

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: Keeler
Subseries:

OA/ID Number: 21180
FolderID:

Folder Title:
GCC [Global Climate Change] Emissions Trading

Stack:	Row:	Section:	Shelf:	Position:
S	20	6	6	1

Horse Small Business

trading, rules, Admin policies - "sweeteners"

→ baseline issue

→ send a description of IPCC scientists for the record

→ "most of the effects this century are pre-ordained"

→ EPA pre-decisional document to implement Kyoto
dated 5/31

Horse Int'l Relations Hearing

Campbell Gilman question #1
+ B Admin using executive privilege

How are permits allocated in your analysis for trading

Hamilton Econ consequences - why should I believe you?
Why weren't developing countries included?
Science - how do you respond to critics?

Hillard Will energy costs go up under Kyoto
Will the cost of gasoline go up
How will this affect our trade deficit?
You don't think this will affect employment

Gilman Can a country trade its unused permits
Rogue nations
Effect on military - effect on domestic operations

Berman Gasoline prices + energy efficiency
Costs of not acting

Sherman Would want quantification of air quality benefits
cost of energy - is it possible that hilds would consume less +
thus pay less than under BATF
will Kyoto ↓ oil imports

Hillard Limits on flex mechanism
studies done after Kyoto
how did you estimate \$205 for elect res

What is the beginning point of your analysis

of jobs in energy-intensive industries
growing?

Russia - Japan trade?

curves in documents?

baseline #

McIntosh

Does EPA have authority to regulate CO₂?

Is it a HAP?

When will we get rest of answers to my q's?

phased - mid-May

late May

Performance data + base data for CCAP - do you have these?

- no, will check on it

What interagency efforts did EPA participate in?

- CCAP

What was process, interagency, to develop performance measures

- we think of perf measures as effect on the env.

~~McIntosh~~

Is EPA following Str's statement @ no backdoor implies

- EPA's efforts to date are voluntary

So voluntary is not included in statement

- yes

Dam trading prog?

- will be in impl legis when treaty is sent to Senate

Do you agree w/ O3 Action views (go forward w/o LDCs, should cut 50-70%)

- we favor Kyoto Protocol, we agree w/ it

Is that a "bare minimum"

- imp 1st step, reasonable thing to do

Should Americans reduce 50-70%.

- that's not in Kyoto Protocol

mont.

Do you agree w/ AFL-CIO testimony about 1.5m loss?

- quite modest

1.5m is not quite modest

How do you retain coal jobs

- overall impact quite modest

- some sectors will grow, some will shrink

There's no other analysis than Yellen's?

Does the Dept have any analysis

- Dept did not

You know Yellen's analysis is based on trading w/ CDM

- Yellen's analysis is predicated on the Admin policy

-(Gardiner): CDM is in Kyoto

Can't CDM rules be overruled by UN

- no - negotiations

Job training programs for dislocated - is this same as what we have for NAFTA

- I said we have made a commitment to any dislocated

So it is the same programs as what we have for NAFTA

- we have not speculated - it is premature to deal w/ something 10 yrs out

- we have 3 programs existing

3/98

Senate Ag

Lugar 560 MMTC required to meet Kyoto
EIA - his tech scenario - 79 MMTC &

Admin - similar reductions possible

Admin relying significantly on Russia + UK

Need an Interagency Encl + Energy Intl Security
Task Force

Also need to focus on data

Wyden CCC debate a false dichotomy w/ ag portrayed as a villain

- Ag is a cost-effective way to address GW

- could ↓ $\frac{1}{4}$ of reg. emis. thru ag

Admin has not focused on forests

\$6.36 CCTI - none for sustainable forestry practices

that USFS says could get $\frac{1}{4}$ of emis reductions

\$2 - \$20/ton could get $\frac{1}{4}$ of reductions - USFS

5 practical steps

1) CRP

2) defer^{to} state taxes on cons. easements

3)

4) FIP

5) system of carbon credits that would include similar

Want analyses to decide what projects were included
in CCTI

Leahy
(VT)

GCC in 1990 Farm Bill

Believes in GCC science

1997 EDF report on Green Mts

Concern @ maple syrup, leaf peepers, ski industry

VT will have 1st large scale biomass plant (wood chips)

Need LDCs to participate

Grassley
(IA)

Debate should not question legitimacy of need to act

- treaty ≠ answer Byrd-Hagel

- still disagreement @ GCC causes

- concern @ competitiveness

- there will be a massive redistribution of wealth N → S

Comparison of free trade + Kyoto

"

Kyoto + Law of the Sea Treaty

Craig
(ID)

Trip to South Pole

Not sure why we are now in a warming period

One of largest ag costs - fuel, then ag chemicals

Kyoto puts economy + ag industry at risk

- if sky were falling, that would be ok, but science not clear

Bring the treaty to the Senate, but don't send policy

(eg CCTF) prior to ratification

Roberts
(KS)

All the reg's would only get $1/2^\circ$ over 100 yrs

Will take 10-20 yrs to develop technology

We have a serious challenge

Concern e UN prescribed mandatory efforts

- US gets no credit for no till, prec. ag., etc.

CCTI is prior to ratification

Hunger + malnutrition is just as imp't as GCC and other env'l issues

Kerry

Supports Env'l + Energy Security Initiative

There is GCC - could seriously affect ag

Need energy to produce food

Shouldn't be cutting formula funds given research needs

Santorum

Not sure what the problem is, but we ~~seem~~ sure about the solution

3/3/98 Cott, Helms, Hagel letter to POTUS

Rominger

While aggregate effects on ag may be a wash, could have sig regional effects

Forests affected more than ag

Carbon sinks - forests + soils, biomass energy

\$58m on GLE ag research; F&ES asks for \$10m more

Harkin

Doing nothing may be disastrous ("worst thing of all") for ag
1978-91 output/unit energy $\uparrow$ 50%.

sinks

renewables - biomass energy

Logan

Is there an addl econ analysis document?

How strong is the consensus on the science?

Are the fluctuations something we've seen one time, or is this unique?

A large share will

- what kind of wealth transfers

- how much will we buy abroad

SE: A very significant share could be bought from abroad, and it makes envl + econ sense

How much will it cost a farmer in Indiana to buy from a Russian

How many tons will we need to buy

Will it be several billion dollars of grain

Will LDCs participate

SE: China + India are obviously key

What are implications of LDC participation on US defense + security

Harkin

^{SE} Are other countries aware of bans to their farmers from
emissions credits?

^{SE} Does treaty exempt 123 countries from GHG restrictions?

^{SE} 15-20 key LDCs

^{SE} Mex + SKor say they're developed for OECD, LDC
developing for Kyoto - Which is it?

^{SE} Why did developed countries let Australia get a target
above 1990?

Craig

^{SE} What will you be signing?

^{SE} Will that Protocol be then brought to the Senate?

^{SE} Is the Protocol an enforceable document?

Lugar

^{SE, JY, RR}

What will Admin do in the interim (e.g. over this year)?

^{SE} 1) emissions trading rule

2) full court diplomatic press

3) legislative + admin steps

JY

These are win-wins, no regrets policies - tech, elect res.

RR Reorganizing GCC etc @ USDA

Interagency Envt + Energy Security Task Force - We will pursue it

^{SE}

How can Kyoto be avoided?

Horse Commerce

3/98

DRI estimate: IAT for dom. only

Schacter 2 weeks from today - complete econ analysis
want it out for peer review

Elect res being used to mask costs of GCC policy

Crago concern @ LDC participation
costs

Dingell 30% reduction in energy costs (?) → use
what is Admin elect res.
concern @ LDCs, China, India

Burr concerned if model used today, + in Kyoto is one of the
models used last summer (IAT)

Stu *A* no^{pre} approval/certification of trades by an intl body

Sch can protocol be amended prior to signing
concern @ LDC part
intl trading

what is difference b/t JAT + this analysis
50% constraint on trading

Stu: we will not accept such a limitation - period.

Hall most everyone on this committee is dumb
what's the harm - are we going to bomb them
sic a special prosecutor on them
will your analysis go to peer review?
is it still futile to use 1 model or a set of models?

Crapo what if no trading?
what does meaningful participation mean?
how is document amended

Norwood which is better, ground or satellite temp. measurements?
has there been a study on how many times CEA has
been right or wrong
1965 Medicare bill - CBO - projection by CEA 25yrs
act -> \$96 - actual \$130b
no one believes #5, no one is sure @ elect res.

Bur: What is tech that will be used in 2015 to reduce GHG
EIA projects that on A1 surpasses A1 ems in 2015
- is this # right or yours?
Is the Wash Post right?
What is # if we do it dumb?
What did you assume @ the nature of intl trading since
rules are still to be decided? (in econ analysis)
Is $7=3$? Please explain

Dingell: Real # is 30%?

Bur: Is EU 8% or lower bc of accounting?
Would you buy an ins policy w/ an undefined premium?

- Dingell
- IAT was futile. How is new analysis anything more than a post-hoc ~~of~~ justification for Kyoto?
 - Wirth + Admin promised \$s - never got them - you said substantial uncertainty & estimates - now you give vs \$70-110 - which do you believe
 - There were no estimates in Kyoto. Aren't you estimated premised on LDC participation?
 - Testimony has basic assumptions & elect res. What bill are you talking about
 - Electric res will elim high cost plants - won't that cause $\downarrow$ @ plants $\rightarrow$ how will that help w/ meeting Kyoto
 - How do you know \$20b savings
Please provide estimates of \$20b - would like to see study - wants proposal + study for the record
 - LDCs did not agree to commitments in Kyoto
 - Please submit economic analysis
 - Would like Admin to submit the analysis
 - ~~Q~~ Will we trade w/ E'n Ew, China, India?
 - Won't trading w/ China + India be like buying from a counterfeit
 - It's not a closed mkt bc of LDCs w/o binding target - how does mkt est clearing price?

Strick it will be completed when we get good efficient trading rules + LDC part

~~1/20/00~~

Dingell

Compliance + verification

Will you sign even if we don't get trading rules

Whitfield

Will we sign w/o rules on trading

Stv Trading rights are central

What is rationale of signing prior to getting all we want

Balance of evidence is not as strong as clear + convincing

Little emul been from Kyoto - Bolin quoted in WA Post

GCMs backcasted $5^{\circ} \Delta$ over past 100 yrs instead of actual 1'

How can we trust them

IAT had higher costs than what we presented today

3000 jobs lost in textile(?); devastated coal industry $\rightarrow$ CAA

KY has 3^d lowest elec rates - so no ben from elec res.

Why would Republicans support Kyoto?

Coburn

What is leverage for amendments to protocol on LDCs

Will we have accomplished anything w/o China

Stv - China is a key country

Why would we rein energy subsidies in LDCs $\downarrow$ emissions

Isn't SO_2 cost $\downarrow$ bc of railroads dereg

Why not a worse case scenario on econ if we're

assuming a worse case on CC

Refered to WEFA study

~~Amber...~~

FSU

Markey Kyoto + fast-track related
elect res. - did wholesale (?) - FERC $\rightarrow$ \$6/yr
retail will get much more than \$6 - 10-25
(N) is like sorting your Frankie Avalon records
How can we use MEN, Fasttrack or FTA to spur on
LDCs?
Concern @ how $\uparrow$ trade in goods $\uparrow$ pollution

Gardner humans are affecting the climate
so much hyperbole on both sides of issue
farmers (IA) have a legitimate concern @ costs
corn - carbon sink
ethanol as a renewable energy source

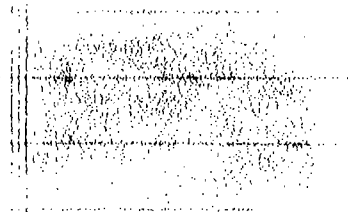
Klink concern that we used to predict the only ice age
need LDCs
should be exporting best tech, not worse
what is % of CO₂ in atm from human activity
have we given up on China + India
Sto-China is a key developing country

GATT problem w/ umbrella?

3) decision on econ analysis - 2 weeks?

Since

1



Since

Since

Sch
can work is just beginning as stated in testimony
what kind of analysis outside of govt.?
what about the other 2 IAT models?
did you say you can't just rely on 1 model

who's in umbrella

4/4/98 House Science Comm

Janssenbrunne

sound science - no

will Kyoto work - no - dev country

0.01 - 0.02 °C less by 2050

is treaty fair - no - dev country (competitiveness)

higher energy cost + burdensome regs

"sanctuaries" for energy-intensive industries - LDC

- LDCs will be less interested in taking

slow econ growth

100,000 - millions of jobs

> to get no envl benefit

Brown

most pressing problem - LDCs

McGrath

When, Where, What flex

work in progress - LDCs

budget proposals

Hayes

4E098

3 end-use tech price scenarios

FSU 16 Summit paper tons

Econ analysis

dramatically reduced use of coal

intl trading - sig lower costs

can't be achieved w/o price mechanism

- could slow econ growth

- long issue is recycling

- stock turnover key - no quick fixes

David Smith - AFL-CIO

enough information, burden of evidence $\rightarrow$ take seriously. Pres is right

- US ought to lead the way

sooner we begin, the easier it will be

Kyoto not a good roadmap - Pres shouldn't sign

1) need CDCs - leakage

2) understanding of enormous consequences - Big function of economy

$\rightarrow$ what does this mean:

orders of magnitude of all studies, however some indicate

job losses 900,000 - 1.5m

1% $\downarrow$ GDP

EDF

3 submitted documents

emissions trading - targets can be met in affordable fashion

Title IV analogue - costs $\downarrow$ 20-45%.

early reduction credit program

Grustance Holmes - GCC

not action vs. inaction, but what is responsible action

Kyoto not responsible action

fatally flawed

bad deal for America

- not global

foreign activity could hurt US econ. growth

WEFA study

- a Protocol analysis?

\$2000 net ~~for~~ households

2 1/2 m ^{over} jobs

oil shocks comparison

prolonged economic recession

EU + trading will lower cost dramatically - but future is uncertain & their fate @ Buenos Aires

only US + Ukraine will have permits to sell

billions \$ → overseas

massive taxes for foreign aid

Bus Council Sus Energy

support early action

believe Kyoto could be a 1st step

strongly for emissions trading

LDCs

sinks, CDM

AEP: \$0.37/ton for 53m tons

voluntary programs have helped reduce emissions, but not enough

need programs to ↑ use of cleaner, more efficient energy

cost of compliance being severely overestimated

need to consider cost of action

\$16/week insurance costs bc of climate change → Ins Assn

energy-intensive industry job loss (Repub-(A))

dev countries don't ensure an adequate level of
labor rights, + envl rights

Doyle - coal → nat gas substitute is up to 50%,
effect on nat gas prices

Hughes - Gulf Coast can supply nat gas to meet ↑ @
Kyoto will ↑ gas

Doyle - would like to see more R+D
(clean coal?, sequestration?)

Smith - 40,000 coal miners that lost their jobs

Hall - will submit g. re costs

Sansabrenne - interest in revenue recycling
concern of capital transfers

**ORAL TESTIMONY OF DR. JANET YELLEN
CHAIR, COUNCIL OF ECONOMIC ADVISERS
BEFORE THE
U.S. SENATE
COMMITTEE ON ENERGY AND NATURAL RESOURCES
MARCH 25, 1999**

Thank you, Mr. Chairman. I appreciate having this opportunity to discuss with you the economics of climate change and the Administration's efforts to address this significant environmental challenge. As you know, the Administration released a report last July, entitled "The Kyoto Protocol and the President's Policies to Address Climate Change: Administration Economic Analysis." In addition, since the Kyoto Conference, a variety of research on the economics of Kyoto, and especially on the economics of Kyoto's flexibility mechanisms, has been undertaken. Today, I will provide a brief summary of the Administration's Economic Analysis and review several of the key findings in the recent economic literature on climate change.

Administration Economic Analysis

The Administration's Economic Analysis found that the economic cost of attaining the targets and timetables specified in the Kyoto Protocol will be modest for the United States in aggregate and for typical households, assuming that effective mechanisms for international trading, joint implementation, and the Clean Development Mechanism are established, and

assuming also that the United States achieves meaningful participation by key developing countries,.

An illustrative assessment using the Second Generation Model that accounts for effective trading and developing country participation yields permit price estimates ranging between \$14/ton and \$23/ton, and direct resource costs to the U.S. between \$7 billion and \$12 billion/year. Under the assumptions of the Administration's analysis, permit prices in the range of \$14/ton to \$23/ton translate into energy price increases at the household level between 3 and 5%, but this would be roughly offset by the Administration's electricity restructuring proposal. I would be happy to further discuss this analysis during the question and answer period.

Recent Research on the Economics of Climate Change

Since December 1997, many economists have conducted and made available their analyses of the Kyoto Protocol. For example, the Stanford University Energy Modeling Forum (EMF), a long-running model comparison exercise involving many of the leading climate and energy models, has coordinated full scale analyses of the Kyoto Protocol with 10 global models. Further, the Organisation for Economic Co-operation and Development (OECD) has published the proceedings of the economic modeling workshop it sponsored this past fall. The modeling results from EMF and OECD provide very useful context for the Administration's economic analysis. First, the illustrative model used by the Administration, the Second Generation Model of the Pacific Northwest National Laboratory, tends to fall in the middle of the range of the EMF models in terms of U.S. permit prices. Under Annex I trading the SGM permit price is at the

clim? median of this set of models and under full global trading it is just below the median permit price. Second, both modeling exercises found that the reduction in permit prices as trading expands from no trading to Annex I trading to full global trading is robust. On average, the EMF models found that Annex I trading would cut the U.S. permit price by 53% relative to a no trading scenario, while the OECD models found a 57% average price reduction. In full global trading, the permit price would be, on average, 80% lower than the no trading price.

r the Several EMF modeling teams have considered the impact of constraints on the opportunity to buy or sell emissions allowances in an international market. While the United States is unambiguously opposed to trading restrictions, several parties to the agreement have indicated support for some form of a trading constraint. Trading restrictions would generate no benefit for the global climate while they could significantly increase the costs of achieving the Kyoto targets. In my written testimony I describe two examples of trading constraints where the U.S. permit price would increase by up to four times higher than the unconstrained price.

Most models used to evaluate the Kyoto Protocol only focus on carbon dioxide emissions and do not account for the 6 types of greenhouse gases comprising Kyoto targets and the opportunity to trade across gases. However, recent work by a group of researchers at MIT has found that including the opportunity to abate non-CO₂ greenhouse gas emissions and promote carbon sinks reduces the costs to the United States by about 25% relative to a carbon-only approach (assuming no international trading). Other recent research has found similar results.

The EMF modeling indicates that economic and environmental benefits could accrue to some developing countries if they adopt emissions targets. Setting a binding emissions target

**ORAL TESTIMONY OF DR. JANET YELLEN
CHAIR, COUNCIL OF ECONOMIC ADVISERS
BEFORE THE
U.S. SENATE
COMMITTEE ON ENERGY AND NATURAL RESOURCES
MARCH 25, 1999**

Thank you, Mr. Chairman. I appreciate having this opportunity to discuss with you the economics of climate change and the Administration's efforts to address this significant environmental challenge. As you know, the Administration released a report last July, entitled "The Kyoto Protocol and the President's Policies to Address Climate Change: Administration Economic Analysis." In addition, since the Kyoto Conference, a variety of research on the economics of Kyoto, and especially on the economics of Kyoto's flexibility mechanisms, has been undertaken. Today, I will provide a brief summary of the Administration's Economic Analysis and review several of the key findings in the recent economic literature on climate change.

