circles overlap. ^{Don't} ~~There can be a temptation here to use such a clause as a way for~~ all of us to have our cake and eat it too in the sense that we espouse a very tight target and timetable, like 1990 by 2010, to satisfy the international and environmental communities while using the escape clause price of \$25, a price so low that in the view of the economic team is ^{almost sure} ~~virtually unachievable~~ while meeting the target to reassure business and labor that the policy will not entail undue harm. The economic team perceives a tremendous danger here if we try to rely on such a clause to bridge a very large gap among our views on appropriate targets and timetables. We would not find it tenable to defend the assertion that we expect to achieve a target like 1990 by 2010 target with a permit price of say \$25 which would be near the absolute lower bound of estimates. The economic team would end up ^{having} ~~saying~~ that we have adopted a target that we are very pessimistic about being able to achieve without invoking the escape clause.

- (i) if one believes claims of the wishful-thinking free-lunch technology optimists
- (ii) conditioned on the U.S. obtaining international agreement on all our demands, including not only international trading but also some serious participation by developing countries, or

(iii) even knowing that conditions (I) and (ii) are unlikely to be met. Then the escape clause could be explicitly acknowledged as probably converting a quantity target into a price target.

- ***Technical points:***

- Who would sell permits? Could be:

- (i) national governments (in countries with domestic emissions-trading schemes) or

- (ii) a supra-national authority (in which case would have to decide how to split the proceeds).

- What is time path? Would have to pre-set one price for 2010 and another for 2020.

(Could also interpolate more points along the path; but banking and borrowing should have the same effect.)

- ***Scholarly references:*** Nordhaus (1997), McKibbin and Wilcoxon (1997) and Pizer (1996) have proposed plans under which there is a cap on how much the price of carbon can rise and argued that it has a number of desirable properties.

McKibbin, Warwick, and Peter Wilcoxon, 1997, "A Better Way to Slow Global Climate Change," The Brookings Institution, Washington, DC, March.

Nordhaus, Bill, 1997, "Climate Allowances Protocol (CAP): Comparison of Alternative Global Tradable Emissions Regimes," Yale University, June 17.

Pizer, William A, 1996, "Optimal Choice of Policy Instrument and Stringency Under Uncertainty: The Case of Climate Change," Resources for the Future, Discussion Paper 97-17, Dec.



EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS
WASHINGTON, D.C. 20500

cc: JY

MEMBER

August 26, 1997

MEMORANDUM FOR VICTORIA GREENFIELD, STATE

FROM:

JEFF FRANKEL

SUBJECT:

Comments on Escape Clause papers

Overall, I think that the escape clause idea might turn out to be very important (notwithstanding that the U.S. has not yet brought it up in the international negotiations, if I am not mistaken). I am glad that you are working on the escape clause, and I look forward to continuing to exchange thoughts on it.

First, comments on the paper "Climate Change: "Escape Clause"

I think that the focus on the examples of "competitiveness and national security" in paragraph 2 of page 1, and also pages 2 and 3, is misplaced. Most importantly, serious concerns about "competitiveness" per se properly apply only to a small number of (energy-intensive) industries that may be adversely affected in international competition. This point came out clearly in an interagency paper reviewing the literature on competitiveness written and circulated by Peter Orszag, drawing on Janet Yellen's remarks at a Principals meeting on developing country participation. (The point is somewhat related to Paul Krugman's "Competitiveness: A Dangerous Obsession.") Rather than saying "competitiveness", I think what you want to say is "adverse effects on the economy." These are effects on the entire economy of higher energy prices (or, if a more inefficient means of implementation is chosen, the effects of regulation) that would be virtually as worrisome regardless which foreign countries participated and regardless whether international trade existed.

A less important point is that I am not sure why national security is mentioned so many times. The major implication of climate change policy for national security that I can think of is that reducing US use of fossil fuels would mean reducing dependence on Mideast oil, and would thereby *enhance* national security.

As I have mentioned to you by telephone, I also think it might be useful to consider adding some other escape clauses, in addition to the principal one triggered by unexpectedly severe adverse economic effects or energy price increases. My guess is that this paper is the place to enter these ideas (rather than the other paper, for example). Three possibilities:

- An escape clause that would be triggered in the future if continued scientific research determined that the dangers from GHG concentrations and climate change were much less than feared. (Presumably the treaty would be renegotiated in such a case anyway. But the arguments for putting this language in now are three: (1) to facilitate the change, should this come to pass, (2) so that we don't look foolish in the eyes of history if this should come to pass, and most importantly, (3) to help allay the fears of today's skeptics.)
- An escape clause that would be triggered in the future if developing country accession turned out to be less than we expect after Kyoto.
- An escape clause that would be triggered if other Annex I countries fail to abide by their commitments.

Each of these might be important.

Comments on the paper Climate Change: Permit Prices "Too High"

I have seen Treasury's comments. I agree with all six of them, and would have liked to make most of the same points myself. So consider that two votes for their suggestions.

A note under their item 5: your words on the possibility of an international mandate for common policies and measures runs against good economics if common "standards" is the sort of thing contemplated. But those words would instead be consistent with good economics if the proposal by Treasury regarding a possible U.S. implementation (measures to raise the price of carbon directly) were interpreted as the common policy/measure.

I approve the focus in the paper on "permit prices too high" even if, as Treasury suggests, you were to change the title. I think the triggering condition, permit prices above some level "+x%", needs to be clarified in the longest paragraph on page 4. Also, in the preceding bullet, I don't like the phrase "competitiveness /national security" for the reasons indicated toward the beginning of this memo.

Jeffrey A. Frankel
09/19/97 01:06:00 PM

Record Type: Record

To: Janet L. Yellen/CEA/EOP, Adele C. Morris/CEA/EOP, Randall W. Lutter/CEA/EOP, Joseph E. Aldy/CEA/EOP

cc:

Subject: escape clause and McKibbin-Wilcoxon

You have heard me mention several scholarly references in connection with the Escape Clause proposal (tho I don't think any use that phrase or have in mind exactly what we want). Billy Pizer, who presented at the lunch seminar recently is quite relevant, regarding the uncertainty of prices vs. quantities. But I particularly recommend that people also look at a March paper by McKibbin-Wilcoxon. I am sending you all copies. I think it makes clear that what we would be contemplating in the Escape Clause is a potentially radical change in the proposed nature of the system -- but a change that has many desirable properties (given the mess otherwise).

JF

Draft. Close hold.

JF 10/15/97

ADVANTAGES / DISADVANTAGES OF VARIOUS POSSIBLE ECONOMIC TRIGGERS

Desirable characteristics of a trigger:

- related to cost of limiting emissions
- built-in stabilizer for macro-economy
- simplicity/conducive to public salesmanship

Yet to be discussed:

- (i) Would this go in the treaty?
- (ii) What is it that would be "triggered on"? If the response is to be the sale of additional emission permits, what would be the quantity and price?

First-best trigger:

- **Price of Carbon Permit**

Advantages:

- (1) Specifically addresses the possibility that emissions reductions would result in high costs, and thus insures against uncertainty in an economically desirable way;
- (2) Once the price level of the trigger is set, then the answer to item (ii) above is clear.

Disadvantage:

The price of carbon emission permits may not be a widely understood concept.

(The possibilities that follow are economic triggers *other* than the price of carbon. Ranking is preliminary; principals may not agree.)

Second-best trigger:

- **Permit price*Quantity-of-permits/GDP**

Advantage: The formula contains the carbon price, and thereby responds to the onerousness of emission limitations per se.

Disadvantage: it is more complicated than some of the other possibilities, and does not allow the President to say "I promise that if X [an easily-understood bad thing]

happens, the constraint will be loosened.”

Third-best trigger

- **growth below 2%**

Advantages: (1) Acts as an automatic stabilizer (as do the others). (2) Encompasses both the possibility of slowdown in long-term growth and the possibility of cyclical downturns. Both are relevant: (i) slow growth of either sort could be the result of onerous emissions restrictions, (ii) slow growth of either sort, even if the result of standard macroeconomic factors, might still lead one to choose less aggressive emissions reductions (assuming environmental benefits are a “normal” good).

Disadvantages: (1) a measure of GDP will not fully reflect the economic costs of the policy because declines in consumption will be masked by some increases in investment, (2) the trigger does not address situations where climate policy negatively impacts high economic growth years (e.g., imagine that under climate policy, GDP grows at 2.2%, but under the counterfactual, GDP would have grown at 3%), (3) the shadow price of the quantitative emissions constraint is lower if growth falls, not higher.

Fourth-best triggers:

- **recession**

Advantage: Very easily explained and understood.

Disadvantages: (1) Doesn't get at slow long-term growth. (2) Unlikely to be triggered often. (3) In the year following a recession, output gap is usually still high.

- **output gap above 1%**

Advantage: May address short-term cyclical conditions better than a recession trigger.

Disadvantages: (1) Doesn't get at long-term growth. (2) Not explainable to public. (3) Partly subjective even within economists' paradigm.

- 
- **unemployment above 7%**

Advantage: easily explained and understood

Disadvantages: (1) Unrelated to long-term growth. (2) An imperfect measure even of short-term cyclical conditions: the natural rate of unemployment moves around. (3) Probably bears the least connection to emissions of any of the measures.

- 
- a committee (Sec.Treas, Chair Fed. Res., etc.) judges "economic distress"

Disadvantage: very subjective/political/ad hoc.

- some attempt to judge whether economic slowdown is attributable to climate change policy

Disadvantage: even more subjective/political/ad hoc.

ADVANTAGES / DISADVANTAGES OF VARIOUS POSSIBLE ECONOMIC TRIGGERS

Desirable characteristics of a trigger:

- related to cost of limiting emissions
- built-in stabilizer for macro-economy
- simplicity/conducive to public salesmanship

Yet to be discussed:

- (i) Would this go in the treaty?
- (ii) What is it that would be "triggered on"? If the response is to be the sale of additional emission permits, what would be the quantity and price?

First-best trigger:

- **Price of Carbon Permit**

Advantages:

- (1) Specifically addresses the possibility that emissions reductions would result in high costs, and thus insures against uncertainty in an economically desirable way;
- (2) Once the price level of the trigger is set, then the answer to item (ii) above is clear.

Disadvantage:

The price of carbon emission permits may not be a widely understood concept.

~~(The possibilities that follow are economic triggers *other* than the price of carbon.
Ranking is preliminary; principals may not agree.)~~

Second-best trigger:

- **Permit price*Quantity-of-permits/GDP**

Advantage: The formula contains the carbon price, and thereby responds to the onerousness of emission limitations per se.

Disadvantage: it is more complicated than some of the other possibilities, and does not allow the President to say "I promise that if X [an easily-understood bad thing] happens, the constraint will be loosened."

Third-best trigger

- **growth below 2%**

Advantages: (1) Acts as an automatic stabilizer (as do the others). (2) Encompasses both the possibility of slowdown in long-term growth and the possibility of cyclical downturns. Both are relevant: (i) slow growth of either sort could be the result of onerous emissions restrictions, (ii) slow growth of either sort, even if the result of standard macroeconomic factors, might still lead one to choose less aggressive emissions reductions (assuming environmental benefits are a "normal" good).

Disadvantages: (1) a measure of GDP will not fully reflect the economic costs of the policy because declines in consumption will be masked by some increases in investment, (2) the trigger does not address situations where climate policy negatively impacts high economic growth years (e.g., imagine that under climate policy, GDP grows at 2.2%, but under the counterfactual, GDP would have grown at 3%), (3) the shadow price of the quantitative emissions constraint is lower if growth falls, not higher.

Fourth-best triggers:

- **recession**

Advantage: Very easily explained and understood.

Disadvantages: (1) Doesn't get at slow long-term growth. (2) Unlikely to be triggered often. (3) In the year following a recession, output gap is usually still high.

- **output gap above 1%**

Advantage: May address short-term cyclical conditions better than a recession trigger.

Disadvantages: (1) Doesn't get at long-term growth. (2) Not explainable to public. (3) Partly subjective even within economists' paradigm.

- **unemployment above 7%**

Advantage: easily explained and understood

Disadvantages: (1) Unrelated to long-term growth. (2) An imperfect measure even of short-term cyclical conditions: the natural rate of unemployment moves around. (3) Probably bears the least connection to emissions of any of the measures.

- **a committee (Sec. Treas, Chair Fed. Res., etc.) judges "economic distress"**

Disadvantage: very subjective/political/ad hoc.

- **some attempt to judge whether economic slowdown is attributable to climate change policy**

Disadvantage: even more subjective/political/ad hoc.

ESCAPE CLAUSE: INTERNATIONAL ASPECTS

Multilateral version:

- A *supranational authority*, presumably the same one that is to monitor countries' emission levels under any sort of agreement, stands ready to sell permits (beyond the basic agreed-to target levels) to whatever *national governments* wish to purchase them at a pre-determined price P.
- In the basic agreement, countries agree to emission targets, but reserve the right to whatever manner of domestic implementation they desire (as in current US position against "common policies and measures").
- Parties would have to agree in advance how to divide up the revenue.
- International trade in permits is superfluous in this case, but would do no harm.

Why couldn't individual firms also buy permits from the supra-national authority? In the multilateral version, it is suggested that only national governments be allowed to buy permits from the supra-national authority. Only they can be held internationally responsible for meeting their countries' aggregate emissions commitment. If permits could be purchased by individual firms, the government might be able to explain away any exceedence of its target by claiming that domestic firms might have paid for the extra permits in private transactions.. (This is also an argument why, aside from escape clauses, international trading probably needs to be done via national governments.) It might work for governments to act as the agents for individual firms in making international purchases.

National version:

- *National governments* stand ready to sell additional permits *to their own citizens* at a predetermined price P.
- In the basic agreement, countries agree to a common plan for domestic implementation: a scheme of tradable permits.
- It does not matter whether the initial allocation of permits in a particular country is done by auction or arbitrary allocation, insofar as the workability of the escape clause is concerned. All that matters is that the initial allocation is the quantity agreed to in the treaty.
- Each government would get to keep the revenue raised.

- International trade in permits is again superfluous in this case. Indeed, it might be necessary to rule it out. Otherwise an irresponsible government (think “transition economies”) could flood the market with permits, which it prints at the cost of the paper while receiving real money for them. (Of course such a country would be grossly out of compliance with the international treaty. But one does not wish to structure a treaty in such a way that a single irresponsible government can result in the breaching of intended emission limits, not just by its own economy, but worldwide.)

Why couldn't countries retain their own domestic implementation schemes? If some countries implemented their emission limits by means other than tradable permits, whether taxes or regulation, then it would be difficult to enforce the principle that the country's total emissions are to be limited by their initial allocation plus those demanded at the marginal cost P . The “marginality” becomes suspect. There would be nothing to stop a country from abolishing its existing energy taxes and regulations (or even adding energy subsidies!) and selling a lot of permits to its citizens because the true marginal cost of emission overruns would be far below P .