Administration Economic Analysis

The Administration's Economic Analysis found that the economic cost of attaining the targets and timetables specified in the Kyoto Protocol will be modest for the United States in aggregate and for typical households, assuming that effective mechanisms for international trading, joint implementation, and the Clean Development Mechanism are established, and

would generate climate benefits by reducing global emissions below what they would otherwise have been. In addition, if the target is set not too far below the business as usual emissions level, the participation of the country in a global trading system would produce economic benefits or “gains from trade” for both the developing country and its trading partners, such as the United States. Annex I countries (and private firms in these countries), who would purchase these emissions allowances in the world market, would achieve their targets at lower cost than without the participation of the developing countries.

Conclusion

The Administration’s overall conclusion is that the economic impact of the Protocol will be modest under the conditions we have identified in our economic analysis. The purpose of this testimony has been to summarize the analysis we have presented in the Administration Economic Analysis on climate change and to provide a brief update of recent analytic efforts outside of the government.

I look forward to continuing to work with members of this Committee, as well as with other interested parties, in further analyzing the Kyoto Protocol and evaluating the net effects of reducing greenhouse gas emissions. It is my hope that economic analysis will continue to play a key role in designing policies in this area.

I welcome your questions.

**TESTIMONY OF DR. JANET YELLEN
CHAIR, COUNCIL OF ECONOMIC ADVISERS
BEFORE THE
U.S. SENATE
COMMITTEE ON ENERGY AND NATURAL RESOURCES**

MARCH 25, 1999

Thank you, Mr. Chairman. I appreciate having this opportunity to discuss with you the economics of climate change and the Administration's efforts to address this significant environmental challenge. As you know, the Administration released a report last July, entitled "The Kyoto Protocol and the President's Policies to Address Climate Change: Administration Economic Analysis." The report states that, in the Administration's view, the costs of achieving our Kyoto target would be modest if we can succeed in implementing international trading, joint implementation, and the Clean Development Mechanism in an efficient manner and we achieve meaningful developing country participation. In addition, since the 1997 Kyoto Conference, a variety of research on the economics of Kyoto, and especially on the economics of Kyoto's flexibility mechanisms, has been undertaken. Today, I will provide a brief summary of the Administration's Economic Analysis and review several of the key findings in the recent economic literature on climate change.

The Potential Impact of Climate Change

The Intergovernmental Panel on Climate Change (IPCC) concluded in 1995 that "the balance of evidence suggests that there is a discernible human influence on global climate." Current concentrations of greenhouse gases have reached levels well above those of preindustrial times. If growth in global emissions continues unabated, the atmospheric concentration of carbon dioxide (CO₂) will likely double relative to its preindustrial level by midway through the next century and continue to rise thereafter. As a result of the increased concentration of CO₂, the IPCC estimates that global temperatures will increase by between 2 to 6 degrees Fahrenheit in the next 100 years, with a best guess of about 3.5 degrees Fahrenheit. Potential consequences associated with this shift in climate include a rise in sea levels, greater frequency of severe weather events, shifts in agricultural growing conditions from changing weather patterns, threats to human health from increased range and incidence of diseases, changes in availability of freshwater supplies, and damage to ecosystems and biodiversity. Further discussion of the costs of climate change is contained in the Administration Economic Analysis.¹

¹ Please refer to the attached paper copy or <http://www.whitehouse.gov/WH/New/html/kyoto.pdf> for a PDF version of this document.

The Kyoto Protocol and the Buenos Aires Conference of the Parties

The Kyoto Protocol provides several mechanisms that would allow countries to achieve the emissions targets established in this agreement in a cost-effective fashion. These mechanisms, which permit what we have termed “when”, “what”, and “where” flexibility in meeting the Kyoto emissions targets, are described in detail in the Administration Economic Analysis. Since securing international emissions trading, the Clean Development Mechanism, and joint implementation in Kyoto, the Administration has worked in bilateral and multilateral arenas to promote understanding of these mechanisms and to develop rules that will promote their efficient operation. Last fall in Buenos Aires, a workplan to resolve key implementation issues regarding these mechanisms by the end of 2000 was agreed to by all the participating countries. I want to reiterate that efficient implementation of these flexibility mechanisms is critical to reducing the costs of achieving the targets established in the Kyoto Protocol.

Costs of Action

In assessing the economic effects of the Kyoto Protocol, the Administration has drawn on the insights of a wide range of models and analysis. Examples include models of the energy sector and economy over the next 25 years, such as those participating in the Stanford Energy Modeling Forum, the Intergovernmental Panel on Climate Change’s review of the economic and social dimensions of climate change, the work of the Organisation for Economic Co-operation and Development (OECD) on the economic dimensions and policy responses to global warming, and the Administration’s staff-level interagency analysis. In addition, the Administration used other tools, such as a meta-analysis, basic economic reasoning, overviews of the domestic and international energy sectors, statistics regarding energy efficiency and greenhouse gas emissions, and economic indicators from World Bank, International Energy Agency, and Energy Information Administration databases.

Assuming that effective mechanisms for international trading, joint implementation, and the Clean Development Mechanism are established, and assuming also that the United States achieves meaningful participation by key developing countries, the Administration’s overall assessment is that the economic cost of attaining the targets and timetables specified in the Kyoto Protocol will be modest for the United States in aggregate and for typical households. This conclusion is not entirely dependent upon, but is fully consistent with, formal model results. The Administration believes that there are limitations to relying on any single model to assess the economic impact of the Kyoto Protocol. However, model results can further inform and improve the understanding of the effects of climate change policy. To complement the economic analysis of the Administration’s policy to address climate change, we have conducted an illustrative assessment with a modified version of the Second Generation Model (SGM). The results from the SGM substantiate the conclusion that the economic effects of an efficient, effective, and global policy to address the risks of climate change will be modest.

An assessment using the SGM model that accounts for effective trading and developing country participation yields permit price estimates ranging between \$14/ton and \$23/ton, and direct resource costs to the U.S. between \$7 billion and \$12 billion/year (1997 dollars). The range reflects uncertainty about the extent of Annex I participation in international trading.

Under the assumptions of the Administration's analysis, permit prices in the range of \$14/ton to \$23/ton translate into energy price increases at the household level between 3 and 5%. Under these permit prices, fuel oil prices would increase about 5 to 9 percent, natural gas prices about 3 to 5 percent, gasoline prices about 3 to 4 percent (or around 4 to 6 cents per gallon), and electricity prices about 3 to 4 percent. This increase in energy prices at the household level would raise the average household's energy bill in ten years by between \$70 and \$110 per year, although such predictions may not be observable because they would be small relative to typical energy price changes, and nearly fully offset by electricity price declines from Federal electricity restructuring. By 2008-2012, the anticipated 10 percent decline in electricity prices from restructuring is projected to lead to expenditure reductions of about \$90 per year for the average household.

The illustrative modeling analysis does not account for several key components of the Kyoto Protocol and the Administration's policies to reduce greenhouse gas emissions. These include the benefits of reducing net emissions through carbon sinks, the Administration's electricity restructuring proposal, the Administration's Climate Change Technology Initiative (increases in R&D funding and new tax incentives in the Administration's FY 2000 Budget), the Administration's sectoral consultations to encourage and support voluntary efforts by U.S. industry to undertake emissions reductions, including the provision of credit for early action, and the Administration's efforts to reduce federal energy use. There are also ancillary benefits of reducing greenhouse gas emissions -- in particular, the corresponding reductions in conventional air pollutants like sulfur dioxide and fine particulate matter. These benefits alone could produce savings equal to about a quarter of the costs of meeting our Kyoto target.

The Administration released last year its proposed electricity restructuring legislation and the analysis supporting that proposal. The Administration's proposed Comprehensive Electricity Competition Act (CECA) is estimated to reduce greenhouse gas emissions by about 25 to 40 million metric tons of carbon equivalent per year by 2010. Further, the electricity restructuring proposal provides potential cost-savings in four areas: dispatch efficiency, improved capital utilization, savings in capital additions and cost reductions in fuel procurement, non-fuel operation and maintenance expenses, and administrative and general expenses. These four categories of savings, when translated to consumers, are likely to reach or exceed \$20 billion annually. The Department of Energy's CECA supporting analysis documents² contain further discussion of the Administration's electricity restructuring proposal.

² Please refer to the attached paper copy or <http://www.doe.gov/ceca/ceca.htm> for the PDF version of the supporting analysis.

Recent Research on the Economics of Climate Change

Since December 1997, many economists have conducted and made available their analyses of the Kyoto Protocol. I have noted in previous appearances before Congressional Committees that there are limitations to relying on one or a small set of models and that we were eager to see assessments of the Kyoto Protocol by other models. Two large efforts have been undertaken to coordinate and compile modeling results on the Kyoto Protocol. First, the Stanford University Energy Modeling Forum (EMF), a long-running model comparison exercise involving many of the leading climate and energy models, has coordinated full scale analyses of the Kyoto Protocol. Second, the Organisation for Economic Co-operation and Development (OECD) held an economic modeling workshop this past fall, and has since published the proceedings of this workshop which includes 16 papers. In addition, several research teams have undertaken work in evaluating the potential for intergas trading and the cost-savings of a six-gas target relative to a carbon dioxide-only target. I would like to take this opportunity to provide an overview of this recent research.

Kyoto Modeling Analyses

The Energy Modeling Forum comparison exercise of the Kyoto Protocol has included ten modeling teams from the United States, Europe, and Asia. In evaluating the Kyoto Protocol, all of the participating teams used economic models that incorporate the potential for international trading in greenhouse gas permits. The OECD workshop included presentations by 10 modeling teams, 9 of which had global models as well.^{3,4} By explicitly incorporating international trading, these models can evaluate the opportunities for cost-savings through trading among Annex I nations and among Annex I and developing countries were they to adopt emissions targets. Since the Kyoto Protocol enables all countries with emissions targets to trade emissions allowances among other countries with targets, these models are well-suited to assess the economic implications of the international trading component of the agreement.

While the models used in the EMF exercise and the OECD workshop can assess international trading, there are several other flexibility mechanisms of the Kyoto Protocol that they cannot, at present, readily assess. For example, these models did not incorporate the effects of sinks. While several modelers did assess the economic costs of achieving the Kyoto targets with “off-line” assumptions about sink activity, none incorporated an integrated energy-land use model. Further, most of the modelers did not evaluate opportunities to reduce costs by trading

³ Please note that several modeling teams participating in the EMF exercise made presentations at the OECD workshop.

⁴ PDF-formatted files of the OECD workshop proceedings can be downloaded from the OECD webpage at <http://www.oecd.org/dev/news/Environment/Modelling.htm>.

across greenhouse gases. These models are primarily energy models and are focused on the economics of reducing carbon emissions from fossil fuel combustion. Again, some modelers analyzed the Protocol by making some "off-line" assumptions about the potential reductions in non-carbon dioxide greenhouse gases, but none employed a model with cost curves for these gases. Finally, it should be noted that these models did not include opportunities for emissions reduction through Administration proposals, such as electricity restructuring or the Climate Change Technology Initiative, that could slow the growth over time of greenhouse gas emissions thereby lowering greenhouse gas permit prices.

The results from both the EMF and OECD efforts provide very useful context for the Administration's economic analysis. First, the illustrative model used by the Administration, the Second Generation Model of the Pacific Northwest National Laboratory, tends to fall in the middle of the range of this set of models in terms of U.S. permit prices.⁵ For example, under Annex I trading SGM generates a permit price which is at the median of this set of models. Under full global trading, the SGM permit price is just below the median permit price. Second, the EMF exercise found that the reduction in permit prices as trading expands from no trading to Annex I trading to full global trading is robust. On average, the EMF models found that Annex I trading would cut the U.S. permit price by 53% relative to a no trading scenario. Of these models, one estimated a 72% reduction in the permit price under Annex I trading. In full global trading, the permit price would be, on average, 80% lower than the no trading price. Several models estimated permit price reductions of about 90%.

The reported results from the OECD workshop found similar reductions in permit prices by going from no trading to Annex I trading. On average, the OECD workshop models found that Annex I trading would cut the U.S. permit price by 57% relative to a no trading scenario. Moreover, they found that the European Union and Japan would benefit more from unconstrained Annex I trading. For both the E.U. and Japan, the average reduction in permit prices across these models would be nearly 75%.

Analyses of Trading Constraints

In addition to the modeling of various efficient international trading scenarios, several EMF modeling teams have considered the impact of constraints on the opportunity to buy or sell emissions allowances in an international market. While the United States is unambiguously opposed to trading restrictions, several parties to the agreement have indicated support for some

⁵ Please note that the version of SGM used in EMF differs from the analysis conducted by the Administration because the EMF version does not include cost curves for non-carbon dioxide greenhouse gases used by the Administration. Since efficient trading across gases would lower costs and permit prices, and accounting for six gases affects the stringency of some countries' targets, the EMF version of SGM yields slightly higher permit prices than the Administration version.

form of a trading constraint, for example, by setting a limit on the amount a party can purchase through the trading system. Trading restrictions would generate no benefit for the global climate while they could significantly increase the costs of achieving the Kyoto targets.

Before describing the economic costs of trading constraints, I would like to explain why such constraints yield no climate benefits. Regardless of where a greenhouse gas emission reduction occurs, it has the same effect on total emissions and the same effect on the climate. A ton reduced in New York generates the same climate benefit as a ton reduced in Berlin. In proposing trading constraints, some have focused on countries such as Russia, that will have emissions below their Kyoto targets during the commitment period because of the decline in their economic output associated with the transition to market economies. If trading constraints are established that restrict the ability of Russia to sell permits (or restrict the opportunity for other Annex I countries to buy Russian permits), then emissions during the first commitment period would be lower than in the absence of such constraints. However, Russia would simply bank its allowances and use these allowances in a subsequent commitment period when its emissions exceed its target. While a trading constraint might lower emissions during the first commitment period, the cumulative emissions over several commitment periods from Annex I countries would be the same with and without the trading constraint. Given the long residence times of greenhouse gases (on the order of a 100 or more years), the cumulative effect is what is most relevant in terms of changes in the global climate.

To provide a sense of the economic implications of trading constraints, I would like to share with you two examples from work done by EMF modeling teams. First, consider a trading constraint that mandates that at least two-thirds of the emissions reductions necessary for a country to achieve its Kyoto target must occur through domestic actions. Evaluating this trading constraint with the EPPA model based at the Massachusetts Institute of Technology, the permit price for the United States is almost four times higher with the constraint than under an unconstrained global trading system. It is important to note that the effects of this constraint are even more pronounced for the European Union and for Japan. The permit price for the EU would be more than five times higher than the unconstrained global trading permit price, and the Japanese permit price would be thirteen times higher. As these results indicate, the trading constraint would result in each country experiencing a different marginal cost of abatement, and there would be no common permit price for a ton of carbon equivalent. Since the constraint restricts opportunities for countries like the United States, Japan, and members of the EU to buy emissions allowances, the competitive price for emission allowances from countries like Russia would fall below the unconstrained level.

Second, consider a trading constraint that mandates that acquisitions of permits through international trading could not exceed 10% of a country's emissions allocation. For example, the U.S. target is approximately 1.5 billion tons of carbon equivalent on an annualized basis. Under this trading constraint, the United States, or private firms in the United States, could not purchase more than 150 million tons on an annual basis from other countries. Assessing this trading constraint with the Second Generation Model, the permit price for the United States would more

than triple relative to the unconstrained global trading permit price. For the E.U., the permit price would nearly double, and for Japan, the permit price would be eleven times as high as the unconstrained global price.

While trading constraints increase greenhouse gas permit prices (and subsequently, energy prices) in the United States, the European Union, and Japan, they also reduce the gains from trade by the countries likely to be sellers of emissions allowances. For example, Russia and large developing countries that adopt emissions growth targets and participate in international trading, e.g., China and India, would sell fewer emissions allowances at lower international permit prices under such trading constraints than in an unconstrained global trading environment. Such restrictions lessen the benefits of participation by developing countries in international trading.

Estimated reduction in costs from trading across gases

As we note in the Administration Economic Analysis, the Kyoto Protocol provides additional flexibility in achieving emissions targets by specifying these targets as a basket of 6 types of greenhouse gases (carbon dioxide, methane, nitrogen dioxide, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride). Countries can effectively trade across gases, based on their global warming potential, so that the aggregate weighted emissions reductions occur at least cost. Most models used to evaluate the Kyoto Protocol have not incorporated this kind of flexibility, although several modeling teams are actively working to modify their models to include emissions of non-CO₂ greenhouse gases. In the Administration's analysis, cost curves for these other gases for the United States were used in conjunction with the SGM model. These simulations suggest that trading across greenhouse gases can lower costs up to 15% relative to a situation where no trading across gases occurs.

Complementing this finding, recent work by a group of researchers at the Massachusetts Institute of Technology has found that including the opportunity to abate non-CO₂ greenhouse gas emissions and promote carbon sinks reduces the costs to the United States by about 25% relative to a carbon-only approach (assuming no international trading). On average, they find that Annex I countries' costs would fall by more than 20%. In addition, work by University of Illinois researchers and others has evaluated the changes in costs of abating methane and carbon dioxide to achieve the U.S. Kyoto target instead of abating carbon dioxide alone. They found that meeting an emissions target through cost-effective trading between carbon dioxide and methane reductions could reduce costs by nearly 20% relative to a case with no intergas trading. Finally, research by several Dutch analysts presented at the OECD workshop found significant opportunities for the European Union to substitute abatement of non-CO₂ greenhouse gas emissions for carbon dioxide reductions. They found that 27% of the total reduction effort necessary for E.U. countries to achieve their emissions targets could occur through the abatement of these non-carbon dioxide gases.

Developing Country Participation

Last year during the Buenos Aires Conference, two non-Annex I countries, Argentina and Kazakhstan stated that they will announce emissions targets and expressed their interest in engaging in international emissions trading. We believe that these two countries' efforts may encourage other non-Annex I countries to follow their lead. Economic and environmental benefits could accrue to developing countries if they adopt binding emissions targets and participate in international trading. Setting a target below the business as usual emissions level for the commitment period would generate climate benefits by reducing global emissions below what they would otherwise have been. In addition, if the target is set not too far below the business as usual emissions level, the participation of the country in a global trading system would produce economic benefits or "gains from trade" for both the developing country and its trading partners. Emissions trading by developing countries would occur only if they chose to undertake emissions reductions above and beyond their commitments -- reductions that would generate trading extra income for them as long as their marginal abatement cost is below the world trading price for greenhouse gas permits. Many of the EMF models reveal that, for large developing countries, like China, such excess reductions would indeed be profitable, so that these countries would export allowances and gain from trade. Developing countries would also reap ancillary benefits of reducing conventional air pollutants, which may be substantial. Benefits from trading would also accrue to Annex I countries. Annex I countries (and private firms in these countries), who would purchase these emissions allowances in the world market, would achieve their targets at lower costs than without the participation of the developing countries. However, it should be noted that the more stringent the target for the developing country, the lower the gains from trade both for that country and for Annex I countries such as the United States. Indeed, an extremely stringent target could conceivably make the developing country a net importer of emissions allowances, and raise the international trading price for a greenhouse gas permit. Still, these models illustrate the potential to create targets that simultaneously make the environment, the developing country, and Annex I countries all better off.