Versions giving special treatment to the U.S.

The two versions described above pre-suppose a desire for an honest and workable system. It is possible that the multilateral version would be viewed as unacceptable because of aversion to supra-national authorities, and the national version as unacceptable because of aversion to insistence on a common domestic implementation measures. Is there some other way that the U.S. could tell its businesses they will be protected against a price higher than P ?

(1) The U.S. could insist that the U.S. government be the only one with the right to sell additional permits at price P . If this were accepted, it would have the desirable efficiency properties, while simultaneously transferring potentially huge amounts of money from other countries to the U.S. It is hard to see why any other country would be willing to consider this.

(2) The U.S. (and other countries if they wished) could assure its citizens that if the price were to rise above P , with scope for buying emission permits internationally already having been exploited, then *the country would borrow, as agreed to internationally, however many permits were necessary* to keep the domestic (and world) price from rising above P . This is perfectly workable institutionally. But it is hard to see why it would be any easier to attain quantity targets in 2015, and simultaneously pay back past borrowings, if the 2010 targets have turned out to be prohibitively expensive to meet.

ESCAPE CLAUSE: INTERNATIONAL ASPECTS

Multilateral version:

- A *supranational authority*, presumably the same one that is to monitor countries' emission levels under any sort of agreement, stands ready to sell permits (beyond the basic agreed-to target levels) to whatever *national governments* wish to purchase them at a pre-determined price P.
- In the basic agreement, countries agree to emission targets, but reserve the right to whatever manner of domestic implementation they desire (as in current US position against "common policies and measures").
- Parties would have to agree in advance how to divide up the revenue.
- International trade in permits is superfluous in this case, but would do no harm.

Why couldn't individual firms also buy permits from the supra-national authority? In the multilateral version, it is suggested that only national governments be allowed to buy permits from the supra-national authority. Only they can be held internationally responsible for meeting their countries' aggregate emissions commitment. If permits could be purchased by individual firms, the government might be able to explain away any exceedence of its target by claiming that domestic firms might have paid for the extra permits in private transactions.. (This is also an argument why, aside from escape clauses, international trading probably needs to be done via national governments.) It might work for governments to act as the agents for individual firms in making international purchases.

National version:

- *National governments* stand ready to sell additional permits *to their own citizens* at a predetermined price P.
- In the basic agreement, countries agree to a common plan for domestic implementation: a scheme of tradable permits.
- It does not matter whether the initial allocation of permits in a particular country is done by auction or arbitrary allocation, insofar as the workability of the escape clause is concerned. All that matters is that the initial allocation is the quantity agreed to in the treaty.
- Each government would get to keep the revenue raised.

- International trade in permits is again superfluous in this case. Indeed, it might be necessary to rule it out. Otherwise an irresponsible government (think “transition economies”) could flood the market with permits, which it prints at the cost of the paper while receiving real money for them. (Of course such a country would be grossly out of compliance with the international treaty. But one does not wish to structure a treaty in such a way that a single irresponsible government can result in the breaching of intended emission limits, not just by its own economy, but worldwide.)

Why couldn't countries retain their own domestic implementation schemes? If some countries implemented their emission limits by means other than tradable permits, whether taxes or regulation, then it would be difficult to enforce the principle that the country's total emissions are to be limited by their initial allocation plus those demanded at the marginal cost P . The “marginality” becomes suspect. There would be nothing to stop a country from abolishing its existing energy taxes and regulations (or even adding energy subsidies!) and selling a lot of permits to its citizens because the true marginal cost of emission overruns would be far below P .

Versions giving special treatment to the U.S.

The two versions described above pre-suppose a desire for an honest and workable system. It is possible that the multilateral version would be viewed as unacceptable because of aversion to supra-national authorities, and the national version as unacceptable because of aversion to insistence on a common domestic implementation measures. Is there some other way that the U.S. could tell its businesses they will be protected against a price higher than P ?

(1) The U.S. could insist that the U.S. government be the only one with the right to sell additional permits at price P . If this were accepted, it would have the desirable efficiency properties, while simultaneously transferring potentially huge amounts of money from other countries to the U.S. It is hard to see why any other country would be willing to consider this.

(2) The U.S. (and other countries if they wished) could assure its citizens that if the price were to rise above P , with scope for buying emission permits internationally already having been exploited, then *the country would borrow, as agreed to internationally, however many permits were necessary* to keep the domestic (and world) price from rising above P . This is perfectly workable institutionally. But it is hard to see why, if the 2010 targets have turned out to be prohibitively expensive to meet, it would be any easier to attain quantity targets in 2015 and simultaneously pay back past borrowings.

ESCAPE CLAUSE

9/17/97

- ***"Price-trigger" escape clause*** would focus on the price of energy per ton of carbon: If the price rises to level P, then government(s) are prepared to sell at P however many emission permits are demanded (beyond the shares already allocated to countries, and to citizens by their governments). The effect would be to convert the quantity limit into a price instrument under circumstances when the burden would otherwise be too burdensome.
- ***Analogies from trade policy:***
 - Safeguards: GATT Article 19 (seems to work, despite its admitted vagueness)
 - Tariff-Rate Quotas: imports free up to a pre-assigned quota; additional imports allowed under a pre-set penalty rate.
- ***Insurance version:*** P would be set at "best-guess," say \$100/ton. Or perhaps "best guess plus one standard deviation," e.g., \$150. The intent is to safeguard against unexpectedly large economic costs of emissions reductions -- costs that could turn out to be unexpectedly large if the economic growth rate turned out higher than expected, or if unrealistic estimates regarding the ease of reducing emissions were built into treaty targets
- ***Optimistic version:*** The price could be set low, e.g., \$25. The effect would be to assure constituents that the program will not be too costly. Such a price could be justified:
 - (I) if one believes claims of the wishful-thinking free-lunch technology optimists
 - (ii) conditioned on the U.S. obtaining international agreement on all our demands, including not only international trading but also some serious participation by developing countries, or
 - (iii) even knowing that conditions (I) and (ii) are unlikely to be met. Then the escape clause could be explicitly acknowledged as probably converting a quantity target into a price target.
- ***Technical points:***
 - Who would sell permits? Could be:
 - (i) national governments (in countries with domestic emissions-trading schemes) or
 - (ii) a supra-national authority (in which case would have to decide how to split the proceeds).
 - What is time path? Would have to pre-set one price for 2010 and another for 2020.
(Could also interpolate more points along the path; but banking and borrowing should have the same effect.)
- ***Scholarly references:*** Nordhaus (1997), McKibbin and Wilcoxon (1997) and Pizer (1996) have proposed plans under which there is a cap on how much the price of carbon can rise and argued that it has a number of desirable properties.

McKibbin, Warwick, and Peter Wilcoxon, 1997, "A Better Way to Slow Global Climate Change," The Brookings Institution, Washington, DC, March.

Nordhaus, Bill, 1997, "Climate Allowances Protocol (CAP): Comparison of Alternative Global Tradable Emissions Regimes," Yale University, June 17.

Pizer, William A, 1996, "Optimal Choice of Policy Instrument and Stringency Under Uncertainty: The Case of Climate Change," Resources for the Future, Discussion Paper 97-17, Dec.

ESCAPE CLAUSE

9/17/97

- **"Price-trigger" escape clause** would focus on the price of energy per ton of carbon: If the price rises to level P, then government(s) are prepared to sell at P however many emission permits are demanded (beyond the shares already allocated to countries, and to citizens by their governments). The effect would be to convert the quantity limit into a price instrument under circumstances when the burden would otherwise be too burdensome.

- **Analogies from trade policy:** DCS. can use quotas for (blat) - Normal to see outs.
 - Safeguards: GATT Article 19 (seems to work, despite its admitted vagueness)
 - Tariff-Rate Quotas: imports free up to a pre-assigned quota; additional imports allowed under a pre-set penalty rate.

140X2000
can't support it or below well
low volume or going
can't be disingenuous
don't expect to
high price
2 regulations
Econ team

Insurance version: P would be set at "best-guess," say \$100/ton. Or perhaps "best guess plus one standard deviation," e.g., \$150. The intent is to safeguard against unexpectedly large economic costs of emissions reductions -- costs that could turn out to be unexpectedly large if the economic growth rate turned out higher than expected, or if unrealistic estimates regarding the ease of reducing emissions were built into treaty targets

Alot to recommend as form of insurance - Assume that cost is not too high
insurance cost
Possible in any option
guaranteed
ex. none option
Optimistic Must be honest
Must be realistic for future
Can't follow here
Bridging gap of disagreement on one
We would be to say we are optimistic we would be happy we are getting

Political version: The price could be set low, e.g., \$25. The effect would be to assure constituents that the program will not be too costly. Such a price could be justified:

- (i) if one believes claims of the wishful-thinking free-lunch technology optimists
- (ii) conditioned on the U.S. obtaining international agreement on all our demands, including not only international trading but also some serious participation by developing countries, or
- (iii) even knowing that conditions (i) and (ii) are unlikely to be met. Then the escape clause could be explicitly acknowledged as probably converting a quantity target into a price target.

Woudn't be net - error will not price
Estimates.
Econ team would be to say

- **Technical points:**
 - Who would sell permits? Could be:
 - (i) national governments (in countries with domestic emissions-trading schemes) or
 - (ii) a supra-national authority (in which case would have to decide how to split the proceeds).
 - What is time path? Would have to pre-set one price for 2010 and another for 2020.
 - (Could also interpolate more points along the path; but banking and borrowing should have the same effect.)

- **Scholarly references:** Nordhaus (1997), McKibbin and Wilcoxon (1997) and Pizer (1996) have proposed plans under which there is a cap on how much the price of carbon can rise and argued that it has a number of desirable properties.

McKibbin, Warwick, and Peter Wilcoxon, 1997, "A Better Way to Slow Global Climate Change," The Brookings Institution, Washington, DC, March.

Nordhaus, Bill, 1997, "Climate Allowances Protocol (CAP): Comparison of Alternative Global Tradable Emissions Regimes," Yale University, June 17.

Pizer, William A, 1996, "Optimal Choice of Policy Instrument and Stringency Under Uncertainty: The Case of Climate Change," Resources for the Future, Discussion Paper 97-17, Dec.

5. Escape clauses and other flexibility provisions

In addition to the question of the stringency of targets and timetables, there are a number of other important determinants of the economic costs of a program encompassed in the term "flexibility". The U.S. has proposed both "when flexibility" and "where flexibility."

Examples of "when flexibility" are our proposals for targets that are multi-year averages, for multiple target periods, and for banking and borrowing. Examples of "where flexibility" is international trading, especially with the participation of developing countries. All of these proposals could substantially reduce the cost of a given level of emissions, and are crucial elements of our ability to attain moderate targets, let alone more ambitious targets.

Another possibility that has recently received attention in the inter-agency process is to add one or more escape clauses. The main idea is to safeguard against unexpectedly large economic costs of emissions reductions. These are costs that could turn out to be unexpectedly large if the economic growth rate turned out higher than expected, or if unrealistic estimates regarding the ease of reducing emissions were built into treaty targets. One possible escape clause would focus on the price of energy per ton of carbon.

Nordhaus (1997) and McKibbin and Wilcoxon () have proposed plans under which there is a cap on how much the price of carbon can rise. The proposal is that above a certain level, governments (or perhaps a supranational authority) can make available an indefinite quantity of emission permits at the predetermined price. While the academic proposals tend to call for common policies and measures to be negotiated worldwide, the idea could usefully be integrated into the U.S. proposal for targets and timetables regarding emission quantities in the form of a conditional escape clause. The effect would be to convert the quantity limit into a price instrument under circumstances when the burden would otherwise be too burdensome.

Escape clauses could also serve other purposes as well. Possibilities include:

- An escape clause that would be triggered in the future if continued scientific research determined that the dangers from GHG concentrations and climate change were much less than previously feared. Presumably the treaty would be renegotiated in such a case anyway. But the arguments for putting this language in now are three: (1) to facilitate the change, should this come to pass, (2) so that we don't look foolish in the eyes of history if this should come to pass, and most importantly, (3) to help allay the fears of today's skeptics.
- An escape clause that would be triggered in the future if developing country accession turned out to be less than we expect after Kyoto.
- An escape clause that would be triggered by other Annex I countries' failure to abide by their commitments.

Each of these proposals, might be useful in avoiding economic costs that otherwise might be incurred needlessly.

References

Cline, William, 1992, The Economics of Global Warming, Institute for International Economics: Washington, DC.

Energy Modeling Forum, 1994, Reducing Global Carbon Dioxide Emissions: Costs and Policy Options, EMF Report 12, Stanford University, November 8.

Gaskins, Darius, and John Weyant, 1993 (?), "Model Comparisons of the Costs of Reducing CO2 Emissions," American Economic Review 83, no. 2, 318-323.

IPCC Working Group 3, 1995.

Jorgenson?

Kosobud, R., T. Daly, D. South and K. Quinn, 1994, Energy Journal 15, 213-232.

Manne, Alan, and Richels, Richard, On Stabilizing CO2 Concentrations—Cost-Effective Emission Reduction Strategies, Workshop on Design of International Emissions Trading Systems, Aug 12-14, 97

McKibbin, Warwick, and Peter Wilcoxon, 1997, "A Better Way to Slow Global Climate Change," The Brookings Institution, Washington, DC, March.

Nordhaus, William, 1994, Managing the Global Commons: The Economics of Climate Change, MIT Press, Cambridge, MA

Nordhaus, Bill, 1997, "Climate Allowances Protocol (CAP): Comparison of Alternative Global Tradable Emissions Regimes," Yale University, June 17.

Pizer, William A, Optimal Choice of Policy Instrument and Stringency Under Uncertainty: The Case of Climate Change, Resources for the Future, Discussion Paper 97-17, Dec 96

Repetto, Robert, and Austin, Duncan, The Costs of Climate Protection: A Guide for the Perplexed, World Resources Institute, 1997.

Wigley, T.M.L., Richels, R, and Edmonds, J.A., Economic and Environmental Choices in the Stabilization of Atmospheric CO2 Concentrations, Nature, Vol 379, Jan 18, 96

SAFETY VALVE

Alternative 1: An explicit safety valve in the treaty

International treaty

- This alternative would include the safety valve in the international treaty. In other words, our binding international obligation would be defined as "1990 by XX *unless* the economic costs are excessive." Our submission would define "excessive" economic costs as a permit price above \$Y.

would lead
to many
billions
on wasteful
projects

-- A possible permutation of this approach would be to require all countries that invoke the safety valve clause to devote an amount equal to an agreed price (e.g., \$Y) multiplied by the excess emissions to carbon-reducing activities (e.g., tax cuts for energy-efficiency and R&D, government investments in R&D, purchases of permits internationally, investments in projects abroad, etc.).