Conclusion

The Administration's overall conclusion is that the economic impact of the Protocol will be modest under the conditions we have identified in our economic analysis. The purpose of this testimony has been to summarize the analysis we have presented in the Administration Economic Analysis on climate change and to provide a brief update of recent research efforts outside of the government.

I look forward to continuing to work with members of this Committee, as well as with other interested parties, in further analyzing the Kyoto Protocol and evaluating the net effects of reducing greenhouse gas emissions. It is my hope that economic analysis will continue to play a key role in designing policies in this area.

I welcome your questions.

**ORAL TESTIMONY OF DR. JANET YELLEN
CHAIR, COUNCIL OF ECONOMIC ADVISERS
BEFORE THE
U.S. HOUSE OF REPRESENTATIVES
COMMERCE SUBCOMMITTEE ON ENERGY AND POWER

TUESDAY OCTOBER 6, 1998**

Thank you, Mr. Chairman. I appreciate having this opportunity to discuss with you the economics of climate change and the Administration's efforts to address this significant environmental challenge. As you know, in my previous appearances before this Committee, I emphasized that if flexible, market-based mechanisms are effectively used, the costs of cutting greenhouse gas emissions would be significantly reduced. To further elaborate on these points I made in testimony, the Administration released in July its report on the economic analysis of the Kyoto Protocol. In addition, the Stanford Energy Modeling Forum has been coordinating an economic modeling exercise of the Kyoto agreement, and the participating modelers have made available some of their preliminary results. Today, I will briefly summarize the Administration's Economic Analysis and review several of the key findings of the Energy Modeling Forum effort.

Administration Economic Analysis

The Administration's Economic Analysis found that, assuming that effective mechanisms for international trading, joint implementation, and the Clean Development Mechanism are established, and assuming also that the United States achieves meaningful participation of key developing countries, the economic cost of attaining the targets and timetables specified in the Kyoto Protocol will be modest for the United States in aggregate and for typical households.

An illustrative assessment using the Second Generation Model that accounts for effective trading and developing country participation yields permit price estimates ranging between \$14/ton and \$23/ton, and direct resource costs to the U.S. between \$7 billion and \$12 billion/year. Under the assumptions of the Administration's analysis, permit prices in the range of \$14/ton to \$23/ton translate into energy price increases at the household level between 3 and 5%, but this would be roughly offset by the Administration's electricity restructuring proposal. I would be happy to further discuss this analysis during the question and answer period.

Recent Research on the Economics of Climate Change

Over the past nine months, the Stanford Energy Modeling Forum has conducted a model comparison exercise of the Kyoto Protocol which has included ten modeling teams from academia, government, and the private sector. The EMF results provide very useful context for the Administration's economic analysis. First, the illustrative model used by the Administration, the Second Generation Model of the Pacific Northwest National Laboratory, tends to fall in the middle of the range of this set of models in terms of U.S. permit prices. For example, under Annex I trading SGM generates a permit price which is at the median of this set of models. Under full global trading, the SGM permit price is just below the median permit price. Second, the EMF exercise found that the reduction in permit prices as trading expands from no trading to Annex I trading to full global trading is robust. On average, the EMF models found that Annex I trading would cut the U.S. permit price by 53% relative to a no trading scenario. In full global trading, the permit price would be, on average, 80% lower than the no trading price.

In addition to the modeling of various efficient international trading scenarios, several EMF modeling teams have considered the impact of constraints on the opportunity to buy or sell emissions allowances in an international market. While the United States is unambiguously opposed to trading restrictions, several parties to the agreement have indicated support for some form of a trading constraint. Trading restrictions would generate no benefit for the global climate while they could significantly increase the costs of achieving the Kyoto targets. In my written testimony I describe two examples of trading constraints where the U.S. permit price would increase by up to four times higher than the unconstrained price.

While no non-Annex I country has yet adopted a binding emissions target, the EMF modeling indicates that economic and environmental benefits would accrue if some developing countries do so. Setting a binding emissions target would generate climate benefits by reducing global emissions below what they would otherwise have been. In addition, if the target is set not too far below the business as usual emissions level, the participation of the country in a global trading system would produce economic benefits or "gains from trade" for both the developing country and its trading partners, such as the United States. Annex I countries (and private firms in these countries), who would purchase these emissions allowances in the world market, would achieve their targets at lower cost than without the participation of the developing countries.

Conclusion

The Administration's overall conclusion is that the economic impact of the Protocol will be modest under the conditions we have identified in our economic analysis. The purpose of this

testimony has been to summarize the analysis we have presented in the Administration Economic Analysis on climate change and to provide a brief update of recent modeling efforts outside of the government.

I look forward to continuing to work with members of this Committee, as well as with other interested parties, in further analyzing the Kyoto Protocol and evaluating the net effects of reducing greenhouse gas emissions. It is my hope that economic analysis will continue to play a key role in designing policies in this area.

I welcome your questions.

**TESTIMONY OF DR. JANET YELLEN
CHAIR, COUNCIL OF ECONOMIC ADVISERS
BEFORE THE
U.S. HOUSE OF REPRESENTATIVES
COMMERCE SUBCOMMITTEE ON ENERGY AND POWER**

TUESDAY OCTOBER 6, 1998

Thank you, Mr. Chairman. I appreciate having this opportunity to discuss with you the economics of climate change and the Administration's efforts to address this significant environmental challenge. As you know, I have testified on this topic before this Committee on two prior occasions. In my first appearance, prior to the Kyoto negotiations, I emphasized that if flexible, market-based mechanisms are effectively used, the costs of cutting greenhouse gas emissions would be significantly reduced. Elaborating on this point, I stated in March of this year that, in the Administration's view, the costs of achieving our Kyoto target would be modest if we can succeed in implementing international trading, joint implementation, and the Clean Development Mechanism in an efficient manner and we achieve meaningful developing country participation. A report released by the Administration in July, entitled "The Kyoto Protocol and the President's Policies to Address Climate Change: Administration Economic Analysis" elaborates the assumptions and analysis underlying this conclusion. In addition, the Stanford Energy Modeling Forum has been coordinating an economic modeling exercise of the Kyoto agreement, and the participating modelers, who include academic, private sector and government analysts, have made available some of their preliminary results. Today, I will provide a brief summary of the Administration's Economic Analysis and review several of the key findings of the Energy Modeling Forum effort.

The Potential Impact of Climate Change

The Intergovernmental Panel on Climate Change (IPCC) concluded in 1995 that "the balance of evidence suggests that there is a discernible human influence on global climate." Current concentrations of greenhouse gases have reached levels well above those of preindustrial times. If growth in global emissions continues unabated, the atmospheric concentration of carbon dioxide (CO₂) will likely double relative to its preindustrial level by midway through the next century and continue to rise thereafter. As a result of the increased concentration of CO₂, the IPCC estimates that global temperatures will increase by between 2 to 6 degrees Fahrenheit in the next 100 years, with a best guess of about 3.5 degrees Fahrenheit. Potential consequences associated with this shift in climate include a rise in sea levels, greater frequency of severe weather events, shifts in agricultural growing conditions from changing weather patterns, threats to human health from increased range and incidence of diseases, changes in availability of

freshwater supplies, and damage to ecosystems and biodiversity. Further discussion of the costs of climate change is contained in the Administration Economic Analysis.¹

The Kyoto Protocol and the Buenos Aires Conference of the Parties

Previously, Undersecretary Eizenstat and I appeared before this Committee to discuss the Kyoto Protocol and the Administration's efforts to address the risks of climate change. In my testimony, I described the many important flexibility mechanisms in the Kyoto Protocol and explained how they would allow countries to achieve cost-effectively the emissions targets established in this agreement. These mechanisms, which permit what we have termed "when", "what", and "where" flexibility in meeting the Kyoto emissions targets, are described in detail in the Administration Economic Analysis. Since securing international emissions trading, the Clean Development Mechanism, and joint implementation last year in Kyoto, the Administration has worked in bilateral and multilateral arenas to promote understanding of these mechanisms and to develop rules that will promote their efficient operation. This work will continue in the talks in Buenos Aires and beyond. While I will defer to the Department of State for a discussion of the upcoming international negotiations, I will reiterate that efficient implementation of these flexibility mechanisms is critical to reducing the costs of achieving the targets established in the Kyoto Protocol.

Costs of Action

In assessing the economic effects of the Kyoto Protocol, the Administration has drawn on the insights of a wide range of models and analysis. Examples include models of the energy sector and economy over the next 25 years, such as the Stanford Energy Modeling Forum, the Intergovernmental Panel on Climate Change's review of the economic and social dimensions of climate change, the work of the Organization for Economic Co-operation and Development (OECD) on the economic dimensions and policy responses to global warming, and the Administration's staff-level interagency analysis. In addition, the Administration used other tools, such as a meta-analysis, basic economic reasoning, overviews of the domestic and international energy sectors, statistics regarding energy efficiency and greenhouse gas emissions, and economic indicators from World Bank, International Energy Agency, and Energy Information Administration databases.

Assuming that effective mechanisms for international trading, joint implementation, and the Clean Development Mechanism are established, and assuming also that the United States achieves meaningful participation of key developing countries, the Administration's overall assessment is that the economic cost of attaining the targets and timetables specified in the Kyoto Protocol will be modest for the United States in aggregate and for typical households. This conclusion is not entirely dependent upon, but is fully consistent with, formal model results. The

¹ Please refer to the attached paper copy or <http://www.whitehouse.gov/WH/New/html/kyoto.pdf> for a PDF version of this document.

Administration continues to believe that there are limitations to relying on any single model to assess the economic impact of the Kyoto Protocol. However, model results can further inform and improve the understanding of the effects of climate change policy. To complement the economic analysis of the Administration's policy to address climate change, we have conducted an illustrative assessment with a modified version of the Second Generation Model (SGM). The results from the SGM substantiate the conclusion that the economic effects of an efficient, effective, and global policy to address the risks of climate change will be modest.

An assessment using the SGM model that accounts for effective trading and developing country participation yields permit price estimates ranging between \$14/ton and \$23/ton, and direct resource costs to the U.S. between \$7 billion and \$12 billion/year. The range reflects uncertainty about the extent of Annex I participation in international trading.

Under the assumptions of the Administration's analysis, permit prices in the range of \$14/ton to \$23/ton translate into energy price increases at the household level between 3 and 5%. Under these permit prices, fuel oil prices would increase about 5 to 9 percent, natural gas prices about 3 to 5 percent, gasoline prices about 3 to 4 percent (or around 4 to 6 cents per gallon), and electricity prices about 3 to 4 percent. This increase in energy prices at the household level would raise the average household's energy bill in ten years by between \$70 and \$110 per year, although such predictions may not be observable because they would be small relative to typical energy price changes, and nearly fully offset by electricity price declines from Federal electricity restructuring. By 2008-2012, the anticipated 10 percent decline in electricity prices from restructuring is projected to lead to expenditure reductions of about \$90 per year for the average household.

The illustrative modeling analysis does not account for several key components of the Kyoto Protocol and the Administration's policies to reduce greenhouse gas emissions. These include the benefits of reducing net emissions through carbon sinks, the Administration's electricity restructuring proposal, the Administration's Climate Change Technology Initiative (R&D funding and tax incentives in the FY 1999 Budget), the Administration's sectoral consultations to encourage and support voluntary efforts by U.S. industry to undertake emissions reductions, including the provision of credit for early action, and the Administration's efforts to reduce federal energy use. There are also ancillary benefits of reducing greenhouse gas emissions -- in particular, the corresponding reductions in conventional air pollutants like sulfur dioxide and fine particulate matter. These benefits alone could produce savings equal to about a quarter of the costs of meeting our Kyoto target.

Since I last testified before this Committee, the Administration has released its proposed electricity restructuring legislation and the supporting analysis of this proposal. The Administration's proposed Comprehensive Electricity Competition Act (CECA) is estimated to reduce greenhouse gas emissions by about 25 to 40 million metric tons of carbon equivalent per year by 2010. Further, the electricity restructuring proposal provides potential cost-savings in four areas: dispatch efficiency, improved capital utilization, savings in capital additions and cost

reductions in fuel procurement, non-fuel operation and maintenance expenses, and administrative and general expenses. These four categories of savings are likely to reach or exceed \$20 billion annually. The Department of Energy's CECA supporting analysis documents² contain further discussion of the Administration's electricity restructuring proposal.

Recent Research on the Economics of Climate Change

Since I last appeared before this Committee, many economists have conducted and made available their analyses of the Kyoto Protocol. I noted in both of my previous appearances that there are limitations to relying on one or a small set of models and that we were eager to see assessments of the Kyoto Protocol by other models. In March, I indicated that the Energy Modeling Forum (EMF) based at Stanford University, a long-running model comparison exercise involving many of the leading climate and energy models, would conduct full scale analyses of the Kyoto Protocol. We have now received a compilation of the preliminary analyses by the participating modeling teams.

EMF Kyoto Analyses

The Energy Modeling Forum comparison exercise of the Kyoto Protocol has included ten modeling teams from the United States, Europe, and Asia. In evaluating the Kyoto Protocol, all of the participating teams used economic models that incorporate the potential for international trading in greenhouse gas permits. By explicitly incorporating international trading, these models can evaluate the opportunities for cost-savings through trading among Annex I nations and among Annex I and developing countries were they to adopt emissions targets. Since the Kyoto Protocol enables all countries with emissions targets to trade emissions allowances among other countries with targets, these models are well-suited to assess the economic implications of the international trading component of the agreement.

While the EMF models can assess international trading, there are several other flexibility mechanisms of the Kyoto Protocol that they cannot, at present, readily assess. For example, these models did not incorporate the effects of sinks. While several modelers did assess the economic costs of achieving the Kyoto targets with "off-line" assumptions about sink activity, none incorporated an integrated energy-land use model. Further, most of the modelers did not evaluate opportunities to reduce costs by trading across greenhouse gases. These models are primarily energy models and are focused on the economics of reducing carbon emissions from fossil fuel combustion. Again, some modelers analyzed the Protocol by making some "off-line" assumptions about the potential reductions in non-carbon dioxide greenhouse gases, but none employed a model with cost curves for these gases. Finally, it should be noted that these models did not include opportunities for emissions reduction through Administration proposals, such as

² Please refer to the attached paper copy or <http://www.doe.gov/ceca/ceca.htm> for the PDF version of the supporting analysis.

electricity restructuring or the Climate Change Technology Initiative, that could lower greenhouse gas permit prices.

The EMF results provide very useful context for the Administration's economic analysis. First, the illustrative model used by the Administration, the Second Generation Model of the Pacific Northwest National Laboratory, tends to fall in the middle of the range of this set of models in terms of U.S. permit prices.³ For example, under Annex I trading SGM generates a permit price which is at the median of this set of models. Under full global trading, the SGM permit price is just below the median permit price. Second, the EMF exercise found that the reduction in permit prices as trading expands from no trading to Annex I trading to full global trading is robust. On average, the EMF models found that Annex I trading would cut the U.S. permit price by 53% relative to a no trading scenario. Of these models, one estimated a 72% reduction in the permit price under Annex I trading. In full global trading, the permit price would be, on average, 80% lower than the no trading price. Several models estimated permit price reductions of about 90%.

Analyses of Trading Constraints

In addition to the modeling of various efficient international trading scenarios, several EMF modeling teams have considered the impact of constraints on the opportunity to buy or sell emissions allowances in an international market. While the United States is unambiguously opposed to trading restrictions, several parties to the agreement have indicated support for some form of a trading constraint, for example, by setting a limit on the amount a party can purchase through the trading system. Trading restrictions would generate no benefit for the global climate while they could significantly increase the costs of achieving the Kyoto targets.

Before describing the economic costs of trading constraints, I would like to explain why such constraints yield no climate benefits. Regardless of where an emission reduction occurs, it has the same effect on total emissions and the same effect on the climate. A ton reduced in New York generates the same climate benefit as a ton reduced in Berlin. In proposing trading constraints, some have focused on countries such as Russia, that will have emissions below their Kyoto targets during the commitment period because of the decline in their economic output associated with the transition to market economies. If trading constraints are established that restrict the ability of Russia to sell permits (or restrict the opportunity for other Annex I countries to buy Russian permits), then emissions during the first commitment period would be lower than in the absence of such constraints. However, Russia would simply bank its allowances and use these allowances in a subsequent commitment period when its emissions exceed its target. While

³ Please note that the version of SGM used in EMF differs from the analysis conducted by the Administration because the EMF version does not include cost curves for non-carbon dioxide greenhouse gases used by the Administration. Since efficient trading across gases would lower costs and permit prices, the EMF version of SGM yields slightly higher permit prices than the Administration version.

a trading constraint might lower emissions during the first commitment period, the cumulative emissions over several commitment periods from Annex I countries would be the same with and without the trading constraint. Given the long residence times of greenhouse gases (on the order of a 100 or more years), the cumulative effect is what is most relevant in terms of changes in the global climate.

To provide a sense of the economic implications of trading constraints, I would like to share with you two examples from work done by EMF modeling teams. First, consider a trading constraint that mandates that at least two-thirds of the emissions reductions necessary for a country to achieve its Kyoto target must occur through domestic actions. Evaluating this trading constraint with the EPPA model based at the Massachusetts Institute of Technology, the permit price for the United States is almost four times higher with the constraint than under an unconstrained global trading system. It is important to note that the effects of this constraint are even more pronounced for the European Union and for Japan. The permit price for the EU would be more than five times higher than the unconstrained global trading permit price, and the Japanese permit price would be thirteen times higher. As these results indicate, the trading constraint would result in each country experiencing a different marginal cost of abatement, and there would be no common permit price for a ton of carbon equivalent. Since the constraint restricts opportunities for countries like the United States, Japan, and members of the EU to buy emissions allowances, the competitive price for emission allowances from countries like Russia would fall below the unconstrained level.

Second, consider a trading constraint that mandates that acquisitions of permits through international trading could not exceed 10% of a country's emissions allocation. For example, the U.S. target is approximately 1.5 billion tons of carbon equivalent on an annualized basis. Under this trading constraint, the United States, or private firms in the United States, could not purchase more than 150 million tons on an annual basis from other countries. Assessing this trading constraint with the Second Generation Model based at the Pacific Northwest National Laboratory, the permit price for the United States would more than triple relative to the unconstrained global trading permit price. For the EU, the permit price would nearly double, and for Japan, the permit price would be eleven times as high as the unconstrained global price.

While trading constraints increase greenhouse gas permit prices (and subsequently, energy prices) in the United States, the European Union, and Japan, they also reduce the gains from trade by the countries likely to be sellers of emissions allowances. For example, Russia and large developing countries that adopt emissions growth targets and participate in international trading, e.g., China and India, would sell fewer emissions allowances at lower international permit prices under such trading constraints than in an unconstrained global trading environment. Such restrictions lessen the benefits of participation by developing countries in international trading.

Developing Country Participation

While no non-Annex I country has yet adopted a binding emissions target, economic and environmental benefits would accrue if some developing countries do so. Setting a target below the business as usual emissions level for the commitment period would generate climate benefits by reducing global emissions below what they would otherwise have been. In addition, if the target is set not too far below the business as usual emissions level, the participation of the country in a global trading system would produce economic benefits or "gains from trade" for both the developing country and its trading partners. Emissions trading by developing countries would occur only if they chose to undertake emissions reductions above and beyond their commitments -- reductions that would generate trading extra income for them as long as their marginal abatement cost is below the world trading price for greenhouse gas permits. Many of the EMF models reveal that, for large developing countries, like China, such excess reductions would indeed be profitable, so that these countries would export allowances and gain from trade. Developing countries would also reap ancillary benefits of reducing conventional air pollutants, which may be substantial. Benefits from trading would also accrue to Annex I countries. Annex I countries (and private firms in these countries), who would purchase these emissions allowances in the world market, would achieve their targets at lower cost than without the participation of the developing countries. However, it should be noted that the more stringent the target for the developing country, the lower the gains from trade both for that country and for Annex I countries such as the United States. Indeed, an extremely stringent target could conceivably make the developing country a net importer of emissions allowances, and raise the international trading price for a greenhouse gas permit. Still, these models illustrate the potential to create targets that simultaneously make the environment, the developing country, and Annex I countries all better off.

Conclusion

The Administration's overall conclusion is that the economic impact of the Protocol will be modest under the conditions we have identified in our economic analysis. The purpose of this testimony has been to summarize the analysis we have presented in the Administration Economic Analysis on climate change and to provide a brief update of recent modeling efforts outside of the government.

I look forward to continuing to work with members of this Committee, as well as with other interested parties, in further analyzing the Kyoto Protocol and evaluating the net effects of reducing greenhouse gas emissions. It is my hope that economic analysis will continue to play a key role in designing policies in this area.

I welcome your questions.

TESTIMONY OF DR. EDWARD MONTGOMERY
CHIEF ECONOMIST, U.S. DEPARTMENT OF LABOR
BEFORE THE HOUSE SUBCOMMITTEE ON NATIONAL ECONOMIC
GROWTH, NATURAL RESOURCES, AND REGULATORY AFFAIRS
ON THE KYOTO PROTOCOL
APRIL 23, 1998

Thank you, Mr. Chairman and Members of the Committee. I am pleased to have this opportunity to appear before the Committee to elaborate on the Administration's views on global climate change policy.

The international agreement that was reached in Kyoto this past December is a crucial step forward in addressing global climate change. Global warming may be the most pressing environmental concern of the next century. The Intergovernmental Panel on Climate Change (IPCC), representing the world's climate change scientists, concluded that "the balance of evidence suggests that there is a discernible human influence on global climate." Current concentrations of carbon dioxide, methane, nitrous oxide, and the other so-called greenhouse gases have reached levels well above those of preindustrial times.

As a result of the increased concentration of CO₂, the IPCC estimates that global temperatures will increase by between 2 to 6 degrees Fahrenheit in the next 100 years. The IPCC reports that a doubling of carbon dioxide levels would lead to additional deaths in the U.S. from higher summer temperatures, even after netting out the effects of warmer winters and assuming acclimatization. Researchers predict sea level increases, spread of tropical diseases, increased precipitation, and more violent storms due to increased concentrations of greenhouse gases.

While some of these effects may not be felt for several decades, it is important to begin to take action now in order to avoid leaving an even greater burden for future generations. We already face up to another 1.0 degree Fahrenheit temperature increase from emissions that have occurred. Delayed action will only increase the level of greenhouse gases accumulating in the atmosphere and magnify the future costs of addressing this issue. As CEA Chair Yellen recently noted, William Cline, then of the Institute for International Economics, estimated that the monetary damages expected from a 4.5 degree Fahrenheit average worldwide temperature increase would amount to about 1.1 percent of GDP per year for the U.S. economy -- \$90 billion per year in today's terms. Responsible action today would seem a prudent form of insurance to protect the world for our children and grandchildren.

The President's plan represents a flexible and market-oriented approach to global climate change and is designed to insure that we reach our goals with the least cost and in the most efficient manner. It exploits the creativity and ingenuity of American companies and their workers rather than relying upon policies like taxing the use of fossil fuels. The plan emphasizes partnering with business by investing in the further development of win-win technologies which lower energy consumption (and costs) while reducing emissions. The \$6.3 billion program of increased R&D spending and tax credits that the President proposed is designed to harness the power of the market to seek reductions in greenhouse gases at the least cost possible.

Let me emphasize that at the core of the President's policy is the recognition that we must begin to address this real problem but that we must do it in such a way as to minimize any effect on the competitiveness of U.S. industry and workers. That is why the Administration has insisted upon international emissions trading, meaningful developing country participation, inclusion of land-use activities that absorb carbon ("sinks") and six categories of gases, as well as our domestic initiatives which can help ensure that reductions in global greenhouse gas emissions are consistent with continued strong economic growth. Our experience with the SO₂ program showed that when market flexibility is harnessed emission reductions can be achieved at costs 60 to 80 percent below what was originally thought possible. While success such as this is not guaranteed, it does illustrate the efficacy of using flexible market-based strategies to address the problem.

In trying to assess the potential costs of global climate change policy there are several points to keep in mind. First, the parameters of the international effort to reduce greenhouse gas emissions are still in some respects a work-in-progress so, despite the claims of some studies, it is not yet possible to provide a full authoritative analysis. Second, one only has to pick up the paper on a daily basis and read the range of forecasts for the economy over the next quarter to appreciate the high degree of uncertainty attached to economic forecasts over the short term, let alone over a decade. How many forecasters a year ago, let alone ten years ago, predicted that we would again be seeing gas prices around \$1.00 per gallon?

Despite the uncertainty surrounding economic forecasts a decade into the future, there is good reason to believe that the costs of this policy will be modest. As Chair Yellen noted in her recent testimony, features of the Kyoto Protocol that the President insisted upon such as international emissions trading, joint implementation, and the Clean Development Mechanism have all been found to significantly reduce the costs of abatement. With these features embodied in the Protocol, model estimates suggest that the costs could range between \$7 and \$12 billion per year in 2008-2012 or one tenth of one percent of GDP. These estimates may overstate actual costs as they do not include the benefits of climate change abatement as well as the effects of electric utility restructuring and the Administration Climate Change Initiative. In addition, lower energy costs are but one of many factors affecting competitiveness. In fact, energy prices account for only 2.2 percent of total costs to U.S. industry and already vary substantially across countries. Gas prices range from 8 cents per gallon in Venezuela to \$1.28 in the U.S. to \$4.41 in France. Despite high energy prices in Europe and Japan, neither they nor U.S. industry is moving en masse to Venezuela. Further, the Administration's proposed plan for electric utility restructuring may actually offset any energy price increase caused by efforts to limit greenhouse gases.

While we expect that the costs of global climate change policy to be modest, it is possible that some industries and workers may be adversely affected by a rise in energy prices. The President has stated that we have a moral obligation to help those who may be affected by any change in our economy which affects people through no fault of their own. The President

and the Department of Labor have demonstrated the strength of this commitment to helping today's workers manage change by doubling funding for programs that provide access to training and assistance to those workers when they need it.

Any layoff is a painful event for the workers and communities involved. By insisting upon flexible market-based solutions, the President's global climate change policies are designed to minimize any adverse effect on energy prices and the economy. Just as we do today, the Department of Labor is committed to helping any worker or community that may be affected. Rapid response teams have a proven track record of helping workers who are affected by any economic dislocation to look ahead and plan for their future. Working with locally-managed job training organizations, these teams set up worker assistance workshops that cover everything from resume writing to interviewing skills. Dislocated workers may also participate in job fairs, training (including community college courses), direct placement, and related skills and remedial assistance from federally-funded programs. The Secretary has repeatedly stated her commitment to further improving these programs by increasing job placement and wage replacement for workers who permanently lose their jobs in a plant closing or mass layoff.

Thank you Mr. Chairman for this opportunity to discuss global climate change policy and I welcome any questions you might have.

Statement of Dan Reicher
Assistant Secretary for Energy Efficiency and Renewable Energy
U.S. Department of Energy
Before the
Subcommittee on National Economic Growth, Natural Resources, and Regulatory Affairs
Committee on Government Reform and Oversight
U.S. House of Representatives

April 23, 1998

Mr. Chairman and members of the Subcommittee, I appreciate the opportunity to appear before you to discuss how the Department of Energy's enhanced energy research and development initiative can help the nation reduce our dependence on foreign oil, increase our nation's competitiveness, cut air pollution, help maintain our leadership in energy technology, and at the same time, address climate change.

As the 21st century approaches, our nation faces many energy, economic, and environmental challenges. Over the next few years, we will confront the threat of global climate change; restructure U.S. electricity markets; implement new federal and state clean air requirements; encounter a volatile global energy market; and face increased economic competition in the global market for clean energy technologies. There is a technology path that can help meet these challenges and turn them into opportunities.

Research, development and accelerated use of energy efficiency and clean energy technologies, built upon a solid foundation of advanced science and basic research, are major parts of the

solution. In fact, this technology path is so important in meeting these challenges, that even without the threat of climate change, these investments would still be wise national policy. This exact point was made last Fall by the President's Committee of Advisors on Science and Technology.

There is no "silver bullet" that will address all our future energy needs. A broad and balanced R&D portfolio -- one that builds on clean fossil, renewable and nuclear supplies and increased efficiency of energy use -- is essential. We must make better use of conventional energy sources through energy efficiency while also investing in new energy supply technologies. A robust energy portfolio will provide many benefits, including reduced energy costs, increased energy security, improved air quality, greater U.S. competitiveness, and reduced greenhouse gas emissions.

That is why we are asking for funding for the following:

- Hydropower R&D to develop a fish friendly turbine that will help us preserve our large installed hydropower base that currently provides approximately 10 percent of U.S. electricity;
- Technologies that improve the efficiency and extend the operating life of current nuclear power plants;
- Super clean diesel engines that will be one-third more efficient than comparable gasoline engines and meet equivalent emission standards;

- Advanced gas turbines that can provide industrial and commercial buildings not only with their electricity, but with their heat, at system efficiencies of 70 percent and higher;
- R&D partnerships with the most energy-intensive U.S. industries -- like steel, chemicals, and forest products -- to develop technologies to save energy and increase industrial productivity;
- A new R&D collaboration with the agriculture industry to use crops like corn and soybeans -- instead of oil -- to make everyday consumer items -- ranging from paints and plastics to carpets and car parts; and.
- Sequestration technologies to keep the carbon dioxide from coal combustion out of the atmosphere.

These investment proposals are built on a solid track record of DOE success in advancing energy technology.

In January, Chrysler, Ford, and GM stunned the world with their announcement of concept vehicles that promise two to three times greater fuel efficiency. This followed a DOE, Chrysler and A.D. Little announcement of a major breakthrough in powering a fuel cell electric car with gasoline.

Last week in Nevada we dedicated an advanced clean coal power plant that produces 20 percent fewer greenhouse gas emissions and 90 percent less sulfur and nitrogen oxide emissions. The advances in this plant result in part from our Fossil Energy R&D efforts.

Yesterday, Mayor Giuliani and Secretary Peña celebrated a new state-of-the-art office tower in Manhattan -- a building already fully rented, powered in part by fuel cells and photovoltaic panels, and expected to be 40 percent more energy efficient than the average building its size, with a similar reduction in associated greenhouse gas emissions. The technologies used in this building were developed by DOE in partnership with industry and the national laboratories.

Next week, in Indiana, Bethlehem Steel and DOE will showcase an array of technologies that will significantly cut pollution and energy use in the largest integrated steel mill in the nation -- a mill that spends about \$300,000 per day on energy -- or more than \$100 million per year.

And this year, DOE has pioneered a simple method for leveraging billions of private sector dollars for energy retrofits for the nation's Federal buildings. The Federal government occupies 500,000 structures and is the single largest energy user in America. In one recent example, New York's Consolidated Edison is investing \$6 million of its own money to retrofit a V.A. hospital that will save the V.A. and taxpayers \$1 million a year.

Clearly, the common ground in the climate change debate is technology. From Mobil Oil to the Sierra Club, there is agreement that substantial industry and government support for energy R&D is a key element of an effective response to climate change, independent of opinions about the

science or diplomacy of the issue. Last year, a peer-reviewed study conducted by five national laboratories recognized that the United States can hold down the costs of meeting climate change goals by developing clean energy technologies. In fact, the study concluded that significant progress in reducing greenhouse gas emissions can be achieved without increasing the nation's total energy bill. Just yesterday, eleven laboratory directors issued a study that outlined almost 50 separate technology pathways for reducing greenhouse gas emissions over the next 30 years while providing other benefits.

Finally, technology is a key to ensuring the meaningful participation of developing nations in a climate treaty. It is technology that will provide developing nations with the ability to grow their economies, and at the same time limit their greenhouse gas emissions and reduce the traditional air pollutants choking many of their cities. And, clean technology will help ensure that developing countries become a business opportunity rather than a diplomatic challenge for our nation. Mr. Chairman, over the next four decades, developing countries alone will require new electricity generating capacity worth more than \$3 trillion. In order to meet this explosive energy demand and reap the resulting technology sales and jobs, we must invest now in the research, development, and deployment of energy technologies. U.S. companies and workers can have the largest piece of this huge market if we win the R&D race. But, if our commitment to energy technology R&D is stalled by finger-pointing over Kyoto "back-doors" and economic models, then the U.S. economy, our citizens, and the global environment will be the real losers.

Thank you again, Mr. Chairman, and members of the Subcommittee for the opportunity to testify before you today.

**TESTIMONY OF DAVID GARDINER
ASSISTANT ADMINISTRATOR
OFFICE OF POLICY, PLANNING, AND EVALUATION
ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
SUBCOMMITTEE ON NATIONAL ECONOMIC GROWTH,
NATURAL RESOURCES, AND REGULATORY AFFAIRS
COMMITTEE ON GOVERNMENT REFORM AND OVERSIGHT
U.S. HOUSE OF REPRESENTATIVES**

April 23, 1998

Thank you, Mr. Chairman and Members of the Subcommittee, for giving me this opportunity to testify on the Kyoto Protocol. The United States agreed to the Protocol in December because the scientific evidence strongly supports our belief that a changing climate would pose very serious risks to public health and the environment. The framework for action that was negotiated in Kyoto would address those risks in a flexible, common-sense, and cost-effective way. The Kyoto Protocol would buy America an insurance policy to protect against a possible disaster in the future. Moreover, while protecting the future, it brings us substantial human health, environmental, and economic benefits in the near term.

It is difficult to predict with certainty what will happen in the future, but the risks are enormous. If emissions of greenhouse pollutants are not reduced worldwide, atmospheric concentrations are expected to double by the year 2060. That would cause global temperatures to rise by roughly two to six degrees by the year 2100, and global sea levels to rise 6 - 38 inches.

Climatic changes on that scale would pose very serious threats to public health and the environment. For example, a doubling of current atmospheric concentrations of greenhouse pollutants could contribute to more frequent and intense episodes of urban smog, thus increasing rates of human illness and death. The projected increase in the duration and frequency of heat waves could increase mortality rates due to heat stress.

Climate change also could lead to increases in several infectious diseases, including malaria, dengue, and yellow fever, as the range of organisms that carry these diseases expands. It has been estimated, for example, that as global surface temperatures rise, by the end of the 21st century the global population will suffer an additional 50 - 80 million cases of malaria.

By the year 2100, EPA's report to Congress estimated that rising sea levels could submerge 15 - 60 percent of America's coastal wetlands. These wetlands are nature's kidneys; they cleanse and purify the waters that pass through them. Their loss would be a blow to the health of humans and wildlife alike.

Groundwater aquifers and surface waters could be rendered unfit for drinking by the saltwater intrusion that could be common as sea levels rise. Five thousand square miles of dry land in states like Louisiana and Florida could be inundated, with devastating effects on the quality of drinking water. Both droughts and floods are likely to become more frequent and severe as average temperatures rise, thus increasing personal and property damage.

In short, the potential consequences of climate change go far beyond a few degree rise in average global temperatures over the next century. Rising temperatures and related climate phenomena pose a distinct and serious threat to human health, the environment, and the quality of life on earth. The Intergovernmental Panel on Climate Change stated the problem succinctly: "Climate change is likely to have wide-ranging and mostly adverse impacts on human health, with significant loss of life."

In the face of this evidence, and because the effects of climate change would be so serious and so costly, the United States negotiated an agreement that will allow participating nations to reduce greenhouse pollution in common sense, cost-effective, and flexible ways.

First, the Protocol sets realistic targets and timetables for reducing emissions of greenhouse pollutants. The United States would reduce its emissions 7 percent below 1990 levels, Japan 6 percent, and the European Union 8 percent.

Second, the Protocol ensures that countries can meet their obligations through the use of flexible market mechanisms, not mandatory policies or taxes. This flexibility will allow companies and countries to find the cheapest possible ways of hitting their emissions reduction targets. In fact, because emissions permits can be traded, there is a built-in incentive to develop advanced -- and cheaper -- methods of reducing emissions.

In this country we have several years of experience using the power of the free market to reduce pollution at the lowest cost. We've incorporated market trading mechanisms into programs to control acid rain, water pollution, lead in gasoline, criteria

air pollutants, and the chemicals which deplete the ozone layer (chlorofluorocarbons). The results have been impressive. The lead trading program, for example, reduced control costs by about 20 percent. Acid rain control costs were 50 percent lower than expected. CFC phaseout costs were cut dramatically. We believe the flexible market mechanisms built into the Kyoto Protocol will be equally effective in reducing greenhouse pollutants at the lowest possible cost.

The United States entered the Kyoto negotiations with a third objective: securing the meaningful participation of developing countries. The Kyoto Protocol does not meet all our objectives in this area. But it makes a solid start by encouraging investments in developing countries that can be credited toward the Protocol's emissions reductions targets through the Clean Development Mechanism.

The President's proposed Climate Change Technology Initiative also is part of our common-sense, cost-effective strategy. This initiative expands existing voluntary programs designed to reduce greenhouse pollutants. These voluntary programs bring economic benefits beyond those associated with the control of global warming. They provide incentives for American businesses and communities to cut greenhouse pollution now in ways that make economic sense now. They speed the adoption of today's cost-effective, energy-efficient, low-carbon technologies throughout the economy, and hasten the development of even more advanced technologies in the future.

And they work. By 1999, our goals are to reduce greenhouse pollutants by over 40 million tons a year, eliminate 90,000 tons of nitrogen oxides, a prime component of

urban smog and reduce U.S. energy consumption by over 45 billion kilowatt hours in 1999, providing \$3 billion in energy savings to consumers and businesses.

Let me give you just one example of how rewarding these kinds of actions can be for both the environment and the economy. In East Indiana, the Inland Steel Company is installing technology that will recapture coke gas emissions and use it to generate both electricity and steam heat. Any excess electricity not used at the steel mill will be sold to the local utility. Thus, this new, state-of-the-art, cogeneration facility will save Inland money while it reduces the emissions of greenhouse gas and other pollutants from both the steel mill and the local utility.