This approach effectively moves from a binding *target* to a binding *obligation* (1990 by XX or \$Y per ton). In making this shift, we could note that President Clinton has always emphasized the need for a binding and *realistic* target.

Public stance

- "Climate change is the premier environmental challenge of the 21st century, and President Clinton has therefore committed this nation to reducing our greenhouse gas emissions to 1990 levels by XX. But we have to be realistic: If it turns out that this goal is just too expensive, we have to protect the economy while still taking a solid first step in addressing climate change. So our international obligation also includes a safety valve that limits the permit price to \$Y per ton (y cents per gallon of gasoline).

Some will say that it is impossible to meet our target of 1990 by XX without the permit price exceeding the ceiling. But the President believes that with our R&D effort, our tax cuts, and most importantly with the ingenuity of the American people and businesses, we can do it. And whatever happens, we will have made a *moderate but disciplined* first step in reducing greenhouse gas emissions while continuing to grow the economy.

This proposal allows us to balance the need for a binding target with the need for a realistic one. The honest answer is that given the uncertainty involved -- for example, over the likely role of technology -- we can't know what's realistic until we get started."

Q: Is the target binding?

A: Yes, but our international obligation clearly also states that the costs of meeting that target must be reasonable. So we're bound to a credible first step, not to economic suicide. What's important here is that we take a moderate but disciplined first step in addressing climate change.

Alternative 2: No safety valve in treaty, but regular reviews

International treaty

- This alternative would *not* include the safety valve explicitly in the Kyoto treaty. Rather, it would only include the safety valve in our domestic implementing legislation.
- International obligations would be re-evaluated every few years, in light of new information about the costs and benefits of addressing climate change.

Public stance

- “President Clinton has committed to reducing our greenhouse gas emissions to 1990 levels by XXX. But mindful of the need to avoid undue economic harm, he has also proposed a safety valve in case the costs of meeting that target are excessive. There is substantial uncertainty surrounding how quickly the economy will grow, how rapidly technology will develop and diffuse, and how easily industry will adapt to the need to reduce greenhouse gases. Given this uncertainty, the only way to have a realistic approach is to re-evaluate our obligations on a regular basis.”

Q: Is the target binding?

A: Yes, but our obligations will be re-evaluated on a regular basis as we learn more about the science and economics of climate change.

Alternative 3: No safety valve in treaty, stress that many actions are available for us to make the target

International treaty

- This alternative would *not* include the safety valve explicitly in the Kyoto treaty. Rather, it would only include the safety valve in our domestic implementing legislation.

Public stance

- “Climate change is the premier environmental challenge of the 21st century, and President Clinton has therefore committed this nation to a binding target of reducing our greenhouse gas emissions to 1990 levels by XX.

With our R&D effort, our tax cut package, and our Federal energy efficiency efforts, we believe that we can make this target while continuing to grow the economy.

But no one would expect this President, any future President, or any future Congress to impose excessive costs on the economy. If it turns out that this goal is just too expensive, we have to protect the economy while still taking a solid first step in addressing climate change. So the President has also proposed a safety valve, that will limit the economic costs involved by allowing more permits to be sold.”

Q: Is the target binding?

A: Yes. And with our tradeable permits system, our R&D effort, our tax cut plan, and our Federal energy efficiency plan, we believe that we can meet our target without imposing undue harm on the economy. But just to be safe, the President has also proposed a safety valve to ensure that the permit price does not rise above a certain level.

DEVELOPING COUNTRIES

The Steinberg Doctrine: "The United States will not assume binding obligations until developing countries make adequate commitments in terms of their own obligations."

MEMORANDUM

DATE: 10/7/97

RE: Safety Valves, Carbon Prices, and Emissions

A "safety valve" implemented with tradeable permits would result in a hybrid permit-tax system. The safety valve would serve as a ceiling on the price of a carbon permit. While this provides increased certainty to those who must acquire permits to operate their firms, it also could result in domestic emissions in excess of a specified target, depending on the price of the safety valve. Based on an analysis of available modeling results, safety valves set at low prices (e.g., \$10-\$30) could result in emissions well above a 1990 target in 2010 and subsequent years. For example, a safety valve set at \$25/ton could result in emissions 12% - 20% above 1990 levels in 2010.

Economic Analysis

For this overview of safety valves, we considered economic outputs from the SGM model (Edmonds) and the DOE 5 Labs Study. The SGM model suggests that permit prices would need to be about \$110/ton to achieve the 1990 emissions level in 2010.¹ This permit price is consistent with the range of estimates from other economic models, and actually lies near the low end of the carbon price estimates from these models. Safety valve prices set higher than this would not be triggered, under this model's assumptions. However, prices set less than \$110/ton could be reached as industry trades carbon permits under a climate policy. Safety valve prices set lower than the unconstrained permit price for meeting 1990 in 2010 would result in purchases of additional permits. The magnitude of these additional purchases depends on the safety valve price. The chart below and the attached figure illustrate the emissions associated with a range of safety valve prices.

Approximate Emissions in 2010 Under Various Safety Valve Prices

Carbon Price	Emissions in 2010	Percent above 1990
\$10	1690	25%
\$30	1600	19%
\$50	1520	13%
\$75	1440	7%
\$100	1370	2%

Model: SGM

¹ This price is higher than the SGM result in the IAT report because of a 1% AEEI assumption.

"claims"

Preliminary Draft

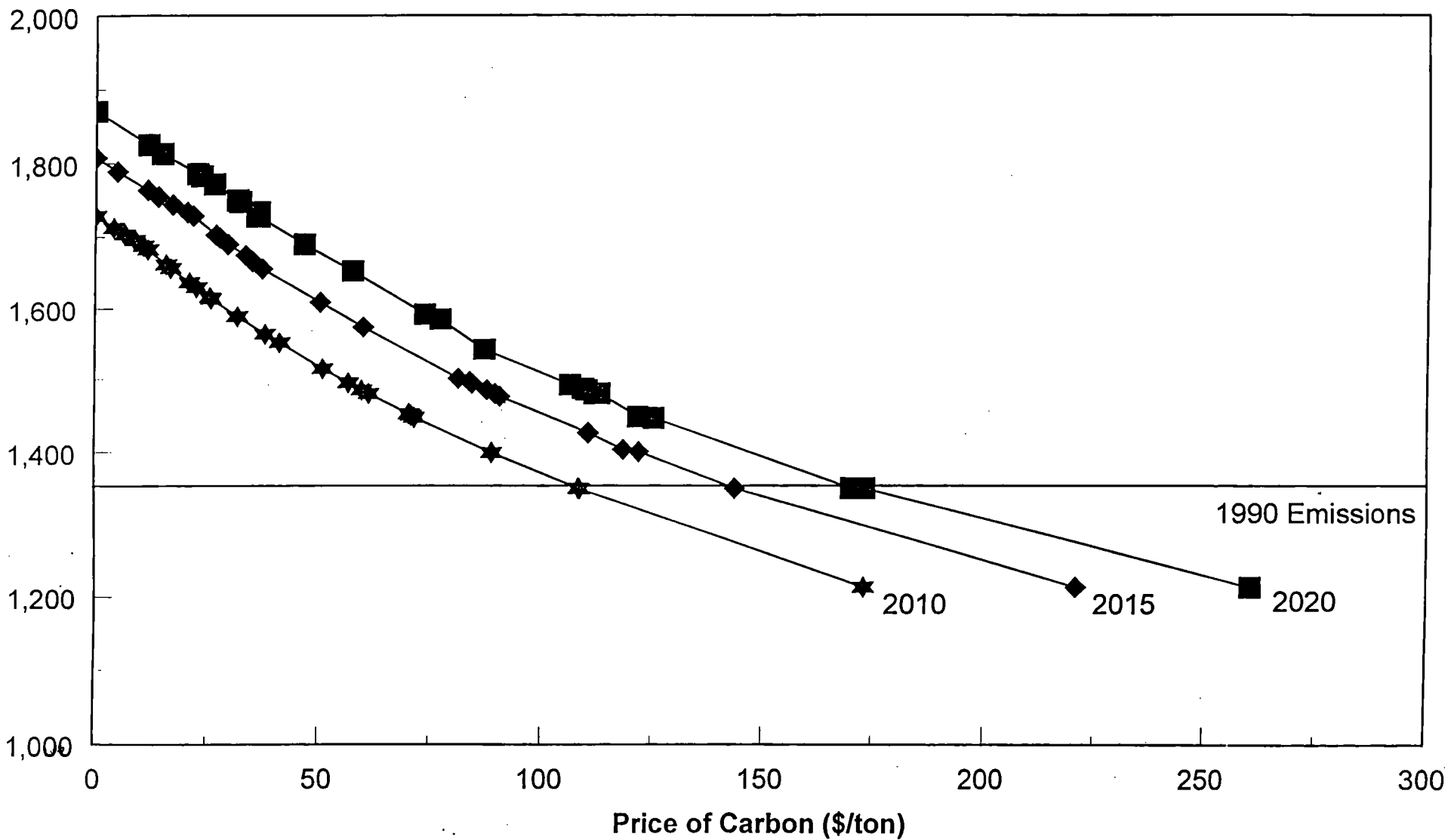
The DOE 5 Labs Study, although much less transparent than the model outputs of SGM, provides estimates of the effects of two permit prices: \$25/ton and \$50/ton. At \$25/ton, the study estimates that emissions would be about 1500 MMTCE in 2010, or 12% above 1990 levels. Under the assumptions of unspecified government programs and a \$50/ton permit system, U.S. emissions could return to the 1990 level in 2010. Given many of the methodological assumptions in the study that do not conform with actual consumer and firm behavior and the unspecified government policies, this \$50/ton could be considered the lower bound of the range of permit prices to achieve 1990 levels.

according
to the
study

Regardless of study, safety valve prices less than \$50/ton would likely result in emissions^{well} in excess of 1990 levels in 2010. Note also that most models indicate that to maintain emissions at the 1990 level beyond 2010 requires even higher carbon prices. This implies that the safety valve approach may need to have prices rise over time.

Safety Valves: Prices and Emissions of Carbon, 2010 - 2020

Emissions (MMTCE)



Model: SGM

Possible economic triggers (other than price of carbon P)

Desirable characteristics:

- related to climate change policy?
 - built-in stabilizer for economy?
 - simplifying: ability to sell public
- either/or

st cyclical fluctuations
 LT trend diff
 energy techn. shocks & other
 aspect of GCC policy

- (2)
 2nd best
- $P \times \text{Quantity-of-permits/GDP}$
- 3rd best
- recession too low prob. - only gets cyclical
 - growth below 2% per yr. p.o. + R.L. better than recession - Also good for LT D. Wilcox 4/11
 - unemployment above 7% only gets cyclical (if even that)
 - output gap above 1% too complic.
 - a committee (Sec. Treas, Chair Fed. Res., etc.) judging "economic distress" too subjective
 - some attempt to judge whether economic slowdown is attributable to climate change policy

Economic trigger not related
to price of permits

- aggregate demand shocks
- trend growth
- technology shocks (innovation)

	<u>pure price</u>	<u>recession</u>	<u>$\frac{P \cdot Q}{GDP}$</u>
aggregate demand business cycle	yes	(1/2) yes	maybe
trend growth	No	No	yes
technology	yes	No	yes



Jeffrey A. Frankel
10/14/97 04:12:21 PM

Record Type: Record

To: Lisa D. Branch/CEA/EOP

cc: See the distribution list at the bottom of this message

Subject: mtg. on non-p "econ.distress" triggers for GCC safety valve

I'd like to call a working group meeting for Wednesday. Let's try for 9:15, after the breakfast meeting, in my office. (Otherwise, 2:00 is a possibility for me.) Lisa, could you see if most people are free?

The President wants us to consider what possibilities there might be for a safety valve triggered by adverse economic developments, that would not involve price. Unthought-through suggestions so far include P*Quantity-of-permits/GDP, recession, growth below 2%, unemployment above 7%, output gap above 1% ~~9:30 or 2:00~~, and a committee (Sec.Treas, Chair Fed. Res., etc.) judging "economic distress."

We would be pursuing this on the assumption that the President has now basically already made the fundamental decision about targets and timetables. So that should be taken as given, for this exercise.

JF

Message Copied To:

Adele C. Morris/CEA/EOP
Joseph E. Aldy/CEA/EOP
Randall W. Lutter/CEA/EOP
ORSZAG_P @ A1 @ CD @ LNGTWY
Jonathan.gruber @ treas.sprint.com @ inet
david.wilcox @ treas.sprint.com @ inet

Possible economic triggers (other than price of carbon P)

Desirable characteristics:
related to climate change policy?
built-in stabilizer for economy?

...

- $P \times \text{Quantity-of-permits/GDP}$
- recession
- growth below 2%
- unemployment above 7%
- output gap above 1%
- a committee (Sec. Treas, Chair Fed. Res., etc.) judging "economic distress"
- some attempt to judge whether economic slowdown is attributable to climate change policy

Economic trigger not related
to price of permits

- aggregate demand shocks
- trend growth
- technology shocks (innovation).

	<u>pure price</u>	<u>recession</u>	<u>$\frac{P \cdot Q}{GDP}$</u>
aggregate demand	yes	(1/2) yes	maybe
trend growth	No	No	yes
technology	yes	No	yes

Different Approaches to a Safety Valve

There are essentially two different approaches to setting the safety valve:

- A permit price ceiling - if the price of permits rose about P , the government would sell as many permits as demanded at that price P
- An “insurance policy” based on economic conditions - if there is a recession, or if growth is slow, the government would somehow relax the emissions quantity constraint. E.g., by selling additional permits at some price or even by suspending participation altogether.

Your economic advisors strongly prefer the first approach, for three reasons:

- This price ceiling approach is the most appropriate given the enormous uncertainty about the ability of emerging technologies, international trading, and JI to lower the cost of meeting our emissions targets. This uncertainty is not insured by policies that focus on economic conditions, but it is by policies that focus on permit price, since if the optimistic forecasts of the gains from these factors prove to be wrong the permit price will rise.
- A safety valve based on economic conditions does not take into account the “but for” case - e.g. “but for our policy, growth would have been even faster”. Suppose that there is an enormous negative effect of this policy which lowers GDP growth by 1 percentage point in each year. If the economy is otherwise booming, so that growth in the absence of this policy would have been 3.5%, then the result of the policy will still be a reasonable 2.5% growth rate. In this case, focusing on the growth rate (or some other cyclical indicator) will miss the enormous negative implications for the economy of our climate change policy.

This problem cannot be remedied through analysis to try to separate the “but for” path of growth. Given the enormous uncertainties, even ex post, about the effect of environmental regulation on the economy, it is impossible to separate out the role of policy to obtain the counterfactual economic performance.

- The price ceiling approach automatically dictates the response of the government to the safety valve being triggered: it releases more permits until their value drops to the trigger level. But an economic conditions-based trigger provides no guidance for either how many more permits should be issued, or at what price they should be issued.