Ideas like that help enhance the productivity of the American economy. They help American businesses compete more effectively in the global economy. And by reducing greenhouse pollution they help us reduce the threat of global warming.

One last point: every dollar we invest to improve energy efficiency and limit climate change will control pollutants besides greenhouse gases. Fossil fuel combustion is also a major source of conventional air pollutants like particulates, nitrogen oxides, volatile organic compounds, and carbon monoxide. These pollutants have been linked to heightened risks of mortality, chronic bronchitis, congestive heart failure, heart disease, and other serious illnesses. Children and the elderly are most vulnerable to these pollution-related illnesses.

In summary, the Kyoto Protocol lays the groundwork for a cost-effective, common-sense approach to controlling climate change. It is a work in progress, and

the progress so far has been heartening. We have to do more to engage the developing countries, but the framework for future action is strong.

Most important, the need for action is clear. Let me close by quoting from an article by Stephen Wolf, the CEO of US Airways: "But in the long term, if we do not address this issue forcefully today, we and our children and our children's children will be penalized in ways we do not even want to contemplate." I will be happy to answer any questions that you may have.

**Statement of
Stuart E. Eizenstat
Under Secretary of State
for Economic, Business and Agricultural Affairs
before the
House International Relations Committee
May 13, 1998**

Thank you, Mr. Chairman.

At the outset, let me thank those members of Congress, in this chamber and in the Senate, who participated with us in the Kyoto Conference last December and who lent their advice and support to our efforts there. Rarely has there been an environmental issue more important or complex than global warming, and rarely has there been a greater need for the Executive Branch and the Congress to work closely together.

It is with great pleasure that I appear here today to explain the Administration's position on global warming. To this end, I will divide my testimony into four parts: (1) a short discussion of the science – the driving force for all the efforts we have taken to date to mitigate a significant and growing global environmental problem; (2) a discussion of the results of the Kyoto Conference and key features of the Kyoto Protocol; (3) an effort to correct misperceptions; and (4) a brief review of the President's Climate Change Technology Initiative. I hope to leave you with a clear understanding of why we believe that it is necessary to act, of how we intend to proceed internationally, and of what the President plans to do here at home.

The Science

Human beings are changing the climate by increasing the global concentrations of greenhouse gases such as carbon dioxide, methane and nitrous oxide. Burning coal, oil and natural gas to heat our homes, power our cars and illuminate our cities produces carbon dioxide and other

greenhouse gases as by-products -- more than 6 billion metric tons worth of carbon in the form of carbon dioxide annually. Similarly, deforestation and land clearing also release significant quantities of such gases -- another 1 to 2 billion tons a year. Over the last century, greenhouse gases have been released to the atmosphere faster than natural processes can remove them. There is no ambiguity in the data; since 1860, concentrations of carbon dioxide have risen 30 percent, from 280 parts per million (ppm) to 365 ppm.

In December 1995, the authoritative Intergovernmental Panel on Climate Change (IPCC), representing the work of more than 2,000 of the world's leading climate change scientists from more than 50 countries, concluded that "the balance of evidence suggests that there is a discernible human influence on global climate."

The IPCC Assessment represents the best synthesis of the science of climate change. It concludes:

Concentrations of greenhouse gases could exceed 700 ppm by 2100 under "business as usual" -- levels not seen on the planet for 50 million years. The projected temperature increase of 2 to 6.5 degrees Fahrenheit over the next 100 years, could exceed rates of change for the last 10,000 years. For perspective, while there is some uncertainty, tropical sea surface temperatures in the last ice age were anywhere from 2 to 9 degrees Fahrenheit cooler than today.

Increased temperatures are expected to speed up the global water cycle. Faster evaporation will lead to a drying of soils and in some areas increased drought. Overall, however, due to the faster global cycling of water, there will be an increase in precipitation.

Sea levels are expected to rise between 6 and 37 inches over the next century. A 20 inch sea level rise could double the global population at risk from storm surges -- from roughly 45 million to over 90 million, even if coastal populations do not increase. Low-lying areas are particularly vulnerable (e.g., much of coastal Louisiana and the Florida Everglades).

Human health is likely to be affected. Warmer temperatures will increase the chances of heat waves (like the Chicago event in 1995 that

killed over 400 people) and can exacerbate air quality problems such as smog, and lead to an increase in allergic disorders. Diseases that thrive in warmer climates, such as dengue fever, malaria, yellow fever, encephalitis, and cholera are likely to spread due to the expansion of the range of disease carrying organisms. By 2100, there could be an additional 50-80 million cases of malaria each year.

Agriculture, forests, and natural ecosystems are also likely to be affected. The poorest countries, already subject to food production and distribution problems, will likely suffer the greatest agricultural impacts. Doubling current carbon dioxide concentrations could lead to a dramatic change in the geographic distribution of one-third of the Earth's forests. (For example, the ideal range of some North American forest species would shift by as much as 300 miles to the north in the next 100 years -- far faster than their ability to migrate on their own.) Such changes could have profound effects on parks and wildlife refuges, and lead to a reduction in species diversity.

What Changes Have We Seen to Date?

The earth's temperature is increasing: Scientists from our National Oceanic and Atmospheric Administration (NOAA), the U.K. Meteorological Office and the National Aeronautics and Space Administration (NASA) all recently announced that 1997 was the warmest year on record. In fact, nine of the last 11 years are among the warmest ever recorded.

In recent weeks, satellite images confirmed that a section of an Antarctic ice shelf as big as the District of Columbia has broken away from the Larsen Ice Shelf. A segment the size of Rhode Island broke off from this same area a few years ago. While these events do not appear to threaten a collapse of the west Antarctic ice sheet, they do appear to be related to a several degree warming of the ocean in this region.

In addition, the water cycle of the planet may be speeding up: Since the beginning of the century, NOAA estimates that precipitation in the United States has increased by about 5 - 10 percent, while the frequency of heavy downpours (where more than 2 inches fall in a day) has increased by about 20 percent. The United States has had many recent reminders of how

costly extreme events can be: the Mississippi flooding of 1993 led to damages of between \$10 and \$20 billion; the Southern Plains drought of 1996 was estimated to cost \$4 billion; and the Northwest floods of 1996-97 about \$3 billion. We have yet to determine the total costs of the 1997-98 El Nino. While no single event can be attributed to global warming, increases in floods and droughts are expected as global warming occurs.

Action Needed Now

Some have argued that we can wait to act until all the details of the climate system have been fully understood. The science tells us that this is a recipe for disaster. We will only fully confirm predictions when we experience them. At that point it will be too late. The concentrations of greenhouse gases in the atmosphere continue to rise each year, and because these gases will persist for many decades to centuries, this problem is only slowly reversed. The earth will continue to warm and the seas continue to rise as long as we continue to load the entire atmosphere of the earth with greenhouse gases. The problem has developed over the course of a century and it will take many decades to solve. Already, we have another 1.0 degree Fahrenheit of warming in the pipeline from emissions that have previously occurred, and there will be more warming ahead as emissions continue to occur into the future. So some impacts will happen no matter what actions we take. Nevertheless, we can still forestall many others if we begin taking cost-effective actions now.

We should look at the Kyoto Protocol as an insurance policy against the potentially devastating and irreversible impacts of global warming. This insurance policy is fully justified today, based solely on our current understanding of the science. If we act now the premium will be far more reasonable than if we delay and hope the problem created by greenhouse gases will go away. It is like a life insurance policy whose costs grow significantly if we delay year after year insuring ourselves.

But there is a critical difference in the case of the climate system. In most insurance policies, the loser can be made whole -- restitution is possible; the building can be rebuilt, the stolen car replaced, the fire or flood damage repaired. In the case of global warming, we will not have a second chance -- failure to act will lead to irreversible consequences. We will be

committing ourselves, our children and our grandchildren to a very different planet, and they will never forgive us.

But the premium for this insurance policy must be reasonable. For this reason we rejected unrealistic targets in Kyoto; we insisted on the use of market-mechanisms; and we opposed mandatory policies and measures – like carbon taxes.

The totality of our scientific information, including that on vulnerability and impacts of global warming, provides a compelling reason to act.

Let me now turn to the recent Kyoto Conference.

Kyoto Protocol

Last December in Kyoto, Japan, the nations of the world reached agreement on an historic step to control greenhouse gas emissions which cause global warming. No sooner had the negotiating session ended, however, than some critics on both ends of the political spectrum, without a full examination of the results achieved, denounced the agreement as either too little too late or too much too soon. In fact, the Kyoto Protocol, reached only through the exercise of vigorous American leadership, represents an important achievement in the best interests of the United States. But it is a framework for action, a work in progress, not a finished product ready for Senate consideration.

U.S. Negotiating Objectives

In order to secure an effective agreement that is environmentally strong and economically sound, while protecting the unique worldwide interests of the U.S. military, President Clinton and Vice President Gore established three major objectives. As a result of the Kyoto negotiations, we achieved the first two – realistic targets and timetables for reducing greenhouse gas emissions among the world's major industrial nations, which fully protect the unique role of our military in its global reach; and flexible market-based mechanisms for achieving those targets. The third, meaningful participation of developing countries, will be the focus of our work in the

coming months and years, but with the Kyoto Protocol we have made an important down payment.

Elements of the Kyoto Protocol and Related Decisions

Our first objective – realistic targets and timetables among developed countries – had to be a credible step in reducing the dangerous buildup of greenhouse gases, yet measured enough to safeguard U.S. prosperity at home and competitiveness abroad. In the end, we secured the key elements of the President's proposal on targets and timetables, often over the initial objections of the European Union and other developed countries. The agreement and related decisions include:

The U.S. concept of a multi-year time frame for emissions reductions rather than a fixed, single-year target. The multi-year time frame will allow the United States, other nations and our industries greater flexibility in meeting our targets. Averaging over five years, instead of requiring countries to meet a specific target each year, can lower costs, especially given an uncertain future. The averaging can smooth out the effects of short-term events such as fluctuations in the business cycle and energy demand, or hard winters and hot summers that would increase energy use and emissions.

The U.S. specific time frame of 2008-2012, rather than earlier periods preferred by the European Union and others, giving us more time to phase in change gradually and deploy new technologies cost-effectively, and thereby to cushion the effects on our businesses and workers.

Differentiated targets for the key industrial powers ranging from 6% to 8% below baseline levels (1990 and 1995) of greenhouse gas emissions, with the United States agreeing to a 7% reduction. When changes in the accounting rules for certain gases and offsets for activities that absorb carbon dioxide are factored in, the level of effort required of the United States is quite close to the President's original proposal to return emissions to 1990 levels by 2008-2012, representing at most a 3 percent real reduction below that proposal, and perhaps less.

An innovative proposal shaped in part by the United States, allowing certain activities, such as planting trees, that absorb carbon dioxide – called

“sinks” – to be offset against emissions targets. This will both promote cost-effective solutions to climate change and encourage good forestry practices. As a major forestry nation this will be of special benefit to the United States.

As proposed by the United States, the Kyoto Protocol covers all six significant greenhouse gases even though the E.U. and Japan proposed and fought until the last moment to cover only three. This was an important environmental victory – also supported by many in our own industry – because gases that other countries wanted to omit and leave uncovered (including substitutes for the now banned chlorofluorocarbons that endanger the ozone layer) are among the fastest growing and longest lasting greenhouse gases.

Flexible Market Mechanisms

Our second broad Presidential objective was to make sure that countries can use flexible market mechanisms to reach their targets rather than the mandatory “policies and measures,” such as carbon taxes, favored by the E.U. and many other developed countries.

The Kyoto Protocol enshrines a centerpiece of this U.S. market-based approach – the opportunity for companies and countries to trade emissions permits. In this way, companies or countries can purchase less expensive emissions permits from companies or countries that have more permits than they need (because they have met their targets with room to spare). This is not only economically sensible, but environmentally sound. By finding the least expensive way to reduce emissions, we will be providing a strong incentive for achieving the maximum level of emissions reductions at the least cost. The United States has had a very positive experience with permit trading in the acid rain program, reducing costs by 50 percent from what was expected, yet fully serving our environmental goals.

This was a new concept for developed and developing countries alike – some of whom fought it vigorously. But we have it firmly enshrined in the Kyoto Protocol and it is a critical way of ensuring cost-effective solutions. Its inclusion was a major victory for us.

We went even further by achieving a conceptual understanding with several countries, including Australia, Canada, Japan, New Zealand, Russia and Ukraine, to trade emissions rights with each other. This 'umbrella group' could further reduce compliance costs. Since Kyoto, further discussions have taken place and will continue.

Ensuring that we can meet our target reductions cost-effectively will depend significantly on access to the flexibility mechanisms we fought hard to include in the Kyoto Protocol. Let me be very clear: The commitment we made in Kyoto would not have been made -- could not have been made -- were it not for the flexibility mechanisms that were also agreed there. Until we are satisfied with the rules and procedures yet to be established, the promise of Kyoto will never be realized.

Meaningful Participation of Developing Countries

Our third objective was to secure meaningful participation of key developing countries, a concern that the Senate obviously shares, as evidenced by last summer's Byrd-Hagel Resolution. Global warming is, after all, a global problem which requires a global solution -- not only from the developed world but also from key developing countries.

Per capita emission rates are low in the developing world and will remain so for some time. At the same time, it is also true that by around 2015 China will likely be the largest overall emitter of greenhouse gases, and by 2025 the developing world will emit more greenhouse gases in total than the developed world. So from an environmental perspective, this problem cannot be solved unless developing countries get on board.

We encountered significant resistance in Kyoto by some developing countries to meaningful participation in solving the global warming problem. For example, we had sought to include a specific process through which advanced developing or newly developed countries could take on quantified emission limitation commitments and thereby take part in the international emissions trading regime. While a number of developing countries expressed interest in our proposal and supported it in Kyoto, others rejected it, and it was not possible to include such a specific process in the Protocol. Still, developing countries may nevertheless, as a prerequisite for engaging

in emissions trading, voluntarily assume binding emissions targets through amendment to the annex of the Protocol that lists countries with targets.

Some developing countries believe – wrongly – that the developed world is asking them to limit their capacity to industrialize, reduce poverty and raise their standard of living. We have made clear that we support an approach under which developing countries would continue to grow – but in a more environmentally sound and economically sustainable way, by taking advantage of technologies not available to countries that industrialized at an earlier time.

The Kyoto agreement does not meet our requirements for developing country participation. Nevertheless, a significant down payment was made in the form of a provision advanced by Brazil and backed by the United States and the Alliance of Small Island States. This provision defines a “Clean Development Mechanism,” which embraces the U.S.-backed concept of “joint implementation with credit.” The goal is to build a bridge – with incentives – between developed, industrialized countries, and developing nations. This new mechanism will allow companies in the developed world to invest in projects in countries in the developing world – such as the construction of high-tech, environmentally sound power plants – for the benefit of the parties in both worlds. The companies in the developed world will get emissions credits at lower costs than they could achieve at home, while countries in the developing world will share in those credits, and receive the kind of technology that can allow them to grow with lower greenhouse gas emissions.

The Clean Development Mechanism has great potential, but developing countries will need to do more in order to participate meaningfully in the effort to combat global warming. In determining what developing countries ought to do, we should be aware that the circumstances of developing countries vary widely, along a kind of continuum. Some today are very poor; their greenhouse gas emissions are negligible and are likely to remain so for the foreseeable future. Others, whose greenhouse gas emissions are not substantial, are relatively well off. Some are poor on a per capita basis, but their greenhouse gas emissions today rival or surpass those of the most advanced industrialized nations. Still others have already joined ranks with the industrialized world in the OECD but have not yet fully

accepted the added responsibility for protection of the global environment that comes with their new status.

Any 'one-size-fits-all' approach to the 'meaningful participation of developing countries' and to satisfy the Byrd-Hagel Resolution is thus unlikely to prevail. We found in Kyoto that even among the industrialized countries it was necessary to recognize the individual national circumstances faced by those differently situated in order to reach agreement, notwithstanding our common purpose. Similarly, any uniform, inflexible approach to the 'meaningful participation of developing countries' is unlikely to prevail.

Recognizing our "common but differentiated responsibilities and respective capabilities" it will be necessary to develop an approach that provides for a meaningful global response to the threat of global warming, while acknowledging the legitimate aspirations of developing countries to achieve a better life for their peoples. To succeed, we will need to ensure that those responsible for a significant share of global emissions accept their responsibility to protect the global environment. We will also need to ensure that those who are able to do so contribute according to their capacities and stage of development.

The Global Environment Facility (GEF) plays a unique role in moving developing countries toward integrating climate change mitigation into their overall development processes. The GEF has committed \$732 million to projects in developing countries and the economies in transition for energy efficiency and cleaner energy supply, and it has leveraged over \$3 billion from other sources. Every project includes measures tailored to the conditions in recipient countries to promote stronger environmental policies and domestic investment in clean energy. This is a positive, constructive role for the GEF in the climate issue -- fully consistent with the Byrd-Hagel Resolution and numerous U.S. objectives related to energy, environment, and economic development.

Some Misperceptions

Before moving on, Mr. Chairman, let me address a few specific points on which I believe there may be some misperceptions. The first of these is

that the Kyoto Protocol will damage our national security or imperil the ability of our military to meet its worldwide responsibilities – this is not true.

We took special pains working with the Defense Department and the uniformed military before and in Kyoto to protect the unique position of the United States as the world's only superpower with global military responsibilities. We achieved everything they outlined as necessary to protect military operations and our national security.

At the Kyoto Conference, the Parties took a decision to exempt key overseas military activities from emissions targets, including exemptions for "bunker fuels" (those used in international aviation and maritime transport) and for emissions resulting from a wide range of multilateral operations, such as peacekeeping and humanitarian relief. This exempts from our national targets not only multilateral operations expressly authorized by the U.N. Security Council (such as Desert Storm or Bosnia), but also multilateral operations that the United States initiates pursuant to the U.N. Charter without express authorization (such as Grenada). Countries may also decide among themselves how to account for emissions relating to multilateral operations (e.g., U.S. training in another NATO country) without going through emissions trading.

Furthermore, in terms of domestic implementation of the Kyoto Protocol, the President recently determined that, to ensure defense readiness, he will propose that military operations and training be held harmless from any national emissions limits that might be adopted. Measures intended to promote reductions in emission of greenhouse gases will not impair or adversely affect operations and training or the ability to reallocate emissions resulting from overseas activities and bases. In summary, the Department of Defense is satisfied with the agreement reached in Kyoto.

Second, it has been suggested that the Protocol will create a super U.N. Secretariat that will threaten U.S. sovereignty and national decision-making through alleged intrusive verification procedures and prior approval of individual emissions trades. That is not so. The review process contained in the Protocol largely codifies the existing practice under the 1992 Framework Convention, to which the United States is a Party. Under the Protocol, small expert review teams will continue to visit Annex I countries

for brief periods to review implementation of the Convention and of the Protocol. The review process is intergovernmental, in that experts are nominated by governments. The review teams meet with government officials, and with others by invitation. In reviews under the Convention, including the review of our second national communication which took place here in Washington from April 20-24, 1998, the teams have met with Congressional staff, representatives of the private sector and representatives of environmental organizations – but only with their concurrence. Any other visits, such as site visits, would take place only if approved by the host country and, if the private sector is involved, the relevant interested persons. To date under the Convention, no site visits have taken place.

In addition, let me be unmistakably clear – while trading rules must be established internationally to have emissions trading work – as our SEC must set rules for equity trading – we will not accept nor do we anticipate an approach that would require prior approval of individual emissions trades by an international body. Trading will be done between interested nations and their companies, based on market principles.

Concerns have also been raised that the Protocol is flawed, on the one hand because it will threaten U.S. sovereignty by dictating national decisions on implementation and, on the other hand, because it lacks mechanisms to verify compliance. In fact we believe that the Protocol strikes an appropriate balance between these two extremes.

The United States firmly opposed mandatory, harmonized policies and measures that would be imposed upon us in order to reach our target. We prevailed. The Protocol leaves Parties entirely free to decide how best to meet their targets based on national circumstances.

At the same time, we could not tolerate a free-for-all where Parties might or might not meet their commitments, particularly given the conscientious way the United States meets its international obligations. As a result, the Protocol calls for national measurement of emissions, detailed reporting, and in-depth reviews – on an intergovernmental basis.

The one area where we believe more work needs to be done is in identifying appropriate consequences for non-compliance; the Protocol

provides for elaborating such consequences, with any binding consequences to be done in amendment form, so that the Senate would have the opportunity to approve them.

Finally, some have suggested that the Protocol will result in a huge government transfer of foreign aid to Russia in which we will give away taxpayer money with no leverage on Russian policies with these funds. This also is not true. Under the Protocol's emissions trading provisions, we envision that U.S. private sector firms may choose to purchase international emissions credits in order to meet their emissions obligations. Indeed, the private purchase of emissions credits is one of the crucial ways to achieve cost-effective emissions reductions for U.S. firms.

As with any market transaction, purchases of these credits will have to comply with all U.S. legal and regulatory requirements. In addition, U.S. firms interested in international investment will have an incentive to ensure that other countries meet the international standards for adequate monitoring and reporting of their emissions of greenhouse gases. At the same time, Russia will have significant incentives to use the revenue generated to invest in the most modern, climate-friendly plants and equipment so that, as its economy recovers, it continues to produce emissions credits that it can sell on international markets. But of course, Russia will decide how best to meet its own commitments.

Framework for Action

Where do we go from here? While historic, the Kyoto Protocol is only one step in a long process. It is, in essence, a framework for action, a work in progress, and a number of challenges still lie ahead.

Rules and procedures must be adopted to ensure that emissions trading rights, joint implementation and the Clean Development Mechanism operate efficiently and smoothly. The Kyoto Protocol establishes emissions trading, but leaves open the specifics of operations. We will work hard to ensure that the rules and procedures adopted enable emissions trading, joint implementation and the Clean Development Mechanism to work smoothly and efficiently, thereby encouraging the private sector to engage.

We will also work closely with our industries to be sure they are satisfied that the emissions trading system which is developed is as efficient and effective as possible to meet their needs.

Most significant, we must work to secure the meaningful participation of key developing countries. We must be creative in initiating bilateral agreements. We have made a promising start with an agreement we reached with China during last fall's Summit and in our continuing discussions since then.

Another example is the Joint Statement of President Clinton and President Frei of Chile, issued in conjunction with the recent Summit of the Americas in Santiago. There, the two presidents:

- Expressed their firm support for the principles and objectives of the Kyoto Protocol and their conviction that its market mechanisms will be a great help in mobilizing private sector resources to reduce greenhouse gas emissions;
- recognized the potential of the Clean Development Mechanism to become an important resource for attracting private sector initiatives and investment in clean energy technologies, energy efficiency, forests and other activities that reduce, absorb or eliminate greenhouse gas emissions;
- agreed that all countries should be involved in global efforts to address climate change, taking into account their common but differentiated responsibilities;
- noted that developed countries must set the example in reducing greenhouse gas emissions as a matter of priority, while developing countries should participate meaningfully in efforts to address climate change, for example, by taking on emissions targets whenever possible; and
- committed their governments to work together on these issues in preparation for the next conference of the parties to

the Framework Convention on Climate Change this November in Buenos Aires.

We are also using regional and multilateral fora to achieve our objectives -- such as the recent Summit of the Americas in Santiago, Chile, in the Asian Partnership for Economic Cooperation (APEC) process, the President's recent trip to Africa, and the upcoming G-8 Summit in the United Kingdom.

As Secretary Albright said in her Earth Day speech, we are mounting a full court diplomatic press to bring developing nations into a meaningful role in helping solve the global climate challenge. We will accept nothing less, nor would we expect the United States Senate to do so. As the President has indicated, the United States should not assume binding obligations under the Protocol until key developing countries meaningfully participate in meeting the challenge of climate change. Although the Kyoto Protocol was an historic step forward, more progress is necessary with respect to participation of key developing countries. It would be premature to submit the treaty to the Senate for its advice and consent to ratification at this time.

The Administration also plans to continue to work with the international financial institutions to promote market-based energy sector policies in developing countries that will help reduce developing country greenhouse gas emissions. Multilateral development bank policies, including those of the Global Environment Facility, strongly influence international lending and private capital flows for energy, industrial and transportation investments. Policies that favor market pricing, privatization, clean technologies and environmentally-friendly approaches will make implementing the Kyoto Protocol easier and will speed the growth of markets for new technologies that help reduce emissions in developing countries. We will work with the international financial institutions themselves -- from the World Bank to the regional development banks -- and with other countries, especially developed countries, to achieve these goals in the coming years.

The Kyoto agreement does not solve the problem of global warming, but it represents an important step in dealing with a problem that we cannot

wish away. If we fail to take reasoned action now, our children and grandchildren will pay the price.

Mr. Chairman, before turning briefly to our domestic efforts, let me note two other key elements in this equation – the contributions that the United States provides to carry out work under the U.N. Framework Convention on Climate Change and in the Intergovernmental Panel on Climate Change (IPCC), as well as the contributions that we make to the Global Environment Facility (GEF). For FY 1999, the President has requested \$314 million for the International Organizations and Programs Account, a level that represents a 6.6 percent increase over FY 1998. This amount includes \$8 million for the Climate Stabilization Fund which supports the Framework Convention and the IPCC. Parties to the Convention have much work ahead of them, as I have already noted. In addition, the IPCC has now embarked on its Third Assessment Report of Climate Change, scheduled for completion in late 2000 or early 2001. These funds are vital to ensuring U.S. leadership in both of these organizations and to ensuring that our views and the work of our scientists are taken fully into account.

In addition, the President has requested \$300 million to meet our past and current pledges to help fund the Global Environment Facility (GEF). The GEF helps developing countries act to protect the global environment in several key focal areas including international waters, biodiversity, climate change and depletion of the stratospheric ozone layer. As I noted earlier, if we want to bring developing countries on board with real commitments to limit greenhouse gas emissions, we need to demonstrate that we are a reliable partner by supporting their concrete efforts with reliable resources. At this point, our GEF shortfall damages U.S. credibility in promising to help developing countries meet the climate change obligations we are urging that they undertake. I would therefore urge the Congress to fund fully our \$300 million request, to meet our current pledge and also clear our substantial shortfall of nearly \$200 million.

President's Climate Change Technology Initiative

In his State of the Union address, President Clinton said that global warming is "the gathering crisis that requires worldwide action." We need to

begin now to launch the sensible, cost-effective efforts that will help us avoid the high future cost of inaction.

The President last October outlined a three-stage approach to addressing climate change at home. The first stage consists of immediate actions to stimulate development and use of technologies that can minimize the cost of meeting U.S. goals in reducing greenhouse gas emissions. Stage two will review options created through ongoing technology development and lead to detailed plans for a domestic, market-based permit trading system for carbon emissions. Stage three will begin to implement a market-based emissions-trading system.

As a first installment on this plan, President Clinton announced in his State of the Union message his proposal for a \$6.3 billion Climate Change Technology Initiative over five years to cut U.S. greenhouse gas emissions -- \$1.3 billion higher than the President announced in his initial plan in October. This vigorous initiative calls for tax cuts coupled with research and development (R&D) to take cost-effective, practical steps that will position us well to meet the challenge we face early in the next century.

This initiative consists of two parts -- \$3.6 billion in tax credits for energy-efficient purchases and renewable energy, and \$2.7 billion in new R&D spending over five years.

The tax package includes tax credits of \$3,000 to \$4,000 for consumers who purchase advanced technology, highly fuel efficient vehicles. It provides a 15 percent credit (up to \$2,000) for purchases of rooftop solar electricity and hot water systems to provide incentives for meeting the Million Solar Roofs goal. It also includes a 20 percent credit (subject to a cap) for purchasing energy-efficient building equipment, a \$2,000 credit for purchasing energy efficient new homes, extension of the wind and biomass tax credit, and a 10 percent investment credit for the purchase of combined heat and power systems.

The R&D component covers the four major carbon-emitting sectors of the economy (buildings, industry, transportation and electricity), plus carbon removal and sequestration, Federal facilities, and cross cutting analysis and research. Examples of this R&D effort include the Partnership for a New

Generation of Vehicles (PNGV), a government-industry effort to develop affordable cars that meet all applicable safety and environmental standards and get up to three times the fuel efficiency of today's cars. In 1999, the President's budget for PNGV is \$277 million, up from \$227 million appropriated for 1998. Our PNGV effort is clearly paying off – the developments about higher mileage cars announced by the Big Three last month were assisted by research supported under PNGV. It is exciting to see our U.S. automakers already planning for the cars of the future, not as pipe dreams but as achievable greenhouse gas friendly products.

As General Motors Chair and CEO John F. Smith said recently in announcing GM's plans to step up research spending and focus on bringing new products to market, "No car company will be able to thrive in the 21st century if it relies solely on internal combustion engines."

Similar government-industry efforts are proposed to develop cleaner, more efficient diesel engines for both light trucks and heavy trucks. The R&D effort also includes expanded research partnerships for key renewable technologies such as wind, photovoltaics, geothermal, biomass, and hydropower to accelerate price reductions and improve performance. The President's 1999 budget proposes a \$100 million increase in appropriations for solar and renewable energy R&D – a 37 percent increase over 1998.

We hope that the Congress will view the President's initiative favorably and appropriate the funds and enact the tax incentives that he has requested. We look forward to working with you to put the President's proposals into action.

The President and his Administration are committed to working with you in the Congress, both to realize the potential of the Climate Change Technology Initiative and to craft the ongoing U.S. approach to climate change. The United States has the power to lead the global effort, and Congress holds the key. What is done or not done today will determine the kind of world we will leave to future generations and the conditions of life they will face.

Before concluding, let me also briefly address a concern that some have raised in recent weeks – namely that the Administration is somehow

seeking to implement the Kyoto Protocol before submitting that treaty to the Senate for its advice and consent. This is not so.

We are pursuing a host of actions as a matter of good environmental and good energy policy -- including efforts to promote energy efficiency, to increase the use of renewable forms of energy, to improve air quality, and to develop new technologies. Our efforts in these areas predate the Kyoto Conference last December and the Kyoto Protocol adopted there. They represent a prudent effort to do things today that make sense, that will be good for business and good for our environment.

Last October, the President announced his intention to proceed with the Climate Change Technology Initiative -- whether or not there was a successful outcome in Kyoto -- because the development of sound energy policies is in our national interest. The President mentioned this initiative in his State of the Union message and included it in the Administration's budget proposals to the Congress. We have acted openly, transparently and in a spirit of full cooperation with the Congress.

Let me also note that United States has existing obligations under the United Nations Framework Convention on Climate Change to adopt policies and measures to mitigate climate change. The Framework Convention was negotiated during the Bush Administration, and the United States Senate overwhelmingly gave its advice and consent to the Framework Convention in 1992. To meet our commitments under the Framework Convention, President Clinton launched the Climate Change Action Plan in October 1993 which contained nearly 50 specific measures and programs. And we continue to search for cost-effective ways to act responsibly in the face of this most significant threat to our global environment.

What we have not done -- what we will not do -- is take steps that would require mandatory action at the macro-economic level or with respect to specific sectors of our economy in order to reach the Kyoto target before the President has obtained the advice and consent of the Senate.

Sustained Effort Required

Mr. Chairman, I have mentioned that Kyoto produced a framework for future action, and I have listed a number of the steps that await us. If we delay responding to climate change, the cost of responding in the future will rise. It is crucial now to develop new technologies to avoid future costs.

Coming to grips with the threat of global warming is no small task. We must tackle it in a vigorous, sober and determined manner, understanding that it represents a challenge but also an opportunity. And as we have always done in the face of global challenge, we must assume the responsibilities of American leadership.

Thank you.

**Statement of Kathleen A. McGinty, Chair
Council on Environmental Quality
Executive Office of the President
Before the
House Science Committee
February 4, 1998**

Mr. Chairman, and Members of the Committee:

I am pleased to be here today to describe the agreement reached in Kyoto and our activities, both at home and abroad, to follow-up on the substantial progress achieved in these negotiations. The Kyoto Protocol is an enormous step forward in what will undoubtedly be a long term global effort to safeguard our earth's climate system from unprecedented human-induced harm and to protect our children and grandchildren from the dangerous consequences that could unfold if we fail to heed the warnings from the world's leading scientific experts.

I am very pleased to report that we made tremendous progress in putting into place most of the key building blocks for a sustainable, market-based system for achieving reductions in greenhouse gases. All Americans can be proud of our achievement: U.S. leadership made the difference; the power and integrity of U.S. ideas won the day. On behalf of the President and Vice-President, I would like to commend the skills, perseverance, and dedication of the United States delegation at Kyoto. Nine agencies were represented in Kyoto. Led by our very able State Department team and Under Secretary Eizenstat, the U.S. delegation served our country well and honorably.

Our efforts following up on Kyoto are directed at achieving further progress in obtaining meaningful participation by developing countries and in implementing the President's plan to harness market forces at home and abroad to enhance energy efficiency, environmental quality, and economic prosperity.

Because this committee's jurisdiction focuses on science, I thought it would be useful, before discussing the outcome in Kyoto, to focus briefly on two noteworthy scientific developments that occurred at the end of last year. Based on extensive ground-based measurements, the National Oceanic and Atmospheric Administration (NOAA)-- our lead national agency for collecting weather statistics -- reported that 1997 was the warmest year based on records that date back over a century. While the temperature in any one year cannot prove or disprove anything about global warming, this year's statistics, further confirmed by two other sources of information about global surface temperatures (the Goddard Institute for Space Studies/NASA and the researchers at East Anglia University in the U.K.), follow a clearly emerging pattern. The nine warmest years of the century have occurred in the past 11 years. This pattern of warm years led one of NOAA's leading climate scientists to issue a statement that reaffirms a key conclusion contained in the latest international scientific assessment prepared by

THE KYOTO PROTOCOL

2

02/11/99 11:00 FAX 202-400-4174

Even with the complexities of climate science and the challenge of crafting policy solutions, we found in Kyoto a new spirit of resolve, a new openness to market-based approaches, and a new hope for global cooperation.

Key elements of the U.S. proposals that were adopted as elements of the Kyoto Protocol include the following:

-- Legally binding emission targets: The agreement establishes legally binding targets for developed countries. By advancing from the existing non-binding aim contained in the Framework Convention to a binding target, we believe efforts to address global warming will take on greater significance and commitment. Moreover, our insistence on a legally binding regime encouraged other countries to think more soberly about their reduction proposals. Ultimately, the U.S. agreed to a target of a 7% reduction from baseline levels. Given the changes in the definition of the baseline for the three long-lived chemical compounds (HFCs, PFCs and SF6) from 1990 to 1995 combined with a change in the way sinks are accounted for in the baseline, the actual reduction required in the U.S. is no more than 2-3% more than the President originally proposed as the U.S. negotiating position.

-- Budget periods spanning five years: The U.S. proposal for a five-year budget period was adopted rather than the single-year target proposed by others. Allowing nations to average over five years increases flexibility and lowers costs by smoothing out any short-term variations in emissions based on fluctuations in energy prices, economic activity, business cycles, or weather.

-- First budget period beginning in 2008 and ending in 2012: The U.S. proposal for a budget period beginning in 2008 was accepted. This provides a full decade for redirecting efforts toward greater energy efficiency, allowing for substantial changes in investment decisions and turnover in capital stock. Other proposals calling for reductions to begin as early as 2003 were rejected. Action during this time period appears critical to redirecting emissions toward a pathway that allows for stabilization of greenhouse gases at a doubling of prehistoric levels.

-- Market-basket approach including all 6 gases: The U.S. proposal held sway on including all 6 major greenhouse gases in the calculation of a target. Moreover, we secured trading among these gases so that the lowest cost reductions can be secured.

-- Inclusion of sinks: The U.S. also urged, and the Parties agreed, to allow actions that capture and sequester greenhouse gases (sinks) to be included as part of meeting the target. Carbon sequestration, through activities such as reforestation programs, offers potentially attractive low cost opportunities to reduce net greenhouse gas emissions.

-- International Emissions Trading: The U.S. secured acceptance of emissions trading as a flexible, market-based approach to lowering the costs of meeting a target. While the U.S. has experience with emissions trading in the acid rain and lead phase-out programs, it was a new concept to the international community and incorporated for the first time in the Kyoto

agreement. A number of studies have suggested that the costs of compliance can be significantly reduced if flexible implementation is permitted.

-- Clean Development Mechanism: Under this innovative provision, developed countries will be able to use certified reductions from project activities in developing countries to contribute to compliance with greenhouse gas reduction targets. This provides both a mechanism to secure low cost reductions throughout the world and a powerful economic incentive to lead developing countries toward more climate-friendly technologies. This represents an important avenue for developing country actions to reduce emissions in cooperation with U.S. private sector firms that have the technology, resources and know-how to make such reductions in ways that save energy, reduce emissions and improve performance. This provision effectively embodies the U.S. proposal for joint implementation with credit for activities in developing countries. It also provides, again at U.S. insistence, an incentive for early action by permitting credit for reductions that occur beginning in the year 2000.

-- Emissions from the Military: The U.S. obtained agreement on its proposal for an exemption for emissions from multilateral operations pursuant to the United Nations charter. This decision will ensure that nations do not hold back from participating in humanitarian, peacekeeping and other operations due to concerns about greenhouse gas emissions.

NEXT STEPS -- INTERNATIONAL ACTIVITY

While the Kyoto agreement secures major elements that the U.S. sought to ensure such as flexible, market-based mechanisms for addressing concerns about global warming, future negotiations will still need to address several important issues. The Parties now move forward with working group meetings scheduled for June and the next meeting of the Parties to the Climate Convention scheduled for November in Buenos Aires. Issues that will be addressed at that and subsequent meetings include the following:

- guidelines for implementing the international emissions trading provisions included in the Protocol;
- guidelines for implementing the clean development mechanism;
- further refinement of how sinks will be treated;
- participation of developing countries; and
- additional provisions related to compliance and enforcement.