On the other hand, an obvious attraction of basing the safety valve on economic conditions is that it can be more readily defended and explained. One compromise alternative that may also be defensible on economic conditions grounds is a “hybrid” trigger, which divides the total value of permits by the size of the economy. This trigger would be set off either if the price of permits rises too much, or if economic growth slows too much. This would raise all of the objections levied above, but at a much more muted level, since the price of permits is part of the safety valve.

If the decision is to choose a safety valve related to economic conditions, your economic advisors feel that a preferable option would be to focus on the growth rate of the economy, rather than a cyclical indicator such as the unemployment rate. Cyclical issues are more readily addressed through banking and borrowing provisions, and multi-year averaging periods. The role of a safety valve should be to address long term shifts in the extent to which our target and timetable imposes costs on the U.S. economy, related to factors such as a productivity slowdown. This is best addressed by a safety valve of the form "the government will release X more permits into the U.S. economy if growth falls below 2% per year". Focusing on an annual measure of growth both allows for some measure of cyclical protection and protection against changes in our long run growth performance.

Different Approaches to a Safety Valve

There are essentially two different approaches to setting the safety valve:

- A permit price ceiling - if the price of permits rose about X, the government would sell as many permits as demanded at that price X
- An "insurance policy" based on economic conditions - if there is a recession, or if growth is slow, the government would sell additional permits at some price *or perhaps suspend the constraint, e.g. participation altogether*

Your economic advisors strongly prefer the first approach, for three reasons:

- This price ceiling approach is the most appropriate given the enormous uncertainty about the ability of emerging technologies, international trading, and JI to lower the cost of meeting our emissions targets. This uncertainty is not insured by policies that focus on economic conditions, but it is by policies that focus on permit price, since if the optimistic forecasts of the gains from these factors prove to be wrong the permit price will rise.
- A safety valve based on economic conditions does not ^{take into account} control for the "but for" case - e.g. "but for our policy, growth would have been even faster". Suppose that there is an enormous negative effect of this policy which lowers GDP growth by 1 percentage point in each year. If the economy is otherwise booming, so that growth in the absence of this policy would have been 3.5%, then the result of the policy will still be a reasonable 2.5% growth rate. In this case, focusing on the growth rate (or some other cyclical indicator) will miss the enormous negative implications for the economy of our climate change policy. *They won't find this convincing*

This problem cannot be remedied through analysis to try to separate the "but for" path of growth. Given the enormous uncertainties, even ex post, about the effect of environmental regulation on the economy, it is impossible to separate out the role of policy to obtain the counterfactual economic performance.

- The price ceiling approach automatically dictates the response of the government to the safety valve being triggered: it releases more permits until their value drops to the trigger level. But an economic conditions-based trigger provides no guidance for either how many more permits should be issued, or at what price they should be issued.

On the other hand, an obvious attraction of basing the safety valve on economic conditions is that it can be more readily defended and explained. One compromise alternative that may also be defensible on economic conditions grounds is a "hybrid" trigger, which divides the total value of permits by the size of the economy. This trigger would be set off either if the price of permits rises too much, or if economic growth slows too much. This would raise all of the objections levied above, but at a much more muted level, since the price of permits is part of the safety valve. If the decision is to choose a safety valve related to economic conditions, your economic advisors feel that a preferable option would be to focus on the growth rate of the economy, rather than a

cyclical indicator such as the unemployment rate. Cyclical issues are more readily addressed through banking and borrowing provisions, and multi-year averaging periods. The role of a safety valve is to address long term shifts in the extent to which our target and timetable imposes costs on the U.S. economy, related to factors such as a productivity slowdown. This is best addressed by a safety valve of the form "the government will release X more permits into the U.S. economy if growth falls below 2% per year". Focusing on an annual measure of growth both allows for some measure of cyclical protection and protection against changes in our long run growth performance.

Should be

ESCAPE CLAUSE

9/17/97

highlight
Do Scull
Gene asked me to open up a discussion of escape clauses and their potential role as a component of our policy—a topic that some of us have been discussing for some time. The purpose of an escape clause would be to ~~provide a cap on~~ the possible economic damages to which we would be exposed as a consequence of our treaty obligations—a type of insurance policy.

Our discussion will focus on
• **"Price-trigger" escape clause** would focus on the price of energy per ton of carbon: If the price rises to level P, then government(s) are prepared to sell at P however many emission permits are demanded (beyond the shares already allocated to countries, and to citizens by their governments). The effect would be to convert the quantity limit into a price instrument under circumstances when the burden would otherwise be too burdensome.

• Analogies from trade policy:

- Safeguards: GATT Article 19 (entitles countries to renege on promised concessions in situations where they would cause undue damage, but with compensation.) (seems to work, despite its admitted vagueness) Developing countries are permitted to impose quotas and Qrs in the event of balance of payments disruption.
- Tariff-Rate Quotas: imports free up to a pre-assigned quota; additional imports allowed under a pre-set penalty rate.

80-140
to 15
5-10
• **The Logic of the Escape Clause:** A great advantage of having an escape clause is that it provides a form of insurance against unexpectedly and disastrously large economic costs if things turn out to be very different that we anticipate—for example, if economic growth is unexpectedly large, we would not want to have such a hard constraint that we would end up having a surge in growth choked off through a spiking of carbon emissions prices. It would cap the economic cost we need to bear. To obtain this insurance, we would set the trigger price for the escape clause (say one standard deviation) above our best guess price under our chosen target and timetable—say \$25-150 for a 1990 by 2010 policy or 25-50 for a policy of peaking by 2010. An escape clause to guard against undue economic damage could be incorporated in any proposal for targets and timetables.

80-140
to 15
5-10
As we have thought about an escape clause as an addition to a U.S. proposal over the last week, it has been suggested that a device like this might provide a device to make our various circles overlap. There is a temptation here to use such a clause as a way for all of us to have our cake and eat it too in the sense that we espouse a very tight target and timetable, like 1990 by 2010, to satisfy the international and environmental communities while using the escape clause price of \$25, a price so low that in the view of the economic team is virtually unachievable while meeting the target, to reassure business and labor that the policy will not entail undue harm. *Don't* *point out* that, conceivably, an escape clause could bridge a small gap in views, but not a large difference in our views. The economic team perceives a tremendous danger here if we try to rely on such a clause to bridge a very large gap among our views on appropriate targets and timetables. We are frankly concerned about ending up with an intellectually indefensible position where we could be claiming that we expect to achieve a target when we know that we will end up using the escape clause or where that is even the likely outcome. That would leave us in the

Forecast
We could plausibly argue that with intl. trading, which we have described, that we could reach 1990-2010 with a 50-90 percent price, provided a *flexible* *care* for an escape clause price above that range. But *to go below*

Not likely to
For example, there is a great *discrepancy* between prices *what* *Annex I* *trading* *we might set* *appropriate* *choice* *with* *export* *with* *Annex I* *trading*

SAFETY VALVE

Alternative 1: An explicit safety valve in the treaty

International treaty

- This alternative would include the safety valve in the international treaty. In other words, our binding international obligation would be defined as "1990 by XX *unless* the economic costs are excessive." Our submission would define "excessive" economic costs as a permit price above \$Y.

-- A possible permutation of this approach would be to require all countries that invoke the safety valve clause to devote an amount equal to an agreed price (e.g., \$Y) multiplied by the excess emissions to carbon-reducing activities (e.g., tax cuts for energy-efficiency and R&D, government investments in R&D, purchases of permits internationally, investments in projects abroad, etc.).

This approach effectively moves from a binding *target* to a binding *obligation* (1990 by XX *or* \$Y per ton). In making this shift, we could note that President Clinton has always emphasized the need for a binding and *realistic* target.

Public stance

- "Climate change is the premier environmental challenge of the 21st century, and President Clinton has therefore committed this nation to reducing our greenhouse gas emissions to 1990 levels by XX. But we have to be realistic: If it turns out that this goal is just too expensive, we have to protect the economy while still taking a solid first step in addressing climate change. So our international obligation also includes a safety valve that limits the permit price to \$Y per ton (y-cents per gallon of gasoline).

Some will say that it is impossible to meet our target of 1990 by XX without the permit price exceeding the ceiling. But the President believes that with our R&D effort, our tax cuts, and most importantly with the ingenuity of the American people and businesses, we can do it. And whatever happens, we will have made a *moderate but disciplined* first step in reducing greenhouse gas emissions while continuing to grow the economy.

This proposal allows us to balance the need for a binding target with the need for a realistic one. The honest answer is that given the uncertainty involved -- for example, over the likely role of technology -- we can't know what's realistic until we get started."

ESCAPE CLAUSE: INTERNATIONAL ASPECTS

Multilateral version:

- A supranational authority, presumably the same one that is to monitor countries' emission levels under any sort of agreement, stands ready to sell permits (beyond the basic agreed-to target levels) to whatever *national governments* wish to purchase them at a pre-determined price P.
- In the basic agreement, countries agree to emission targets, but reserve the right to whatever manner of domestic implementation they desire (as in current US position against "common policies and measures").
- Parties would have to agree in advance how to divide up the revenue.
- International trade in permits is superfluous in this case, but would do no harm.

Why couldn't individual firms also buy permits from the supra-national authority? In the multilateral version, it is suggested that only national governments be allowed to buy permits from the supra-national authority. Only they can be held internationally responsible for meeting their countries' aggregate emissions commitment. If permits could be purchased by individual firms, the government might be able to explain away any exceedence of its target by claiming that domestic firms might have paid for the extra permits in private transactions.. (This is also an argument why, aside from escape clauses, international trading probably needs to be done via national governments.) It might work for governments to act as the agents for individual firms in making international purchases.

National version:

- National governments stand ready to sell additional permits *to their own citizens* at a predetermined price P.
- In the basic agreement, countries agree to a common plan for domestic implementation: a scheme of tradable permits.
- It does not matter whether the initial allocation of permits in a particular country is done by auction or arbitrary allocation, insofar as the workability of the escape clause is concerned. All that matters is that the initial allocation is the quantity agreed to in the treaty.
- Each government would get to keep the revenue raised.
- International trade in permits is again superfluous in this case. Indeed, it might be necessary to rule it out. Otherwise an irresponsible government (think "transition

economies”) could flood the market with permits, which it prints at the cost of the paper while receiving real money for them. (Of course such a country would be grossly out of compliance with the international treaty. But one does not wish to structure a treaty in such a way that a single irresponsible government can result in the breaching of intended emission limits, not just by its own economy, but worldwide.)

Why couldn't countries retain their own domestic implementation schemes? If some countries implemented their emission limits by means other than tradable permits, whether taxes or regulation, then it would be difficult to enforce the principle that the country's total emissions are to be limited by their initial allocation plus those demanded at the marginal cost P . The “marginality” becomes suspect. There would be nothing to stop a country from abolishing its existing energy taxes and regulations (or even adding energy subsidies!) and selling a lot of permits to its citizens because the true marginal cost of emission overruns would be far below P .

Wimp versions

The two versions described above pre-suppose a desire for an honest and workable system. It is possible that the multilateral version would be viewed as unacceptable because of aversion to supra-national authorities, and the national version as unacceptable because of aversion to insistence on a common domestic implementation measures. Is there some other way that the U.S. could tell its businesses they will be protected against a price higher than P ?

(1) The U.S. could insist that the U.S. government be the only one with the right to sell additional permits at price P . If this were accepted, it would have the desirable efficiency properties, while simultaneously transferring potentially huge amounts of money from other countries to the U.S. It is hard to see why any other country would be willing to consider this.

(2) The U.S. (and other countries if they wished) could assure its citizens that if the price were to rise above P , with scope for buying emission permits internationally already having been exploited, then *the country would borrow, as agreed to internationally, however many permits were necessary* to keep the domestic (and world) price from rising above P . This is perfectly workable institutionally. But it is hard to see why it would be any easier to attain quantity targets in 2015, and simultaneously pay back past borrowings, if the 2010 targets have turned out to be prohibitively expensive to meet.

Different Approaches to a Safety Valve

There are essentially two different approaches to setting the safety valve:

- A permit price ceiling - if the price of permits rose about P , the government would sell as many permits as demanded at that price P
- An "insurance policy" based on economic conditions - if there is a recession, or if growth is slow, the government would somehow relax the emissions quantity constraint. E.g., by selling additional permits at some price or even by suspending participation altogether.

Your economic advisors strongly prefer the first approach, for three reasons:

- This price ceiling approach is the most appropriate given the enormous uncertainty about the ability of emerging technologies, international trading, and JI to lower the cost of meeting our emissions targets. This uncertainty is not insured by policies that focus on economic conditions, but it is by policies that focus on permit price, since if the optimistic forecasts of the gains from these factors prove to be wrong the permit price will rise.
- A safety valve based on economic conditions does not take into account the "but for" case - e.g. "but for our policy, growth would have been even faster". Suppose that there is an enormous negative effect of this policy which lowers GDP growth by 1 percentage point in each year. If the economy is otherwise booming, so that growth in the absence of this policy would have been 3.5%, then the result of the policy will still be a reasonable 2.5% growth rate. In this case, focusing on the growth rate (or some other cyclical indicator) will miss the enormous negative implications for the economy of our climate change policy.

This problem cannot be remedied through analysis to try to separate the "but for" path of growth. Given the enormous uncertainties, even ex post, about the effect of environmental regulation on the economy, it is impossible to separate out the role of policy to obtain the counterfactual economic performance.

- The price ceiling approach automatically dictates the response of the government to the safety valve being triggered: it releases more permits until their value drops to the trigger level. But an economic conditions-based trigger provides no guidance for either how many more permits should be issued, or at what price they should be issued.

On the other hand, an obvious attraction of basing the safety valve on economic

conditions is that it can be more readily defended and explained. One compromise alternative that may also be defensible on economic conditions grounds is a "hybrid" trigger, which divides the total value of permits by the size of the economy. This trigger would be set off either if the price of permits rises too much, or if economic growth slows too much. This would raise all of the objections levied above, but at a much more muted level, since the price of permits is part of the safety valve.

If the decision is to choose a safety valve related to economic conditions, a preferable option would be to focus on the growth rate of the economy, rather than a cyclical indicator such as the unemployment rate. Cyclical issues are more readily addressed through banking and borrowing provisions, and multi-year averaging periods. The role of a safety valve should be to address long term shifts in the extent to which our target and timetable imposes costs on the U.S. economy, related to factors such as a productivity slowdown. This is best addressed by a safety valve of the form "the government will release X more permits into the U.S. economy if growth falls below 2% per year". Focusing on an annual measure of growth both allows for some measure of cyclical protection and protection against changes in our long run growth performance.

MEMORANDUM

DATE: 10/7/97

RE: Safety Valves, Carbon Prices, and Emissions

A "safety valve" implemented with tradeable permits would result in a hybrid permit-tax system. The safety valve would serve as a ceiling on the price of a carbon permit. While this provides increased certainty to those who must acquire permits to operate their firms, it also could result in domestic emissions in excess of a specified target, depending on the price of the safety valve. Based on an analysis of available modeling results, safety valves set at low prices (e.g., \$10-\$30) could result in emissions well above a 1990 target in 2010 and subsequent years. For example, a safety valve set at \$25/ton could result in emissions 12% - 20% above 1990 levels in 2010.

Economic Analysis

For this overview of safety valves, we considered economic outputs from the SGM model (Edmonds) and the DOE 5 Labs Study. The SGM model suggests that permit prices would need to be about \$110/ton to achieve the 1990 emissions level in 2010.¹ This permit price is consistent with the range of estimates from other economic models, and actually lies near the low end of the carbon price estimates from these models. Safety valve prices set higher than this would not be triggered, under this model's assumptions. However, prices set less than \$110/ton could be reached as industry trades carbon permits under a climate policy. Safety valve prices set lower than the unconstrained permit price for meeting 1990 in 2010 would result in purchases of additional permits. The magnitude of these additional purchases depends on the safety valve price. The chart below and the attached figure illustrate the emissions associated with a range of safety valve prices.

Approximate Emissions in 2010 Under Various Safety Valve Prices

Carbon Price	Emissions in 2010	Percent above 1990
\$10	1690	25%
\$30	1600	19%
\$50	1520	13%
\$75	1440	7%
\$100	1370	2%

Model: SGM

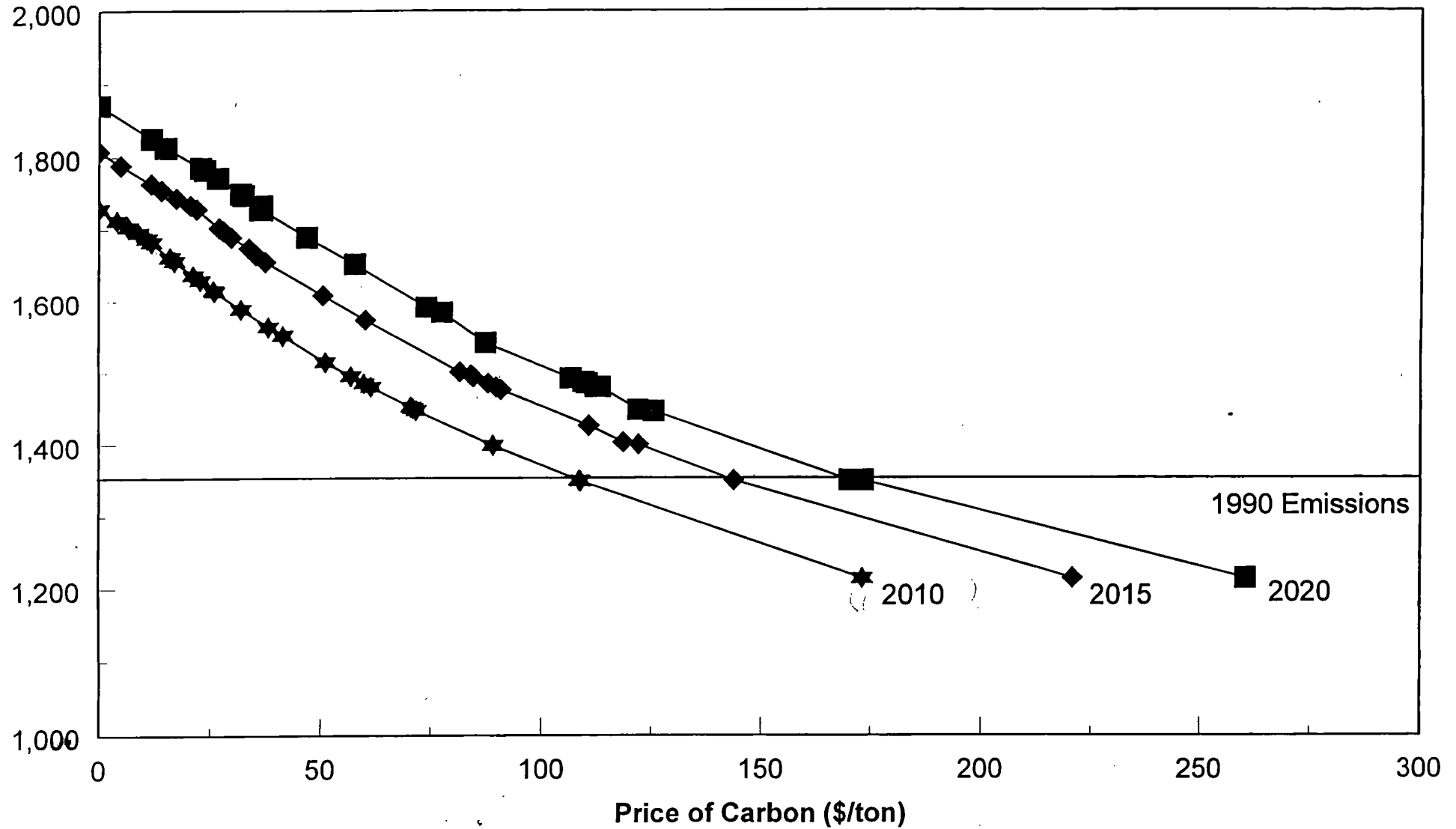
¹ This price is higher than the SGM result in the IAT report because of a 1% AEEI assumption.

The DOE 5 Labs Study, although much less transparent than the model outputs of SGM, provides estimates of the effects of two permit prices: \$25/ton and \$50/ton. At \$25/ton, the study estimates that emissions would be about 1500 MMTCE in 2010, or 12% above 1990 levels. Under the assumptions of unspecified government programs and a \$50/ton permit system, U.S. emissions could return to the 1990 level in 2010. Given many of the methodological assumptions in the study that do not conform with actual consumer and firm behavior and the unspecified government policies, this \$50/ton could be considered the lower bound of the range of permit prices to achieve 1990 levels.

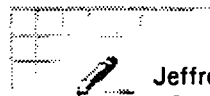
Regardless of study, safety valve prices less than \$50/ton would likely result in emissions in excess of 1990 levels in 2010. Note also that most models indicate that to maintain emissions at the 1990 level beyond 2010 requires even higher carbon prices. This implies that the safety valve approach may need to have prices rise over time.

Safety Valves: Prices and Emissions of Carbon, 2010 - 2020

Emissions (MMTCE)



Model: SGM



Jeffrey A. Frankel
10/10/97 09:38:45 AM

Record Type: Record

To: ORSZAG_P @ A1 @ CD @ LNGTWY

cc: Janet L. Yellen/CEA/EOP, Adele C. Morris/CEA/EOP, Randall W. Lutter/CEA/EOP, Joseph E. Aldy/CEA/EOP

Subject: Escape clause language

Peter,

Below are my reactions to your "first stab" draft escape clause language, with regard to the economic incentives that Alternative 1 seems to create for countries' behavior. All three alternatives of course make the U.S. look somewhat lacking in terms of international integrity or leadership. (An outsider might react that this almost makes our position on land mines look like the moral high ground, by comparison!) But Alternative 1 is the closest to a serious attempt to implement the escape clause proposal.

You might react to my quibbles by asking what alternative I suggest. Intellectually, if we are going to go the escape clause route, my preference would be for a clean version, either the multilateral version of my 9/27 memo, or the national version. I recognize that the first sounds too "U.N.-ish" while the second is unrealistic in requiring common instruments across countries in the form of permit trading (though the force of these political pragmatism arguments seems to me diminished if we are in any case talking about putting forward a proposal for Kyoto that won't be accepted internationally).

- The top bullet explanation would give each country an incentive to (1) abolish its existing energy taxes and regulations (or even add energy subsidies), and (2) sell a lot of permits to its citizens, who would be eager to buy them because the true marginal cost of emission overruns would (due to item (1)) be less than the advertised \$Y. [I have made this point before, and I assume you and Treasury understand it. But I thought I should flag it again. Let me know if you want more detail, or if you don't agree.] Not good from an enviro viewpoint; tho I suppose if the escape clause gave countries an incentive to adopt and emphasize permit-trading, that would be a gain in economic efficiency compared to what most countries do.
- The "--possible permutation", it seems to me, would result in the international trading permit price falling to \$Y, or more likely somewhere below \$Y, on the assumption that governments would rather give \$1 to their own citizens (even if is wastefully spent) than to foreigners. But my concern is that the result might be tens of billions of dollars spent on R&D, etc., which may be far more than can be usefully spent. Especially if one considers the human failings of the political system. Lots of expensive and environmentally-unproductive ethanol projects.

JF

----- Forwarded by Jeffrey A. Frankel/CEA/EOP on 10/10/97 09:06 AM -----

Janet L. Yellen

10/09/97 03:58:35 PM

Record Type: Record

To: Jeffrey A. Frankel/CEA/EOP

cc:

Subject: Escape clause language

----- Forwarded by Janet L. Yellen/CEA/EOP on 10/09/97 03:57 PM -----

Peter R. Orszag

10/09/97 11:11:30

AM

Record Type: Record

To: See the distribution list at the bottom of this message

cc:

Subject: Escape clause language



Please find attached a first stab at different ways of presenting the safety valve. The first includes the safety valve in the international treaty; the second two do not.

I am not at all sure that I have gotten these down accurately. Please send along comments and corrections.

Message Sent To:

Daniel K. Tarullo/OPD/EOP
Todd Stern/WHO/EOP
Kathleen A. McGinty/CEQ/EOP
David B Sandalow/CEQ/EOP
JONATHAN.GRUBER @ MS01.DO.treas.sprint.com @ INET @ LNGTWY
Janet L. Yellen/CEA/EOP
Gene B. Sperling/OPD/EOP

ESCAPE CLAUSE: INTERNATIONAL ASPECTS

Multilateral version:

- A *supranational authority*, presumably the same one that is to monitor countries' emission levels under any sort of agreement, stands ready to sell permits (beyond the basic agreed-to target levels) to whatever *national governments* wish to purchase them at a pre-determined price P.
- In the basic agreement, countries agree to emission targets, but reserve the right to whatever manner of domestic implementation they desire (as in current US position against "common policies and measures").
- Parties would have to agree in advance how to divide up the revenue.
- International trade in permits is superfluous in this case, but would do no harm.

Why couldn't individual firms also buy permits from the supra-national authority? In the multilateral version, it is suggested that only national governments be allowed to buy permits from the supra-national authority. Only they can be held internationally responsible for meeting their countries' aggregate emissions commitment. If permits could be purchased by individual firms, the government might be able to explain away any exceedence of its target by claiming that domestic firms might have paid for the extra permits in private transactions.. (This is also an argument why, aside from escape clauses, international trading probably needs to be done via national governments.) It might work for governments to act as the agents for individual firms in making international purchases.

National version:

- *National governments* stand ready to sell additional permits *to their own citizens* at a predetermined price P.
- In the basic agreement, countries agree to a common plan for domestic implementation: a scheme of tradable permits.
- It does not matter whether the initial allocation of permits in a particular country is done by auction or arbitrary allocation, insofar as the workability of the escape clause is concerned. All that matters is that the initial allocation is the quantity agreed to in the treaty.
- Each government would get to keep the revenue raised.

- International trade in permits is again superfluous in this case. Indeed, it might be necessary to rule it out. Otherwise an irresponsible government (think “transition economies”) could flood the market with permits, which it prints at the cost of the paper while receiving real money for them. (Of course such a country would be grossly out of compliance with the international treaty. But one does not wish to structure a treaty in such a way that a single irresponsible government can result in the breaching of intended emission limits, not just by its own economy, but worldwide.)

Why couldn't countries retain their own domestic implementation schemes? If some countries implemented their emission limits by means other than tradable permits, whether taxes or regulation, then it would be difficult to enforce the principle that the country's total emissions are to be limited by their initial allocation plus those demanded at the marginal cost P . The “marginality” becomes suspect. There would be nothing to stop a country from abolishing its existing energy taxes and regulations (or even adding energy subsidies!) and selling a lot of permits to its citizens because the true marginal cost of emission overruns would be far below P .

Versions giving special treatment to the U.S.

The two versions described above pre-suppose a desire for an honest and workable system. It is possible that the multilateral version would be viewed as unacceptable because of aversion to supra-national authorities, and the national version as unacceptable because of aversion to insistence on a common domestic implementation measures. Is there some other way that the U.S. could tell its businesses they will be protected against a price higher than P ?

(1) The U.S. could insist that the U.S. government be the only one with the right to sell additional permits at price P . If this were accepted, it would have the desirable efficiency properties, while simultaneously transferring potentially huge amounts of money from other countries to the U.S. It is hard to see why any other country would be willing to consider this.

(2) The U.S. (and other countries if they wished) could assure its citizens that if the price were to rise above P , with scope for buying emission permits internationally already having been exploited, then *the country would borrow, as agreed to internationally, however many permits were necessary* to keep the domestic (and world) price from rising above P . This is perfectly workable institutionally. But it is hard to see why, if the 2010 targets have turned out to be prohibitively expensive to meet, it would be any easier to attain quantity targets in 2015 and simultaneously pay back past borrowings.

ADVANTAGES / DISADVANTAGES OF VARIOUS POSSIBLE ECONOMIC TRIGGERS

Desirable characteristics:

- related to cost of limiting emissions
- built-in stabilizer for macro-economy
- simplicity/conducive to public salesmanship

Yet to be discussed:

- (i) What is it that would be "triggered on"?
- (ii) Would this go in the treaty?
- (iii) What would be the quantity and price of safety valve permits under non-carbon price options?

First-best trigger:

- Price of Carbon Permit

Advantages: 1) Specifically addresses the possibility that emissions reductions would result in high costs; 2) Once the price level of the trigger is set, then number iii under the issues yet to be discussed is resolved. Disadvantage: May be difficult to link to a specific easily-understood "bad thing".

(possibilities other than price of carbon permit)

Second-best trigger:

- Permit price*Quantity-of-permits/GDP

The advantage is it contains the carbon price, and thereby responds to the onerousness of emission limitations per se. The disadvantage is that it is more complicated than some of the other possibilities, and does not allow the President to say "I promise that if X [an easily-understood bad thing] happens, the constraint will be loosened."



Jeffrey A. Frankel
09/19/97 12:57:51 PM

Record Type: Record

To: Janet L. Yellen/CEA/EOP, Adele C. Morris/CEA/EOP, Randall W. Lutter/CEA/EOP, Joseph E. Aldy/CEA/EOP

cc: Jon D. Haveman/CEA/EOP

Subject: international aspects of the Escape Clause proposal



At the ESCAPECLIN principles meeting and in recent conversations with Rafe Pomerance at State, it has become clear that (1) some basic aspects of the price-triggered Escape Clause proposal have not been widely understood in other agencies (2) there are also parts of it that we ourselves need to think through more clearly. This is particularly true of the international dimension.