NEXT STEPS -- DOMESTIC ACTIONS

In his State of the Union message, and just last Saturday in his radio address, the President described his proposed tax cut and technology initiative aimed at jump-starting efforts to enhance our nation's energy efficiency and economic competitiveness. This program was laid out in detail on Monday with the release of the President's Budget. It targeted \$6.3 billion over the next five years -- will provide incentives for our industry, businesses and consumers to make and purchase

more energy efficient products. It challenges the innovative abilities of the private sector and helps ensure that those firms that succeed in developing energy saving products will have a substantial market in which to sell those products. For consumers, it provides a double bonus. First it helps reduce the initial costs of purchasing energy saving products. Second, throughout the lifetime of the product, consumers will benefit from reduced energy costs. The President's 1999 Budget includes \$3.6 billion over five years in tax credits aimed at encouraging broader use of existing energy saving technologies and spurring further innovations. It also includes \$2.7 billion in new research and development investments to ensure that innovative greenhouse gas reducing products continue to flow through the pipeline and into the market-place in the coming years.

Examples of specific provisions contained in the President's budget include the following:

- Tax credits for highly fuel efficient vehicles: This credit would be \$4,000 for each vehicle that gets three times the base fuel economy for its class beginning in 2003. A credit of \$3,000 would be available beginning in 2000 for vehicles that get double the base fuel economy for its class. These credits would be available to jump start these markets and would be phased out over time.

- Tax credits for energy efficient equipment: These credits (all of which are subject to caps) would include a 20% credit (subject to a cap) for purchasing certain types of highly efficient building equipment, a 15% credit for the purchase of solar rooftop systems, and a 10% credit for the purchase of highly efficient combined heat and power systems.

- Research and development support: Additional resources are provided for key areas of renewable energy and for carbon sequestration. Activities related to the Partnership for a New Generation of Vehicles include expanded research in fuel cells, batteries and ultra-clean combustion engines. Two new partnerships are proposed for heavy trucks and light trucks, including sport-utility vehicles.

These budget proposals implement one of the key commitments made by the President in his October 22nd speech at the National Geographic Society. In that speech the President also pledged: that the federal government, as the largest user of energy, would take the lead in enhancing our efforts at improving energy efficiency; that we would work closely with the private sector in developing voluntary programs to reduce emissions; that we would grant early credit for reductions that occur prior to a binding target; and that we would help shape utility restructuring in ways that contribute to reductions in greenhouse gas reductions. We are working today to make all of these commitments real.

Beyond the President's budget proposals, a number of encouraging developments have taken place in both the public and private sectors in the short time since Kyoto. Let me briefly mention four of them today.

1. **Fuel Efficient Vehicles:** At the recent automobile show in Detroit, General Motors (GM) announced four passenger hybrid electric and fuel cell vehicles that can achieve fuel efficiency of up to 80 miles per gallon -- production prototypes of which could be available in 2001 and 2004. Ford also unveiled a prototype of a mid-size high efficiency sedan that achieves 63 miles per gallon using an advanced diesel engine. Ford also plans to develop hybrid electric and fuel cell versions of this prototype. Chrysler unveiled its full-size experimental hybrid electric vehicle with a projected 70 miles per gallon fuel economy. These technological advances were made possible through the efforts of the Partnership for a New Generation of Vehicles between the Administration, U.S. auto companies, and their suppliers.

2. **Compressed Air Challenge:** Air compressors represents about 3% of total industrial electricity use and 1% of total U.S. electricity consumption. In mid-January, DOE and major equipment manufacturers announced a new agreement aimed at significantly enhancing efficiency in this sector. Under the agreement, changes in equipment and operating practices are anticipated to reduce energy use in this category by 10% by 2010 at a cost savings of \$150 million per year while reducing greenhouse gases by 700,000 metric tones of carbon.

3. **BP Solar Opening:** Last Friday, BP Solar opened its first manufacturing plant in the United States. Located outside San Francisco, the Vice President flipped a switch to start the plant. This facility will produce a new generation of thin film photovoltaic cells. Spurred by DOE's recently announced Million Solar Roof Initiative, planned plant expansions and openings by other solar cell manufacturers, as well as the President's budget request for enhanced funding for renewable technologies, demonstrate that efforts to increase market penetration based on harnessing the sun's energy are now making significant advances. In fact, the Vice President was able to announce that the private partners in the Million Solar Roofs Initiative have already announced plans for well over half the solar panels needed to get to our goal--a full ten years early.

4. **VCR/TV Energy Star Program:** TV and VCRs represent one of the fastest growing sources of electricity demand. Consumers spend over \$1 billion annually to power VCRs and TVs that are switched off. In early January the Vice President announced a pathbreaking partnership between EPA and the major manufacturers of these electronic goods. The program is quite ambitious with a goal of achieving up to a 70% reduction in energy use when the equipment is turned off without sacrificing product quality, utility or increasing costs. The average household could cut its energy bills by 30% or \$400 per year by switching to the full line of Energy Star products.

These examples further underscore the potential for energy and cost saving opportunities to reduce our emissions of greenhouse gases. The Administration is working on a more detailed economic analysis of the impact of the targets reached in Kyoto. Council of Economic Advisers Chair Janet Yellen will be prepared to discuss the analysis at a hearing next week before the Senate Foreign Relations Committee.

In sum, the Kyoto Protocol represents a significant diplomatic achievement for the United States and a key contribution to the critical effort to safeguard our children from the effects of potentially severe climatic disruption. At the same time, this effort is a work in progress. Much remains to be done if we are fully to seize the environmental and economic benefits of action on this pressing issue. We in the Administration look forward to working with Congress in the months and years ahead to further our efforts to address the risks associated with global warming in a way that enhances our environmental and economic well being.

I welcome the opportunity to visit with you today and look forward to our continued dialogue and exchange.

R
A
JF
JY

BUREAU OF ECONOMIC AND BUSINESS AFFAIRS

FACSIMILE COVER SHEET

Date Sent: 2/12/98 Number of Pages: 18
(Including Cover Sheet)

Time Sent: _____

EB FAX #: 202-647-5713 Verification #: 202-647-5973

TO:	NAME	AGENCY	PHONE #	FAX #
	<u>Joe Aldy</u>	<u>CEA</u>	<u>395-1455</u>	<u>395-6870</u>
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____

FROM: Victoria Greenfield Phone #: 647-6985SUBJECT: Testimony/Hearing : Part ICOMMENTS: Please share with Janet/Jeff, as
appropriate - Janet asked for
a copy (or my notes) yesterday &
may be especially interested?

LEGI-SLATE Report for the 105th Congress Thu, February 12, 1998 11:29am (EDT)

Search of FNS Q&A Testimony to Find 1 transcript...

With reference in text to 'EIZENSTAT CLIMATE CHANGE'

..

2/11/1998 -- Copyright (C) 1998 by Federal Information Systems Corporation
Senate Foreign Relations Cmte Hearing - Q&A: Stuart Eizenstat, Undersec of
State, and Janet Yellen, Chrmn, Council of Economic Advisers - Global
Climate Change Agreement [Transcript 980420042, 1737 Lines]

HEARING OF THE SENATE FOREIGN RELATIONS COMMITTEE

SUBJECT: KYOTO GLOBAL CLIMATE CHANGE AGREEMENT

CHAired BY: SENATOR JESSE HELMS (R-NC)

WITNESSES:

STUART EIZENSTAT, UNDERSECRETARY OF STATE FOR ECONOMIC, BUSINESS AND
AGRICULTURAL AFFAIRS

JANET YELLEN, CHAIRMAN, WHITE HOUSE COUNCIL OF ECONOMIC ADVISERS

419 DIRKSEN SENATE OFFICE BUILDING

WEDNESDAY, FEBRUARY 11, 1998

10:20 A.M. (EST)

SEN. CHUCK HAGEL (R-NE): (Sounds gavel.) Good morning. Mr.
Secretary, welcome. Nice to have you.

MR. EIZENSTAT: Thank you.

SEN. HAGEL: Not unlike occurrences up here we got started -- are
getting started late because of a vote, so we appreciate very much
your patience. Senator Helms is in another meeting -- has asked me to
get going. And we know your time is valuable, and our colleagues are
anxious to talk a little bit about this issue. So we are grateful
that you'd come up.

It could be worse, Mr. Secretary -- you could be dealing with
Iraq. This is just an easy subject this morning -- climate control.

I'm going to begin with my statement, and then would ask any of
my colleagues for additional comments, and then we'll get started with
your statement, Mr. Secretary, and questions.

In the last session of Congress, as you know, Mr. Secretary, I
chaired three subcommittee hearings in advance of the Kyoto
conference. We now have a finished product from Kyoto. The
administration refers to this finished product, the Kyoto protocol, as
a, quote, "work in progress." This leaves people with the mistaken
impression that the treaty remains under negotiation, and that
objectionable parts of the treaty can be negotiated away before it is
submitted to the Senate for advice and consent. This is not the case,
I think as you know. This treaty cannot be amended until it goes into
force, and even then only by a three-quarters vote of all countries
that have become party to the protocol. Developing countries which
are not bound by any emissions limit in this protocol make up more

than three quarters of the world's nations. Certainly later actions of subsequent U.N. conferences might add to the protocol. It might expand U.N. regulations and interpretations of how the treaty would be carried out. Later actions might define compliance measures and enact U.N. sanctions against countries that do not meet their legally binding commitments under the treaty.

But what is in the protocol today, including its many objectionable provisions, will not change prior to it coming into force -- that's assuming it ever comes into force.

This treaty requires a seven percent below 1990 level emissions cut for the U.S. during the years 2008 to 2012. In real terms this would be a devastating 40 percent reduction in projected emissions for the United States. It is inevitable that this extreme cut in energy would cause serious harm to our economy. Furthermore, developing countries, like China, Mexico, South Korea, and 131 other nations, are totally exempt from any of these new restrictions placed on industrial countries. The later change to the treaty requires, as I mentioned, a three-quarters vote after the treaty has already gone into force.

Last July the Senate went clearly on record by passing, 95 to zero, Senate Resolution 98, the Byrd-Hagel resolution. Even more significant than the 95-to-zero vote is that the bipartisan resolution had 65 co-sponsors. This resolution was very clear, as you know. The resolution called on the president not to sign any Kyoto treaty or agreement unless to minimum conditions were met. It said the president should not sign any treaty that either caused serious harm to the U.S. economy, or that did not place legally binding obligations on the developing countries to limit or reduce their emissions in the same compliance period as that required for industrial nations. Nowhere does the resolution mention the administration's nebulous standard of achieving, quote, "meaningful commitments by developing countries," end of quote.

As our colleague, and co-author of Senate Resolution 98, Senator Robert Byrd, noted in his floor state of two weeks ago, the Kyoto protocol fails -- fails to meet either of the requirements of Senate Resolution 98. It fails to meet the minimum criteria set unanimously by the United States Senate. In his floor statement, Senator Byrd called on the president not to sign this treaty. And I agree with Senator Byrd.

I will not now go into all the details on why this particular protocol is so seriously flawed. But they can be grouped in five general areas. They are: no developing country commitments, number one; number two, economic harm to the United States economy; number three, fair treatment for U.S. interests; number four, impact on our national sovereignty; and, number five, impact on our national security. I expect to ask those questions as we get later into the hearing.

This returns us to the question of whether the president will choose to sign this treaty when it is open for signature at the United Nations on March 16th of this year; and, if he does, whether he intends to send it -- send this treaty, if he signs it, to the Senate this year.

I hope, Secretary Eizenstat, you will be able to give us a clear answer to these questions and others. The president claims that the treaty again, quote, "is a work in progress." If so, it makes no sense to sign a flawed treaty, thereby giving our future leverage and negotiating strength away. This would be compounding the president's and vice president's past mistakes. These include agreeing to the Berlin Mandate, and publicly calling on our negotiators in Kyoto to

show increased flexibility, which the vice president did when you and your team were trying to hold to the president's own position that he clearly enunciated last October.

The president's position included insistence that emission cuts not go below the 1990 level and the so-called, quote, "meaningful participation of developing countries." I'll be very interested in understanding from you, sir, what precisely was it that the administration means and does mean by "meaningful participation of developing countries," since we gave it away in Kyoto. But if the president believes this treaty is good enough to sign, it should be good enough to submit to the Senate for open, honest debate. The American people have a right to know exactly what the president has obligated them to do under this treaty. There is also a document known as the United States Constitution. The U.S. Senate has a constitutional responsibility to provide its advice and consent for all treaties agreed to by the president. Until this treaty is ratified by the Senate there should be no action taken by the administration to implement obligations under the treaty through executive order, regulation or budgetary fiat. I look forward to receiving your comments on these points, as well as others.

With that let me call now, Mr. Secretary, on my colleagues for any statements they wish to submit. Secretary Robb -- I mean, Senator Robb. (Laughter.)

SEN. CHUCK ROBB (D-VA): Sometimes I'm not sure. Thank you, Mr. Chairman. Secretary Eizenstat thank you for coming today. I have known you for many years and have a very high regard for your skills in a variety of different areas, and certainly you are unsurpassed as a negotiator. You've just been given a fairly tough list of questions to respond to. I regret I have two other hearings -- one in Intelligence and one in Armed Services that are taking place at the same time. But I wanted to hear your opening statement, and I hope you will be able to address as many of the concerns that were raised by Chairman Hagel as possible.

I was one of the co-signers of the letter that indicated that we thought at the very least we ought to be concerned about serious adverse economic impact on our own economy, and particularly participation in some form by the developing countries. I am -- must say that those concerns have not yet been addressed to my satisfaction, but I commend you on the negotiations with a very difficult topic with disparate views given to you from many participants in the United States. And I look forward to your testimony here. I may have some follow-up questions for the record later on, but at the very least I thank you for what you have attempted to do, which will probably provide little comfort and not a great deal of understanding at this point. But I recognize the tasks you've undertaken. Thank you, Mr. Chairman. I look forward to Secretary Eizenstat's opening statement.

SEN. HAGEL: Senator Robb, thank you.
Senator Grams.

SEN. ROD GRAMS (R-MN): Thank you very much, Mr. Chairman. I would like to recognize your outstanding efforts. And you have spoken with authority and conviction on behalf of not only the U.S. Senate, but also I believe for the American workers, for families and taxpayers as well.

And first I would like to point out to the members of this committee and to Mr. Eizenstat that the Clinton administration and the Department of Energy just 11 days ago missed their legal and contractual deadline to begin taking possession of spent nuclear fuel

from commercial nuclear plants across the country. Now, what does this mean and how does it apply to today's hearing? Well, the DOE's failure to take spent nuclear fuel means that nuclear power plants across our country will have to begin shutting down permanently because of an inadequate storage space for the spent fuel. And, as you may know, nuclear power has been responsible for 90 percent of all the cuts in carbon dioxide emissions from U.S. electricity production since 1973.

As more and more nuclear plants shut down in the United States, more and more are being built across Europe. France is leading the way. And developing nations such as China are about to significantly increase their use of nuclear power, as well as Japan. Meanwhile here at home, due to the rhetoric of extremists, and also the lack of a clear energy policy, we are hamstrung, unable to act because of politics, and not because of science or technology. And I cannot stress enough how important it is to recognize that the failure of this administration to address nuclear waste storage will lead to even greater economic hardship as a result of this treaty.

And we simply cannot meet our energy needs into the next century by signing onto treaties which legally bind us to unreasonable reductions in energy output while at the same time we eliminate cleaner energy by closing down nuclear power plants. Europe recognizes this, as do many other nations with whom we have to compete for jobs and industry and markets. They know we agree to a treaty which works for them and hurts us. But who does it really hurt? Not Bill Clinton, and certainly not Al Gore. It puts off any real political problem for them until well after they are out of office. This treaty hurts moms and dads, grandmas and grandpas. It significantly will impact senior citizens on a fixed income. It takes an enormous swipe at miners, loggers, truckers, farmers -- anyone who has any work in energy-intensive professions. It means less income for families that are struggling to survive and educate their children. It means Americans may have to face a challenge to their way of life and their standard of living. If that's what this treaty hold for Americans, it cannot and will not be supported by this committee or the United States Senate.

I think this body made that point very clearly when we voted unanimously last summer on the Byrd-Hagel resolution. I only regret that this administration saw that vote as a mere suggestion, rather than acknowledging the clear and unambiguous message that it contained. And I'm going to be listening very closely today to hear what direction was given at the Kyoto negotiations by Vice President Gore. I want to know how the administration intends to meet the demands of this treaty. I would like to know how you will pursue developing nations' participation later this year in Argentina. And I would also like to know today, as does everyone else on this committee, when this treaty will be presented to the Senate for ratification. So, again, thank you, Mr. Chairman, for your efforts for holding today's hearings. I am looking forward to the discussion and to the quick delivery of this treaty to the Senate for ratification procedures.

SEN. HAGEL: Senator Grams, thank you.

Mr. Secretary, welcome again, and please proceed.

MR. EIZENSTAT: Thank you, Mr. Chairman. It's a pleasure to be here with you and with Senator Robb and Senator Grams. I appreciate the participation you personally made in going to Kyoto, and the amount of time that you and Senator Baucus and Chafee and Enzi, and Kerry and Lieberman spent on this issue.

Rarely has there been an environmental issue more complex and important, and rarely has there been a greater need for the executive branch and Congress to work closely together. I'll divide the summary of my testimony, which I assume the full version can be submitted for the record, into four parts: First, a short discussion of the science; second, the key features of the protocol; third, efforts to correct misperceptions; and, fourth, a brief review of the president's own climate change technology initiative.

But first on the science. Human beings are changing the climate by increasing the global concentrations of greenhouse gases. Over the last century, greenhouse gases have been released to the atmosphere far faster than natural processes can remove them. There is no ambiguity in the data. In this first chart, the actual data is shown in blue from ice cores taken from scientists, and the orange indicates also actual data taken from the atmosphere in Hawaii.

What this dramatizes quite clearly is that the concentrations of greenhouse gases have grown by some 30 percent, and especially since 1960. You can see the increasing slope of these concentrations in the orange from 1960 to the present date. That slope will increase and continue to increase dramatically.

The authoritative intergovernmental panel on climate change, representing the work of more than 2,000 of the world's leading climate change scientists from more than 50 countries, and representing the best synthesis of the science on climate change, made a number of important conclusions. Under a business-as-usual environment, concentrations of greenhouse gases could exceed levels not seen on the planet for 50 million years. The projected temperature increases of two to six and a half percent over the next hundred years could exceed rates of change not seen for the last 10,000 years. The chart which we have over here indicates both the increase in the concentration levels and in temperature, and it indicates the dramatic connection between concentrations of CO₂ and other greenhouse gases and the dramatic increase in temperatures which would occur if those are left unabated.

Increased temperatures are expected to speed up the global water cycle. It will lead to a drying of soils, and in some areas increased drought. Overall there will be an increase in precipitation. Sea levels are expected to rise between six and 37 inches over the next century. A 20-inch sea-level rise could double the global population at risk from storm surges -- and low-lying areas are particularly vulnerable -- much for example of coastal Louisiana and the Florida Everglades, as well as other parts of the world.