I attach a two-page write-up. It enumerates the features of each of the several versions of the proposal that seem to me to be workable. (I make no judgments about their relative merits in the memo, or indeed about the merit of the whole idea, though I certainly think it has some.) The point here is just addressing workability. To take an extreme example, different countries cannot have escape clauses with different trigger prices in the presence of international trade in permits.

Please let me know what you think. Then let's meet to discuss it among ourselves.

JF

Third-best triggers

- growth below 2%

Advantage: encompasses both the possibility of slowdown in long-term growth and the possibility of cyclical downturns. Both are relevant: (1) slow growth of either sort could be the result of onerous emissions restrictions, (2) slow growth of either sort, even if the result of standard macroeconomic factors, might still lead one to choose less aggressive emissions reductions (assuming environmental benefits are a "normal" good).

Disadvantages: 1) a measure of GDP may not fully reflect the economic costs of the policy because declines in consumption may be masked by some increases in investment, 2) the trigger does not address situations where climate policy negatively impacts high economic growth years (e.g., assume that under climate policy, GDP grows at 2.2%, but under the counterfactual, GDP may grow at 3%).

Fourth-best triggers (with tentative ranking):

- recession

Advantage: very easily explained and understood.

Disadvantages: (1) doesn't get at slow long-term growth. (2) unlikely to be triggered often. (3) In the year following a recession, output gap is usually still high.

- output gap above 1%

— Advantage: see preceding item.

Disadvantages: (1) doesn't get at long-term growth. (2) Not explainable to public. (3) Partly subjective even within economists' paradigm.

- unemployment above 7%

Advantage: easily explained and understood

Disadvantages: (1) Unrelated to long-term growth. (2) An imperfect measure even of short-term cyclical conditions: the natural rate of unemployment moves around. (3) probably bears the least connection to emissions of any of the measures.

- a committee (Sec. Treas, Chair Fed. Res., etc.) judging "economic distress"

Disadvantage: very subjective/political/ad hoc.

- **some attempt to judge whether economic slowdown is attributable to climate change policy**

Disadvantage: even more subjective/political/ad hoc.

9/27/97+

ESCAPE CLAUSE: INTERNATIONAL ASPECTS

Versions of the escape clause proposal differ according to who would sell the permits, how it would interact with international trading, and how it would interact with countries' domestic implementation. I do not believe that one can mix and match these features at will, and still have a plan that is workable. I see four possible plans that are potentially workable (though each has obvious disadvantages.).

Multilateral version:

- A *supranational authority*, presumably the same one that is to monitor countries' emission levels under any sort of agreement, stands ready to sell permits (beyond the basic agreed-to target levels) to whatever *national governments* wish to purchase them at a pre-determined price P.
- In the basic agreement, countries agree to emission targets, but reserve the right to whatever manner of domestic implementation they desire (as in current US position against "common policies and measures").
- Parties would have to agree in advance how to divide up the revenue.
- International trade in permits is superfluous in this case, but would do no harm.

Why couldn't individual firms also buy permits from the supra-national authority? In the multilateral version, it is suggested that only national governments be allowed to buy permits from the supra-national authority. Only they can be held internationally responsible for meeting their countries' aggregate emissions commitment. If permits could be purchased by individual firms, the government might be able to explain away any exceedence of its target by claiming that domestic firms might have paid for the extra permits in private transactions.. (This is also an argument why, aside from escape clauses, international trading probably needs to be done via national governments.) It might work for governments to act as the agents for individual firms in making international purchases.

National version:

- *National governments* stand ready to sell additional permits to *their own citizens* at a predetermined price P.
- In the basic agreement, countries agree to a common plan for domestic implementation: a scheme of tradable permits.

- It does not matter whether the initial allocation of permits in a particular country is done by auction or arbitrary allocation, insofar as the workability of the escape clause is concerned. All that matters is that the initial allocation is the quantity agreed to in the treaty.
- Each government would get to keep the revenue raised.
- International trade in permits is again superfluous in this case. Indeed, it might be necessary to rule it out. Otherwise an irresponsible government (think “transition economies”) could flood the market with permits, which it prints at the cost of the paper while receiving real money for them. (Of course such a country would be grossly out of compliance with the international treaty. But one does not wish to structure a treaty in such a way that a single irresponsible government can result in the breaching of intended emission limits, not just by its own economy, but worldwide.)

Why couldn't countries retain their own domestic implementation schemes? If some countries implemented their emission limits by means other than tradable permits, whether taxes or regulation, then it would be difficult to enforce the principle that the country's total emissions are to be limited by their initial allocation plus those demanded at the marginal cost P . The “marginality” becomes suspect. There would be nothing to stop a country from abolishing its existing energy taxes and regulations (or even adding energy subsidies!) and selling a lot of permits to its citizens because the true marginal cost of emission overruns would be far below P .

Versions giving special treatment to the U.S.

The two versions described above pre-suppose a desire for an honest and workable system. It is possible that the multilateral version would be viewed as unacceptable because of aversion to supra-national authorities, and the national version as unacceptable because of aversion to insistence on a common domestic implementation measures. Is there some other way that the U.S. could tell its businesses they will be protected against a price higher than P ?

(1) The U.S. could insist that the U.S. government be the only one with the right to sell additional permits at price P . If this were accepted, it would have the desirable efficiency properties, while simultaneously transferring potentially huge amounts of money from other countries to the U.S. It is hard to see why any other country would be willing to consider this.

(2) The U.S. (and other countries if they wished) could assure its citizens that if the price were to rise above P , with scope for buying emission permits internationally already having been exploited, then *the country would borrow, as agreed to internationally, however many permits were necessary* to keep the domestic (and world) price from rising above P . This is perfectly workable institutionally. But it is hard to see why, if the 2010 targets have turned out to be prohibitively expensive to meet, it would be any easier to attain quantity targets in 2015 and simultaneously pay back past borrowings.

ESCAPE CLAUSE

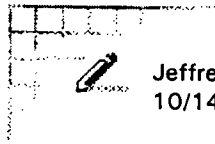
9/17/97

- **"Price-trigger" escape clause** would focus on the price of energy per ton of carbon: If the price rises to level P, then government(s) are prepared to sell at P however many emission permits are demanded (beyond the shares already allocated to countries, and to citizens by their governments). The effect would be to convert the quantity limit into a price instrument under circumstances when the burden would otherwise be too burdensome.
- **Analogies from trade policy:**
 - Safeguards: GATT Article 19 (seems to work, despite its admitted vagueness)
 - Tariff-Rate Quotas: imports free up to a pre-assigned quota; additional imports allowed under a pre-set penalty rate.
- **Insurance version:** P would be set at "best-guess," say \$100/ton. Or perhaps "best guess plus one standard deviation," e.g., \$150. The intent is to safeguard against unexpectedly large economic costs of emissions reductions -- costs that could turn out to be unexpectedly large if the economic growth rate turned out higher than expected, or if unrealistic estimates regarding the ease of reducing emissions were built into treaty targets
- **Optimistic version:** The price could be set low, e.g., \$25. The effect would be to assure constituents that the program will not be too costly. Such a price could be justified:
 - (i) if one believes claims of the wishful-thinking free-lunch technology optimists
 - (ii) conditioned on the U.S. obtaining international agreement on all our demands, including not only international trading but also some serious participation by developing countries, or
 - (iii) even knowing that conditions (i) and (ii) are unlikely to be met. Then the escape clause could be explicitly acknowledged as probably converting a quantity target into a price target.
- **Technical points:**
 - Who would sell permits? Could be:
 - (i) national governments (in countries with domestic emissions-trading schemes) or
 - (ii) a supra-national authority (in which case would have to decide how to split the proceeds).
 - What is time path? Would have to pre-set one price for 2010 and another for 2020. (Could also interpolate more points along the path; but banking and borrowing should have the same effect.)
- **Scholarly references:** Nordhaus (1997), McKibbin and Wilcoxon (1997) and Pizer (1996) have proposed plans under which there is a cap on how much the price of carbon can rise and argued that it has a number of desirable properties.

McKibbin, Warwick, and Peter Wilcoxon, 1997, "A Better Way to Slow Global Climate Change," The Brookings Institution, Washington, DC, March.

Nordhaus, Bill, 1997, "Climate Allowances Protocol (CAP): Comparison of Alternative Global Tradable Emissions Regimes," Yale University, June 17.

Pizer, William A, 1996, "Optimal Choice of Policy Instrument and Stringency Under Uncertainty: The Case of Climate Change," Resources for the Future, Discussion Paper 97-17, Dec.



Jeffrey A. Frankel
10/14/97 04:12:21 PM

Record Type: Record

To: Lisa D. Branch/CEA/EOP

cc: See the distribution list at the bottom of this message

Subject: mtg. on non-p "econ.distress" triggers for GCC safety valve

I'd like to call a working group meeting for Wednesday. Let's try for 9:15, after the breakfast meeting, in my office. (Otherwise, 2:00 is a possibility for me.) Lisa, could you see if most people are free?

The President wants us to consider what possibilities there might be for a safety valve triggered by adverse economic developments, that would not involve price. Unthought-through suggestions so far include P*Quantity-of-permits/GDP, recession, growth below 2%, unemployment above 7%, output gap above 1% 9:30 or 2:00, and a committee (Sec.Treas, Chair Fed. Res., etc.) judging "economic distress."

We would be pursuing this on the assumption that the President has now basically already made the fundamental decision about targets and timetables. So that should be taken as given, for this exercise.

JF

Message Copied To:

Adele C. Morris/CEA/EOP
Joseph E. Aldy/CEA/EOP
Randall W. Lutter/CEA/EOP
ORSZAG_P @ A1 @ CD @ LNGTWY
Jonathan.gruber @ treas.sprint.com @ inet
david.wilcox @ treas.sprint.com @ inet

10/15 GCCmtg on Safety values

non-price trigger

does not tell us how much to sell in extra permits

does not tell us the price to sell extra permits

Possible economic triggers (other than price of carbon P)

Desirable characteristics:

related to climate change policy?

built-in stabilizer for economy?

simplicity

- $P \times \text{Quantity-of-permits/GDP}$
- recession
- growth below 2%
- unemployment above 7%
- output gap above 1%
- a committee (Sec. Treas, Chair Fed. Res., etc.) judging "economic distress"
- some attempt to judge whether economic slowdown is attributable to climate change policy

10/15

Economic trigger not related
to price of permits

- aggregate demand shocks
- trend growth
- technology shocks (innovation).

	<u>pure price</u>	<u>growth rate</u>	<u>recession</u>	<u>$\frac{P \cdot Q}{GDP}$</u>
aggregate demand - business cycle	yes	y	(1/2) yes	maybe
trend growth	No	y (maybe 2% = 1yr)	No	yes
technology (be more inclusive of climate & policy)	yes	n	No -	yes



EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS
WASHINGTON, D.C. 20500

SENIOR ECONOMIST

MEMORANDUM

TO: Joe Romm
Acting Assistant Secretary for Energy Efficiency and Renewable Energy
U.S. Department of the Energy

FROM: Jason Shogren ^{JS} and Joe Aldy ^{JA}

DATE: August 22, 1997

RE: Review of 5-Labs Report: *Scenarios of U.S. Carbon Reductions*

Enclosed you will find our comments on the report *Scenarios of U.S. Carbon Reductions*. We appreciate the opportunity to review the report and we trust you will incorporate our comments.

Comments on "Scenarios of U.S. Carbon Reductions" (5 Labs Study)

General comment

The report, *Scenarios of U.S. Carbon Reductions*, presents a useful cataloging of the technological options that could play a key role in reducing greenhouse gas emissions. The report does not present the specific policies or the behavioral responses that will trigger the adoption or diffusion of these technologies. As such, the report cannot serve as the basis of decision-making by top policy-makers (as opposed to background detail that others may find useful). The report as written, however, leaves the impression that these technologies are policy, which they are not. The U.S. government does not have directly under its control the decisions of private firms and consumers whether to adopt these technologies. The report must be either redone to reflect how likely these technologies will be used given the behavioral responses to likely policies, or reframed to reflect what it is--a catalog of technologies that might be used to address global climate change. The latter path is more straightforward and could readily be accomplished. *Among other changes, it is essential that DOE remove references to "net savings" from the report because this does not reflect the actual costs of implementing these policies.*

Our specific comments follow.

Executive Summary

- 1) paragraph 3: The point regarding the opportunity to reduce emissions through "a vigorous national commitment" should be explicit that this commitment is implemented through federal policies. To state that 120 MMTCE can be reduced by "energy efficiency alone" seems to imply that these reductions are free. These reductions through energy efficiency are induced by aggressive policies, and the statement should reflect that. The subsequent discussion of reductions with carbon permits should also reflect that the level of reductions can occur only through a carbon pricing policy in addition to any non-price policies (e.g., standards).
- 2) Paragraph 4: Estimates of energy cost savings should not be provided unless and until an adequate estimation approach is used to calculate cost savings.
- 3) Paragraph 5: This paragraph should really concentrate on the point that this study identifies a vast array of technologies that may reduce carbon emissions through climate policy. This is the true strength of the study, and it should be emphasized more.

Chapter 1

4) The entire study is premised on two sets of undefined policies: an “aggressive” or “invigorated” public sector effort to stimulate energy efficient technology adoption (efficiency case) and a “very aggressive” public sector effort to stimulate technology development and adoption (high efficiency/low carbon case). The only specific policy instrument mentioned in the report is a tradeable permit at prices of \$25/ton and \$50/ton. The study merely asserts that these unidentified policies would result in: 1) “better technology” (p. 2.5); 2) “higher penetration rates” (p. 2.5); 3) “changing the capital recovery factor [in industry sector] from 33% to 15%” (p. 4.6); and 4) “technological breakthroughs” (p. 5.3). These policy effects would result in reductions of about 200 MMTCE for “free”: firms and individuals receive energy cost-savings greater than or equal to technology adoption costs.

The report specifically states that the efficiency case reduces, but does not eliminate, market barriers and that implementation costs are ignored. Policy intervention to eliminate a market barrier cannot make society better off and generally makes society worse off to the extent that it imposes costs. In particular, a set of climate change policies to stimulate technology adoption could increase efficiency, but only because they also decrease the effect of a market failure (carbon emissions). Social welfare is improved because the net benefits of indirectly fixing the market failure exceed the costs of removing the barriers. If carbon emissions are appropriately priced (assuming in this case that \$50/ton is the correct carbon price), a policy to remove a barrier will generate negative net benefits. High adoption rates will be realized once prices rise enough for some technologies to clear the barriers.¹

The economics literature has identified several barriers that help explain the slow rate of technology adoption.²

- Qualitative attributes of technologies can affect adoption. Consumers of technology prefer technologies because of a set of characteristics, not just energy efficiency. For example, some consumers may purchase a product with a lower efficiency because the former is more reliable than the efficiency-superior product.

¹ In contrast, policy intervention to address a market failure (such as unpriced carbon emissions) may well make society better off, depending on the stringency of the intervention.

² For a review of these issues, see Gilbert Metcalf and Kevin Hassett, “Measuring the Energy Savings from Home Improvement Investments: Evidence from Monthly Billing Data,” National Bureau of Economic Research Working Paper 6074, June 1997; Jeffrey A. Dubin and Daniel L. McFadden, “An Econometric Analysis of Residential Electric Appliance Holdings and Consumption,” *Econometrica*, vol. 52, no. 2, 1984; Adam B. Jaffe and Robert N. Stavins, “Energy-Efficiency Investments and Public Policy,” *Energy Journal*, vol. 15, no. 2, 1994; Albert L. Nichols, “Demand-Side Management: Overcoming Market Barriers or Obscuring Real Costs?” *Energy Policy*, vol. 22, no. 10, 1994; Jerry Hausman, “Individual Discount Rates and the Purchase and Utilization of Energy-Using Durables,” *Bell Journal of Economics*, vol. 10, 1979.

- New technologies may be costly to integrate with existing ones. Until all components of a complex system are fully depreciated it may make sense to replace energy inefficient components with another like-wise inefficient component.
- Uncertainty of future energy prices, or constraints on the ability to borrow capital may make households act as if they have implausibly high implicit discount rates.
- Just because a technology is cost-effective on average does not mean that it is cost-effective for all individuals. Those who may use the device less intensively may find it optimal to purchase a less efficient model.

These barriers clearly demonstrate that investments to minimize energy costs are different from investments to minimize the total costs of production.

The study provides a crude estimate of the costs to government of lowering market barriers to achieve the estimated emissions reductions. A sense of the likely costs can be derived by evaluating the experience of the Climate Change Action Plan (CCAP). CCAP promotes carbon reductions through a broad array of voluntary programs that stimulate "cost-effective" technology adoption by private firms. Participation by a firm in a CCAP program is supposed to reduce carbon emissions and to offer financial returns.³ We do not address an important threshold question of why cost-minimizing firms would ever need any need help from government programs to take actions that would lower their costs.

CCAP received appropriations totaling \$494 million (1995\$) during the FY95 - FY97 period. We assume that these costs are distributed uniformly over the three years. During this period, the Department of Energy and the Environmental Protection Agency can account for reductions of 14 MMTCE (see attached table). Evaluating the cost effectiveness of these programs requires an assumption about emissions reductions in the outyears. Since the programs are persuading firms to adopt innovations that offer financial returns, we believe that the firms would soon have adopted them in the absence of the programs. Thus the emissions reductions might last for several years. To develop illustrative cost estimates we assume between 2 and 7 years of emissions reductions. We describe our estimates given the assumption of 2 years; the method for the assumption of 7 years is identical.⁴ Assuming constant effectiveness of program expenditures, the emissions reductions attributable to past expenditures would grow from 2.8 million tons in the first year to 5.6 million in the second year and third years, and then decline to 2.8 million tons in the 4th year, before falling to 0 in the 5th and subsequent years. The ratio of

³ Note that CCAP efforts are incorporated in the AEO97 baseline.

⁴ This analysis was conducted based on the June 10 draft that stated 180 MMTCE of reductions associated with government programs could be expected under a "very aggressive" set of policies. Since the August 1 draft notes that more non-price policy induced reductions would be expected, the cost estimates provided in this discussion underestimate the program costs associated with this greater number of reductions.

the present value of these costs and of these tons is \$33/ton using a 7 percent discount rate. Thus taking into account the lag between program expenditures and emissions reductions, the average cost effectiveness is \$33/ton (with a 7 year assumption the cost effectiveness is \$13/ton). Assuming constant program effectiveness would imply Federal costs of \$5.9 billion per year (with the 7 year assumption the total cost estimate would be half as much.)

We believe that there are several good reasons to think that the cost of reducing emissions will rise, however, as these or similar programs are expanded. For example, if the potential adopters differed in terms of their cost savings (or willingness to adopt innovations) then the government program would encounter diminishing returns as it tried to reach the less receptive users of technology. Suppose that the (marginal) program cost effectiveness deteriorated by 10 percent every time the annual reductions in emissions grew by as much as the annual reductions implied by the current program. In this instance the marginal cost of achieving 180 million tons of emissions reductions would be about 21 times greater than the marginal cost of the existing program, and far in excess of reasonable values for a ton of carbon emissions averted. In this case the total cost of the program would be \$45 billion per year. Similar assumptions for the 7 year case would lead to total costs of nearly \$7 billion per year, and marginal costs of \$80/ton. Thus we believe that the cost of a government program to ensure energy reductions of 180 million metric tons of carbon could easily run into many tens of billions of dollars per year. In addition, the marginal cost-effectiveness of these programs could substantially exceed reasonable estimates of the value of carbon emissions reductions.

Of course the government might choose to achieve these reductions using command and control type regulations, such as national building codes, or increasingly stringent CAFE standards. These would substitute private sector costs for government administrative costs.

5) 1.1, paragraph 1: Sentence 3 should note that “the improved performance and increased penetration of efficient and low-carbon technologies” are program- and price-induced.

6) 1.1, section 1.1, purpose 1: The statement about a “vigorous national commitment” should be explicit that this means a commitment through government programs.

7) 1.4, Table 1.1: The study notes that it employs EIA’s Annual Energy Outlook 1997 projections for the business-as-usual case in 2010 with a modification to the transportation sector. However, the numbers in this chart do not match up with the numbers in the AEO97 reference case. In fact, they are much closer to the AEO97 low economic growth case (for industry and buildings). We assume that the study is using the reference case from AEO97 since it uses the reference case carbon emissions for 2010. If this is the case, then the following should be the sectoral breakdown of energy consumption (AEO97, pp. 97-99, and pp. 125-127):

Buildings:	36.81 quads
Residential:	20.83 quads
Commercial:	15.98 quads
Industrial:	39.69 quads
Transportation:	31.39+ quads ⁵
Total:	107.89+ quads

If the labs study employs the low economic growth case, then it should state so explicitly in the report and explain why this case, as opposed to the reference or other cases, was selected. Otherwise, the AEO97 numbers should be used.

8) 1.6, Table 1.2: The 2010 BAU carbon emissions for buildings and industry seem not to match the AEO97 reference case emissions for these sectors. AEO97 projects carbon emissions to be 576.1 MMTCE for buildings (residential: 321.4; commercial: 254.7) and industry to be 548.5 MMTCE in 2010. This implies that, with the adjusted transportation emissions, BAU should total 1740 MMTCE, not 1720.

9) 1.8, Table 1.3: The study states that it employs the Annual Energy Outlook business-as-usual (BAU) forecast for the buildings and industry sectors, with modifications that are “not greatly different from the EIA case” (p. 1.2) for the transportation sector.⁶ The one modification stated in the study affects the fuel efficiency of the light duty vehicle fleet. While AEO97 assumes that fuel efficiency will increase in the future, the labs study assumes that fuel efficiency will remain constant. This change should result in a slower rate of energy efficiency improvement in the economy under business as usual conditions.

The AEO97 BAU forecast assumes an improvement of energy efficiency of 0.9% per year through 2015 (annual E/GDP = -0.9%) (AEO97, p. 4). The study assumes energy efficiency improvement under BAU occurs at a rate of 0.77%. This difference appears to be somewhat significant. Inferring from the transportation chapter (table 5.1), this report states that energy use would increase 0.9 quads over the AEO97 reference case. CEA contacted Art Andersen at the Energy Information Administration to determine how much of an effect holding fuel efficiency constant would have on the E/GDP ratio.⁷ According to Andersen, constant fuel efficiency would “disappear in the rounding” in the E/GDP ratio. He stated that this assumption would

⁵ The 1997 AEO projects transportation energy consumption to be 31.39 quads in 2010. With the labs study assumption regarding constant fuel efficiency, the projected energy consumed in this sector should increase. Although the text never explicitly states the extent of this increase, we inferred that it is 0.9 quads. However, since Andersen informed us that the increase would be 0.6 quads, we assessed both in a subsequent comment.

⁶ The labs study also modified the electricity sector forecast, but that modification is not relevant to our discussion of the energy efficiency of the economy.

⁷ Art Andersen is the Director of the Energy Demand and Integration Division, EIA.

result in energy use increasing by 0.6 quads in 2010 over the reference case. CEA recalculated the E/GDP ratio used in the AEO97 BAU to account for this extra energy use (assuming GDP remains the same across these cases), and found that annual E/GDP would decrease 0.86% under the constant fuel efficiency assumption (0.6 quads case). With the inference from the transportation chapter, the annual E/GDP rate would be -0.85% (0.9 quads case). The labs study BAU assumes fewer energy efficiency improvements than should be expected under these adjusted BAU scenarios.

Two related implications arise from this. First, since the study employs a modified version of the AEO97 energy use forecast, it should modify the AEO97 carbon emissions forecast. With a slower improvement in energy efficiency under the lab study assumptions, the 2010 BAU carbon emissions should be greater than the 1722.4 MMTCE in AEO97 (AEO97, p. 120). As we note in the previous comment, by incorporating the AEO97 reference case carbon emissions for buildings and industry, the BAU should be about 1740 MMTCE. This obviously implies that more reductions will be necessary to stabilize emissions at the 1990 level in 2010.

Second, the carbon reductions calculated for the various scenarios in this study are based on this -0.77% E/GDP BAU. This implies that some of the carbon reductions claimed under the efficiency and high efficiency cases actually occur in the -0.86% BAU. This double-counting could be significant. The CEA-generated BAU (0.6 quads case) accounts for 17% of the E/GDP gains assumed in the efficiency case (see attached chart).⁸ The alternative CEA-generated BAU (0.9 quads case) accounts for 15% of the E/GDP gains assumed in the efficiency case. Assuming that E/GDP and carbon reductions are perfectly correlated (given that the efficiency case involves no fuel switching, this is reasonable), then the efficiency case overestimates emissions reductions by 18 to 20 MMTCE.

The text should explain why the lab study E/GDP ratio differs from the AEO97 ratio since it does not seem to result exclusively from keeping fuel efficiency constant. Further, the 2010 BAU emissions reductions should reflect the E/GDP ratio (whether it is -0.77%, -0.85%, -0.86%, or some other rate) used in the study.

10) 1.11, Table 1.4: It would be valuable to understand the effect of non-price policies and permit prices on the carbon reductions. Could you break down the high efficiency cases into two categories: non-price policy induced and permit induced technology adoption?

11) 1.12, paragraph 1: The discussion on government programs costing 15% of investment costs should include references to the literature that have estimated this percentage. Does the literature describe the marginal costs for government programs, or does it just provide this average cost value? Consistent with the literature on technology adoption, the marginal costs should not be

⁸ The AEO97 BAU would capture 25% of the efficiency gains in the efficiency scenario.

assumed to be the same for all units of adoption. In fact, it is likely that the marginal costs increase for higher rates of adoption.

12) 1.12, paragraph 1: The text in this paragraph notes that government costs in the best estimate case are 15% of total investment costs, while figure A-1.1 on p. A-1.2 indicates that the costs are 7% of investment costs for the end-use sectors and 1% for the electricity sector. Which costs are correct?

13) 1.12, paragraph 1: The text notes that “one could argue that... a social discount rate” of 3% or 7% should be used. Alternatively, one could argue that since these analyses assess private decisions on technology adoption, that private marginal rates of time preference should be used that reflect “current market behavior”. This analysis is not attempting to conduct a social benefit-cost analysis. Rather, it is attempting to model the private individual or firm’s benefits and costs associated with a technology adoption decision. Since this report projects technology adoption assuming a set of aggressive policies, the rates of time preference actually used by individuals and firms should be used in assessing the extent of adoption.

Further, the report should not rely on government fiat to lower discount rates. It is very difficult to lower people’s time preferences through policy. Government programs do not increase adoption rates by lowering time preferences, but by lowering the costs of adoption or increasing the benefits of adoption. For example, government programs cost-share the adoption of environmentally-benign agricultural production techniques through the Environmental Quality Incentives Program. Farmers still employ the same discount rate, but their stream of costs are lower because of the government subsidy, and so adoption increases. The report should not assume that government policies can lower private time preference rates, but rather that government policies can affect the stream of costs and benefits of an adoption decision.

14) 1.12, paragraph 5: Again, until the complete costs of investment and accurate cost-savings can be estimated, the text on net benefits should be deleted.

15) 1.13, Table 1.5: The estimates of carbon reductions under the alternative view do not appear to match with the carbon reductions in table A-1.2 on p. A-1.5. It seems implausible that discount rates could double and have no effects on any technology adoption decision in this report. Are the numbers in the appendix the right set? Is it true that every single energy efficient technology adoption decision is cost-effective under the “best estimate” discount rate and the “alternative view” discount rate? If these technologies are such big winners, then why aren’t people and firms already adopting them?

16) 1.14: Unless and until the costs and cost-savings issues are adequately addressed, estimates of net savings should be omitted.

17) 1.15, paragraph 3: As stated in the executive summary comments, the text should not state “energy efficiency alone can take the nation 30 to 50% of the way to 1990 levels.” If energy

efficiency could achieve these reductions “alone”, there would be no need for an invigorated federal policy effort. It should be explicitly stated that policy instruments to achieve this goal are omitted from the analysis.

Chapter 2

18) 2.6, transportation sector bullet: The text states that the transportation sector analysis uses a 5 year time horizon. However, the description of the best estimate and alternative view cost effectiveness calculations on p. A-1.10 indicate that a time horizon of 14 years was used. Further, the transportation chapter indicates that the cost effectiveness analyses were conducted using a 6% discount rate in combination with a decline in usage and depreciation to calculate fuel savings (p. 5.45). The footnote to table 5.9 implies that the analyses used a 14 year time horizon as well. The report should clarify these inconsistencies.

Chapters 3-7

19) There does not appear to be any discussion of the \$25/ton permit scenario in these chapters. Further, the appendices do not explicitly detail this case. The results from this scenario need to be documented in the text and in the appendices. For example, it is impossible to identify the penetration rate for this scenario in the buildings chapter (see p. 3.3). The industry chapter discusses three scenarios: BAU, efficiency, and high efficiency (p. 4.2). The descriptions of the high efficiency case in transportation on p. 5.3 and p. 5.31 do not even mention a permit price. The electricity sector appears to only consider a \$50/ton permit (p. 6.9).

20) The results from the alternative view cost analysis should be incorporated in these chapters.

Chapter 3

21) 3.3: In the context of fully incorporating the effects of climate policy on energy prices, the analyses on buildings technologies should be modified. Under the efficiency case, energy consumption declines. This scenario should be changed to reflect the downward effect on prices resulting from this decreased energy consumption. The result would be to reduce the net improvement in energy use resulting from technological advances. The high efficiency scenario should reflect two counteracting effects on prices: the decline in energy consumption and the \$50/ton permit fee. The study ignores the former effect and insufficiently incorporates the latter effect. For example, in the buildings chapter, the penetration rate is assumed to be 65% instead of 60% of the maximum cost-effective technical potential in this scenario because of the \$50/ton permit price. However, the energy-cost savings calculations for buildings technologies assume the same energy price as in the business as usual scenario. Since the study assumes that exogenous, undefined policy influences drive the penetration rates, the penetration rate should be set at 60% and the energy cost-savings should be recalculated with the appropriate energy price. In addition, the assumed energy use for these technologies should be based on consumers' responses to the lower operating costs. For example, if running an air conditioner becomes less

expensive with a new energy efficient technology, people will run the air conditioner more. This latter effect decreases the carbon reductions associated with each adoption decision.

22) 3.9 and Appendix C-1: The study uses the average cost of electricity to calculate the energy cost savings of these technologies. Many of the electricity-dependent technologies are only cost effective based on the assumption of average, not marginal electricity prices. Since marginal prices may be much lower than average prices, especially in cases where households use less electricity, this may overestimate the extent of cost effective technologies. The analysis should be modified using marginal electricity prices.

23) 3.23, box: The text in the box is not clear on the inclusion of fuel cell technology in the high efficiency scenarios. The first paragraph states that fuel cells were not included in the main building sector scenarios. However, emissions reductions of 3 MMTCE from fuel cells are listed under buildings in Table 1.4 on p. 1.11. Further, the discussion on fuel cells in the text outside of this box implies that fuel cell technology will not be available until 2020 (since it falls in the section "Potential for Advanced Technologies in 2020"). If the study relies on ADL's analysis of fuel cell adoption, then the assumptions of ADL's assessment should be provided in an appendix. Two issues should be addressed here. First, if fuel cells are projected to be adopted under the high efficiency scenarios, then this discussion should be placed in the appropriate section of this chapter (not the 2020 section), and the inconsistencies in the text should be remedied. Second, if fuel cells are adopted, then a discussion of the carbon emissions accounting should be provided to ensure that the study does not double count emissions reductions from energy efficient technology adoption and from switching energy sources to fuel cells.

24) 3.29, summary bullet two: This states that the high efficiency scenario yields 91 MMTCE of carbon reductions from the BAU emissions level. However, Table 1.4 indicates that only 44 MMTCE of reductions occur under the \$25/ton permit price and only 62 MMTCE of reductions occur under the \$50/ton permit price. Which carbon reduction estimate is correct?

Chapter 4

25) 4.6, paragraph 4: The analysis assumes that the capital recovery factor falls by more than half. This appears to be an arbitrary reduction. Did industry behave as if it operated under a lower CRF during the 1970s oil shocks? There is no discussion of the economic behavior necessary to result in this outcome.

26) 4.6, paragraph 4: The high efficiency penetration rate is assumed to be double the rate used in the efficiency scenario, which is the undefined "normal" rate. It is impossible to determine how much of this doubling of penetration results from undefined, aggressive policy efforts and how much results from the permit price. It would be valuable to understand the relative impacts of both.

27) 4.13, paragraph 4: The text states that the high efficiency case causes an acceleration of capital retirement, but does not estimate these costs. Could you estimate the costs of early retirement? If not, can you provide some information on the extent of early retirement (e.g., percentage of capital retired early under this scenario)?

Chapter 5

28) Does this sectoral analysis consider the impact of a permit price? Neither the \$25/ton permit nor the \$50/ton permit are mentioned in the entire chapter. Do all improvements in fuel efficiency and cellulosic ethanol result from non-price policy responses? As the report states, a degree of “luck” is required to achieve the necessary technological breakthroughs to result in the projected carbon reductions. However, without a price incentive, the probability of the nation becoming “lucky” appears more unlikely. If this analysis does not incorporate the permit prices, then this should be made explicit in the discussion of the high efficiency case.

29) The methodology for this sector is insufficiently transparent to grasp easily the impact of technology development and adoption on carbon reductions. Further, the appendices for transportation do not provide the details to remedy the shortcomings in the chapter. It is difficult to compute carbon reductions from increases in fuel efficiency. The text should take the reader through the process of piecing together all of these energy efficient technologies, illustrating the final effect on fuel economy, and then translating this into carbon reductions.

30) 5.4, Table 5.1: Why do the energy consumption numbers for this sector in 1997 vary across scenarios? We understand that the start year for the scenario analyses is 1998 (e.g., refer to Table 4.8 on p. 4.12 that implies 1998 as the start year for assessing cumulative incremental investment).

31) 5.21, paragraph 2: Does the assumption about reducing technology costs reflect any empirical analysis on transportation technologies? For example, the 1970s oil shocks and fuel efficient imports spurred domestic fuel efficiency R&D. Does this analysis incorporate information about accelerating technology development and lowering technology costs that may be available from this earlier period?

32) 5.23, paragraph 3: As we have noted before, it is difficult to modify consumers’ preferences. Assuming that the demand for horsepower will decrease because consumers will become “more green” over the next decade appears tenuous. This statement is repeated on p. 5.32. Is there any evidence that concern about global warming has affected consumers’ purchase decisions to date?

33) 5.25, paragraph 1: If the turbocompound diesel engine and the advanced LE-55 heat engine are not available in the reference case (which implies that the earliest these are available is 2016), then how are they made available by 2003? Is there any precedent for accelerating transportation technology from a time horizon of at least 18 years to a horizon of only 5 years? How do these

engines conform to present emissions standards for particulates and NO_x and how will future standards under the new ozone and particulate matter rules affect them?

34) 5.25, paragraph 1: The efficiency case assumes that advanced drag reduction in heavy trucks has become available this year, but this is excluded from the reference case. First, has this actually occurred? Second, if it has already occurred, then why is it excluded from BAU?

35) 5.25, paragraph 4: Again, the assumption of reducing a technology price appears arbitrary. What is the basis for assuming that the trigger price for heavy truck technologies will fall?

36) 5.25, paragraph 5: The efficiency analysis assumes penetration rates of 100% for several of the heavy truck technologies over a 20 year period. This seems incongruous with the assumptions in the other sector analyses that imply much lower penetration rates. 100% penetration of a technology within 20 years, that is not expected to be available 18 years from now in the BAU, appears to be an extreme and unsubstantiated assumption.

37) 5.32, paragraph 1: The analysis assumes that fuel cells, because their costs are unknown, will be cost effective. This is an entirely arbitrary assumption, especially for a technology that is not even projected to become available in the BAU scenario. There is absolutely no economic basis for this assumption. This assumption is all the more extraordinary given that this analysis does not (apparently) incorporate the impacts of a carbon permit on fuel prices.

38) 5.36, Table 5.7: If the scenarios overestimate fuel economy, as stated in the footnote, then the numbers should be revised to remedy this error.

39) 5.38, paragraph 2: The modification of assumed improvement of fuel efficiency by multiplying the expected improvement by 0.7 to reflect offsetting performance effects, appears arbitrary. Why wouldn't the fraction be much smaller? The introduction to this chapter indicates that almost all improvements in fuel efficiency are offset by performance effects. Why would only 30% of fuel efficiency improvements in the future be offset?

40) 5.45: The chapter is not explicit about its accounting of fuel efficiency improvements in light duty vehicles and the change in the fuel mix reflecting an increase in cellulosic ethanol and the use of fuel cell technology. We cannot determine if carbon reductions are double counted. The study does not discuss how cellulosic ethanol and fuel cells are accounted for in the energy cost savings description on pp. 5.43-5.45. If the reductions from fuel efficiency and the reductions from cellulosic ethanol and fuel cells do not overlap, then this should be stated explicitly. Again, a more transparent presentation of the methodology would address the readers' uncertainty about this issue.

41) 5.45, Table 5.9: The cost effectiveness estimates assume a constant price of \$1.20 per gallon through the life of the vehicles. The gasoline price should be adjusted down to reflect the impact of decreased gasoline consumption due to fuel efficiency. Further, vehicle miles traveled should

increase through time as cars become more fuel efficient, consistent with the trend to date, instead of held constant.

Chapter 7

42) 7.1, paragraph 2: If the report has eliminated the double counting in this sector evident in the June 10 draft, then the sentence that states that double counting is “a likely possibility” should be deleted. A reference to appendix G-2 should be inserted.

43) 7.2, paragraph 3: Again, if the double counting has been remedied by integrating the dispatching and repowering analyses, then the following sentence should be modified: “The analytical approach was static in that the cost of repowering was computed for each candidate power plant but the analysis did not optimize unit/plant production cost, dispatch, or system load.”

44) 7.6, paragraph 5: The reference to appendix G-2 appears to be wrong. This reference implies that appendix G-2 provides a methodology for SO₂ and NO_x benefits. Nothing in the text of chapter 7 reads as if the double counting issue from the June 10 draft has been resolved.

Appendices

45) A-1.9: The alternative view cost-effective estimates for buildings assumes an 18 year time horizon. However, the methodology discussion on p. 2.5 states that a “technology is defined as ‘cost-effective’ if it delivers a good or service at equal or lower life-cycle costs relative to the current practice”. If cost-effectiveness is measured in terms of a technology’s life cycle, then shouldn’t the time horizon for calculating the stream of benefits be constrained by the life of the product? It is not possible for a technology to generate cost savings beyond its lifetime. In the buildings case, the end uses with the largest potential carbon reductions in the high efficiency case are other uses (10 MMTCE commercial, 6 MMTCE residential) and lighting (7 MMTCE commercial, 6 MMTCE residential). These account for 29 of the 62 MMTCE of reductions for this sector. However, the lifetimes for these end uses are much shorter than 18 years. For other uses, the lifetime ranges from 7 (commercial) to 10 years (residential). For lighting, the lifetime ranges from 1 (residential) to 12 years (commercial). The cost effectiveness estimates should be recalculated using specific end use lifetimes.

Summary of Greenhouse Gas Emissions-Reduction Actions

Million Metric Tons of Carbon Equivalent

Source: U.S. Climate Action Report—1997

Action Number	Action Title	1993 Action Plan Estimate for 2000	1997 U.S. CAR Revised Estimate for 2000	Actual Reductions to Date
Residential & Commercial Sector Actions		26.9	10.3	
New	Rebuild America	2.0	1.6	--
1 and 2	Expanded Green Lights and Energy Star Buildings	3.6	3.3	--
3	State Revolving Fund for Public Buildings	1.1	Terminated	
4	Cost-Shared Demonstrations of Emerging Technologies	3.8	0.0	--
5	Operation and Maintenance Training for Commercial Building Facility Managers and Operators			
6	Energy Star Products	5.0	4.3	--
7	Residential Appliance Standards	6.8	0.2	--
8 and 11	Energy Partnerships for Affordable Housing	4.4	0.4	--
9	Cool Communities			
10	Update State Building Codes			
New	Construction of Energy-Efficient Commercial and Industrial Buildings		0.1	--
New	Superwindow Collaborative		0.0	--
New	Expand Markets for Next-Generation Lighting Products		0.2	--
New	Fuel Cells Initiative		0.0	--
Industrial Sector Actions		19.0	4.8	
12	Motor Challenge	8.8	1.8	--
13	Industrial Golden Carrot Programs	2.9	Merged into Action 12 Terminated	
14	Accelerate the Adoption of Energy-Efficient Process Technologies			
15	Industrial Assessment Centers	0.5	CCAP Component Terminated	
16	Waste Minimization	4.2	2.1	--
17	Improve Efficiency of Fertilizer Nitrogen Use	2.7	0.8	--
18	Reduce the Use of Pesticides		Terminated	
Transportation Sector Actions		8.1	5.3	
19	Cash Value of Parking	6.6	4.6	--
20	Innovative Transportation Strategies			
21	Telecommuting Program			
22	Fuel Economy Labels for Tires	1.5	0.7	--
Energy Supply Actions		10.8	1.3	
23	Increase Natural Gas Share of Energy Use Though Federal Regulatory Reform	2.2	Terminated	

Action Number	Action Title	1993 Action Plan Estimate for 2000	1997 U.S. CAR Revised Estimate for 2000	Actual Reductions to Date
24	Promote Seasonal Gas Use for Control of Nitrogen Oxides	2.8	0.5	--
25	High-Efficiency Gas Technologies	0.6	Terminated	
26	Renewable-Energy Commercialization	0.8	0.3	--
27	Expand Utility Integrated Resource Planning	1.4	Terminated	
28	Profitable Hydroelectric Efficiency Upgrades	2.0	0.0	--
29	Energy-Efficient Distribution Transformer Standards	0.8	0.5	--
30	Energy Star Distribution Transformers			
31	Transmission Pricing Reform	0.8	Terminated	
New	Green Power Network	Not included	0.0	--
Land-Use Change & Forestry Actions		10.0	2.4	--
43	Private Depletion of Nonindustrial Private Forests	4.0	Terminated	
44	Accelerate Tree Planting in Nonindustrial Private Forests	0.5	0.4	--
16	Waste Minimization	4.2	2.0	--
9	Expand Cool Communities	0.5	To be determined	
Methane Actions		16.3	15.5	--
32	Expand Natural Gas STAR	3.0	3.4	--
33	Increase Stringency of Landfill Rule	4.2	6.3	--
34	Landfill Methane Outreach Program	1.1	1.9	--
35	Coalbed Methane Outreach Program	2.2	2.6	--
36	RD&D for Coal Mine Methane	1.5	Terminated	
37	RD&D for Landfill Methane	1.0	Terminated	
38	AgSTAR Program	1.5	0.3	--
39	Ruminant Livestock Efficiency Program	1.8	1.0	--
Actions to Address Other Greenhouse Gases		16.3	25.4	--
17	Improved Fertilizer Management	4.5	5.3	--
40	Significant New Alternatives Program	5.0	6.4	--
41	HFC-23 Partnerships	5.0	5.0	--
42	Voluntary Aluminum Partnership	1.8	2.2	--
New	Environmental Stewardship Initiative	Not included	6.5	--
Foundation Actions			11.3	--
	Climate Wise	Not estimated	1.8	--
	Climate Challenge	Not estimated	7.6	--
	State and Local Outreach Programs	Not estimated	1.9	--
Total GHG Emission Reductions From CCAP		108.6	76.0	14.0

Data is not readily available for cumulative emissions reductions for many CCAP programs. Emissions reductions of about 5 MMTCE can be attributed to DOE's CCAP programs. EPA's Office of Air and Radiation is responsible for emissions reductions of about 9 MMTCE through their CCAP programs.

Improvements in Efficiency, 1997-2010 Under Alternative Annual E/GDP Rates

No Efficiency

BAU-CEA (0.6)

BAU-CEA (0.9)

BAU-DOE5

Efficiency Case

All efficiency values are shown relative to a 1997 E/GDP ratio indexed to 1.