This would also affect human health. It would exacerbate air quality problems, and diseases that thrive in warmer climates, including malaria and yellow fever would increase. It is estimated that by the end of the next century there would be an additional 50 to 80 million cases of malaria each year if this climate change continues unabated.

It would also lead to a dramatic change in the geographic distribution of a third of the Earth's forests. Nine of the last 11 years are among the warmest ever recorded, and increases in floods and droughts are expected as global warming occurs.

Some have argued that we should wait. Science tells us that this is a recipe for disaster, and the concentration of greenhouse gases in the atmosphere will continue to rise each year. This is a problem that has developed over the course of a century, and it will take many decades to solve.

We should look, Mr. Chairman and members of the committee, at Kyoto as an insurance policy against the potentially devastating and irreversible impacts of global warming. If we act now, the premium on this insurance policy will be far more reasonable and less costly than if we delay in hope that the problem created by greenhouse gases will somehow go away. Indeed, it's like a life insurance policy whose costs grow significantly if we delay year after year in insuring ourselves.

In the case of global warming, we will not have a second chance. Failure to act could lead to irreversible consequences, and we'll be committing ourselves, our children and our grandchildren to a very different planet and they will never forgive us.

Second is the actual conference and protocol itself. It represents an important achievement, but it is a framework for action, not a finished product yet ready for Senate consideration. President Clinton and Vice President Gore established three major objectives for us to negotiate. And as a result of the negotiations, we achieved the first two and have made some progress, though not enough, on the third.

Our first objective was developing realistic targets and timetables among the developed countries. These had to be credible in terms of beginning to reduce the dangerous buildup of greenhouse gases and yet measured enough to safeguard US prosperity at home and competitiveness abroad.

In the end, we secured the key elements of the president's proposal. The US concept of multiyear time frames for emission reductions was selected, rather than a fixed single-year target. This will allow our industries greater flexibility to meet those targets. In addition, the time frame, 2008 to 2012, was the US time frame, not the earlier periods preferred by the European Union, Japan and others. This will help cushion the transition and the effect on businesses and workers.

We also got the concept of differentiated targets for key industrial powers, ranging from 6 to 8 percent below baseline levels, so that our competitors are taking on similar, and in some cases with respect to the European Union, deeper obligations than we are.

When changes in the accounting rules for certain gases and offsets for so-called sinks that absorb carbon dioxide are factored in, the level of efforts required of the United States is very close to the president's original proposal to return emissions to 1990 levels by 2008-2012, representing at most a 3 percent real reduction below that proposal and perhaps less.

An innovative proposal shaped in part by the United States allows certain activity like planting trees and good forest practices that absorb carbon dioxides called sinks to be used to offset emission requirements that industry will have. This will be a significant way of reducing costs and burdens and will be of particular benefit to the United States.

Also, as proposed by the US, the Kyoto Protocol covers all six significant greenhouse gases, even though the European Union and Japan fought until the last moment to cover only three.

Our second presidential objective was to make sure that countries could meet their obligations by flexible market mechanisms, rather than mandatory policies and measures, like carbon taxes favored by the European Union and many other developed countries. The Kyoto Protocol enshrines a centerpiece of this US market based approach the opportunity for companies and countries to trade emissions permits. In this way companies or countries can purchase less expensive

emissions permits from companies or countries that have more permits than they need. This is not only economically sensible but environmentally sound.

We have had a very positive experience with permit trading in our own acid rain program, which has reduced costs by 50 percent from what was expected. This has been confirmed by a number of experts in a recent Wall Street Journal article.

So the inclusion of these market-based mechanisms and the right to trade in the open market was a signal victory for the United States. Indeed, we went even further by achieving a conceptual understanding with several countries, including Australia, Canada, Japan, New Zealand, Russia and the Ukraine, to trade emissions rights with each other. This umbrella group could further reduce compliance costs.

Let me be very clear. The commitment we made in Kyoto would not have been made, could not have been made, were it not for the flexibility that these mechanisms give us that were also agreed to. Until we're satisfied with the rules and procedures yet to be established, the promise of Kyoto will never be realized.

Our third objective was the one that you, Senator Grams, Senator Robb and others alluded to, and that is to secure meaningful participation of key developing countries. This is obviously a concern that the Senate shares, as evidenced by last summer's Hagelburg (ph) Resolution. Global warming is after all a global problem, it requires a global solution, not only for the developed but also from the key developing countries. By 2025 the developed world will be emitting less greenhouse gases and the developing world will be emitting more than the total of the developed world.

We encountered significant resistance in Kyoto by some developing countries to meaningful participation in solving the global warming problem. Still, developing countries may as a prerequisite for engaging in emissions trading, which will be very valuable to them, voluntarily assume binding emissions targets through amendment to the annex of the protocol that lists countries with targets.

Some developing countries seem to believe wrongly that the developed world was asking them to limit their capacity to industrialize. We have made it clear that we support an approach under which developing countries would continue to grow but in a more environmentally sound and economically sustainable way.

Let me be very clear, the Kyoto agreement does not meet our requirements for developing country participation. Nevertheless, a significant down payment was made in the form of provision advanced by Brazil and strongly backed by the United States. This defines a clean development mechanism, which fully embraces the US-backed concept of joint implementation with credits. This will build a bridge with incentives between the developed countries and developing nations, and will allow companies in the United States and elsewhere in the developed world to invest in projects abroad and get credits for it against their emissions targets, again lowering the burden on US industry by allowing this kind of participation. They can either -- invest or they can simply purchase the permits.

In determining what developing countries ought to do, we, of course, need to be aware that the circumstances of developing countries may vary. Any one-size-fits-all approach to meaningful participation of developing countries is unlikely to prevail.

I'd like, Mr. Chairman and members of the committee, to deal very briefly with some misperceptions. The first is that the Kyoto Protocol will imperil the ability of our military to meet its

worldwide responsibilities. This is absolutely untrue.

We took special pains, working with the Defense Department and with our uniformed military, both before and in Kyoto, to fully protect the unique position of the United States as the world's only superpower with global military responsibilities. We achieved everything they outlined as necessary to protect military operations and our national security. At Kyoto, the parties, for example, took a decision to exempt key overseas military activities from any emissions targets, including exemptions for bunker fuels used in international aviation and maritime transport, and from emissions resulting from multilateral operations, such as self-defense, peacekeeping and humanitarian relief.

This exempts from our national targets not only multilateral operations expressly authorized by the UN Security Council, such as Desert Storm or Bosnia, but importantly, also exempts multilateral operations that the US initiates pursuant to the UN charter without express authorization, such as Grenada.

A second misperception is that somehow the protocol will create a super UN secretariat threatening US sovereignty in national decision-making through alleged intrusive verification procedures and prior approval of individual emissions trades. This also is not so.

The review process in the protocol largely codifies already existing practices under the 1992 Rio Convention. The review process is not by some secretariat; it's intergovernmental. Experts are nominated by governments. The review teams meet with government officials and with others by invitation. In reviews under the prior convention, the teams have met with congressional staff, with representatives of the private sector and environmental organizations, but only with their concurrence. Any other visits, such as site visits, would take place only -- and I underscore only -- if approved by the host country, including in this case the United States, and only if the private sector involved agrees to it.

So the notion that somehow people are going to be swooping down on US private property is utterly, completely and totally false.

In addition, let me be unmistakably clear. We will not accept, nor do we anticipate an approach that would require prior approval of individual emissions trades by any international body. Trading will be done between interested nations and their companies based on market principles.

A third concern is that somehow, on the one hand, we're told it will threaten US sovereignty by dictating national decisions on implementation, and yet on the other, it lacks mechanisms or teeth to verify compliance. In fact, the protocol strikes an appropriate balance between these two extremes.

We firmly opposed and succeeded in opposing mandatory harmonized policies that were desired by others and that would have imposed on us uniform ways to reach our targets. We prevailed. The protocol leaves to the parties themselves to decide how best to meet their targets based on national circumstances. If somebody else wants to do it by heavy carbon taxes or heavy central regulations, that's their business; we're going to do it by market-driven mechanisms alone.

At the same time we obviously couldn't tolerate a free-for-all. And so the protocol calls for national measurements of emissions, detailed reporting and in-depth reviews on an intergovernmental basis, not by some secretariat.

Finally, there are some who suggested that the protocol is going to result in a huge government transfer of foreign aid to Russia.

This is also not true. US private sector firms may choose to purchase international emissions credits from Russia and from others. This will be a private decision. And indeed, it's one of the crucial ways to achieve cost-effective emissions reductions for U.S. firms.

Now, where do we go from here? First, rules and procedures must be adopted to assure that emissions, trading rights, joint implementation and the clean development mechanism operate efficiently and smoothly. In addition, we'll work closely with our industries to be sure they are satisfied that the emissions trading system which is developed is as efficient and effective as possible to meet their needs. And I've already met with industry and I've told them, "You have to tell us if it satisfies your needs. We can't tell you."

Most significant, we have to work to secure the meaningful participation of key developing countries. We'll put on a full-court diplomatic press to bring developing nations into a meaningful role to help solve the global climate challenge. We will accept nothing less, nor would we expect the U.S. Senate to do so.

As the president has indicated, the U.S. should not assume binding obligations under the protocol until key developing countries meaningfully participate in meeting the challenge of climate change. And more progress is clearly necessary. It obviously would be premature to submit something to the Senate when the Senate itself has asked for this kind of participation and we have not yet achieved it. That is the great obligation we have to assume over the coming months and, if necessary, years.

The president outlined last October a three-stage approach to address climate change at home. As a first installment, he announced in his State of the Union message a proposal for a \$6.3 billion climate change technology initiative over five years to cut U.S. greenhouse gas emissions. These will mean tax cuts combined with R&D incentives to take cost-effective, practical steps to position us to meet the challenge we face early in the next century.

We have no intention, by executive fiat, of going around the Senate's constitutional prerogatives -- absolutely none. This is a down payment that the Senate itself can make to get us on a path so that we'll be ready for any obligations we may later assume with the Senate's advice and consent. We in the administration have great confidence in the power of U.S. ingenuity, innovation and technology to help us meet our goals. Indeed, I think this will stimulate that ingenuity in remarkable ways.

An example is the partnership for a new generation of vehicles which will get up to three times the fuel efficiency of today's cars, in a recent announcement by the chairman and CEO of General Motors about his goal for a new generation of automobile.

In closing, this administration is committed to work with you in the Congress both to realize the potential of the climate change technology initiative of the president's and to craft our ongoing approach to climate change. We have the power to lead the global effort, and Congress holds the key. What is done or not done today will determine the kind of world we leave to future generations and -- the conditions of life they will face.

But we cannot, in conclusion, ignore what science is telling us. We would do so at our peril. And again, what we're looking for is a kind of insurance policy, one that we can afford, one that is prudent, but one, Mr. Chairman and members of the committee, if we fail to act, if we fail to recognize what these scientists in charge are telling us, will be infinitely more costly to do in the future without action now.

Thank you very much, and I look forward to your questions and comments.

SEN. HAGEL: Mr. Secretary, thank you. Let me ask the distinguished ranking member of the Foreign Relations Committee, Senator Biden, for any opening comments. And then after Senator Biden's comments, we'll go to questions.

SEN. JOSEPH BIDEN (D-DE): Thank you, Mr. Chairman. I'll withhold the opening comments until it comes time to question.

Stu, I think you did -- or Mr. Ambassador, I think you did an incredible job. It's obvious two major things remain to be done. But when I get to questioning, I'll pursue those.

Thanks for the opportunity.

SEN. HAGEL: Yes, sir. We'll take a five-minute rotation period for questions, and I'll begin.

Mr. Secretary, again, thank you for coming up here. And I think there is little doubt that everyone on this panel who has dealt with you over the years has a very, very high regard for you, including this junior senator from Nebraska in the time that we've had to get acquainted over the last year and a half. I've appreciated it. So I say that up front because I think that's important that we all understand our respect for you and the kind of job you have done for this country over the years in many positions.

I'd like to take you through a series of questions. And I'll have more, but my colleagues, I know, want to ask questions. And let me begin with this. Can you tell us at this point the president is prepared to sign the protocol in March? Or when would the president sign this if he intends to sign it?

MR. EIZENSTAT: Mr. Chairman, the protocol is open from the middle of March 1998 to the middle of March 1999. We would plan to sign the protocol within this one-year signing period provided in the agreement. We haven't yet determined the precise timing. And we'll sign at a time that makes the most sense in terms of the overall diplomatic situation.

The issue that is more significant is ratification. And as the president has said, we're not going to submit the protocol for ratification until we get the kind of participation from key developing countries that we want to achieve and that you want us to achieve. And that will be the great obligation on our shoulders in the months and, if necessary, years ahead.

SEN. HAGEL: Are you saying then that you will or you will not, upon the president signing the protocol, send it to the Senate?

MR. EIZENSTAT: Well, again, we don't know where we will be between March of '98 and March of '99, how far we will have come in terms of getting this meaningful participation that we desire and that the Senate has made it unmistakably clear it requires.

If we have not obtained that -- and I think it would be a stretch to imagine that in that one-year period we will have achieved that, because it's going to take a great deal of work -- then we would not be in a position to submit it. If we have, we would be. That is the key issue.

So I can't give you a definitive answer because we don't know where we will be at the end of the signature period. But again, I think, quite frankly, it's a real stretch to imagine that we will get the kind of meaningful participation that we desire and the Senate requires in that one-year time frame.

SEN. HAGEL: You heard my comments in my opening statement, Mr. Secretary, regarding the process of amending. And unless there's some misunderstanding here within the committee and within the rules, it's

02/12/90 10:02 FAX 202 047 3710 20 ROOM 01102

my understanding that we would have some difficulty going back and changing any of the dynamics of this Kyoto protocol.

Would you take us through how this would happen and how it work, using specific examples on developing nations, when the Chinese have said straight out -- told me, with a number of my colleagues present from the United States, that they have no intention of signing anything and would not, as you know, not even consider signing anything on a voluntary basis, as well as other members of the G-77?

MR. EIZENSTAT: No one knows better than I do -- and, of course, you were there as well -- the difficulty we had with some of the developing countries, including China and India. It was not uniform, but certainly they were in the lead.

First, it would require an amendment, as you suggest, for major changes in the treaty. However, a mechanism is created by which countries can, if they wish, voluntarily assume binding obligations. And that is one of the things that we will be pressing developing countries to do.

Let me, if I may, mention a couple of things on the developing-country side, because I think it's important to understand what was accomplished and what wasn't. First, I see a spectrum of developing countries. There are those, for example, who are already members of western industrial institutions; for example, the OECD. Mexico, South Korea would be examples. And there are other countries -- Argentina -- that are knocking on the door. I think that for those countries, they ought to assume, if they're members of, in effect, an industrialized organization, they ought to assume the kind of binding reductions over time that we have done.

Second, there are other countries that are not at that stage of development but who can afford to make binding reductions or perhaps, if not reductions, at least reducing the rate of increase by an efficiency standard. One of the things we've said to these countries is, "If you're concerned about your own stage of industrialization, then you ought to be concerned also about energy efficiency and sustainable development." And we're working on a formula that is emissions per unit of GDP, so that they cut their rate of growth.

For still others, there may be other ways to meet those commitments. Bilaterally, subregionally and multilaterally through the international financial institutions, we will be working to achieve that result. We, for example, want to make sure that the World Bank, the Asian Development Bank, the Inter-American Development Bank that make large loans or grants for power plants and other projects, that they are done in ways that are environmentally sound.

But it's also important to recognize that developing countries did begin a process. It's not sufficient, but we shouldn't think they did nothing. For one thing, for example, they agreed to the creation of this clean development mechanism. This is a way of beginning to bring them into the process. It has a double benefit. It brings them into the process, but it gives our companies credits for any clean projects that they agree to or any credits that they buy.

Second, developing countries also agreed to advance the implementation of their existing commitments under the 1992 Rio convention.

Third, it will, I believe, Mr. Chairman and members of the committee, be a very, very powerful incentive when this trading rights regime begins and we have international emissions trading, as we already have in the acid rain program in the United States. In order to be a party to an emissions trade, a developing country is going to have to take on binding obligations. And so that, in and of itself,

will also create an incentive for developing countries to take on these binding obligations.

SEN. HAGEL: But let me just ask a follow-up question to this and then we'll go to Senator Biden. But I understand your point about incentives and the possibility of developing nations signing on, for the reasons you mentioned. And I suspect there are more.

Why would we sign a treaty, though, why would we put ourselves in a position, when, in fact, there is no assurance that China and India and 132 other nations, as you say, will be the biggest man-made greenhouse gas emitters in the next few years, China being the largest by the year 2015, and as you suggest as well, and I agree, that if this is a global problem, it requires a global solution.

So why would we go ahead and put ourselves in a position with the possibility that these nations would come on board and restrict ourselves to legally binding mandates, restrict our economy and all the dynamics of our society, when the Chinese have made it pretty clear, and other nations, that they have no intention of moving forward on this?

MR. EIZENSTAT: That's a good and important question. Let me answer it in the following way. First of all, we will not be assuming legally binding obligations on ourselves until and unless we have that meaningful participation. Let me underscore that. We will not be assuming legally binding obligations. Only the Senate of the United States can take that upon the United States, and we will not submit it to the Senate until we have that, until we are satisfied and you're satisfied that we have that level of achievement. Secondly --

SEN. HAGEL: May I also ask -- that means the administration will not go forward in trying to implement any dynamic of this Kyoto treaty through regulation, budget, fiat, executive order, until it, as you suggest, is brought before the United States Senate?

MR. EIZENSTAT: Yes, sir. We have no intention, through the back door or anything else, without Senate confirmation, of trying to impose or take any steps to impose what would be binding restrictions on our companies, on our industry, on our business, on our agriculture, on our commerce, on our country, until and unless the Senate of the United States says so.

Now, with respect to the signature issue, which was the second part of your question, there are two factors there. The first is, we believe it's important sometime during this one-year period to lock in the kinds of commitments that we got from the other developing countries and the achievements we achieved. We got (CINCs?) in. We got flexible market mechanisms in. We got our budget period in. We got multi-year budgeting in. All of these -- we got the joint implementation with credits in the form of the clean development mechanism.

These were all brand new concepts, literally brand new. Nobody had ever heard of them anywhere, not just in the developing world. Nobody in Europe had ever heard of an emissions trade, as we've already been doing domestically. Nobody knew what a (CINC?) was except something you wash dishes in. No one had any idea what joint-implementation with credits were. These were U.S. concepts. And we've now gotten countries to agree to that. We want to lock that in.

And last, we didn't want to isolate ourselves, having achieved this, in terms of the ability to continue to get other countries to take this seriously, by being the only country in the world that doesn't sign the treaty. Now, again, the timing, you will understand, has to be done tactically so that we do it at the right diplomatic moment.

But I can assure you, this administration has no plans to and will not in any way, shape or form take executive action preempting your constitutional right to make this ultimate decision. We will push forward with things like tax credits and R&D, assuming Congress approves it, which, of course, is just getting us in line for this, but nothing more and nothing less.

SEN. HAGEL: Thank you. Senator Biden.

SEN. BIDEN: Stu, I think you did an incredible job. The hardest part of all of this is that I think that Senator Byrd may be right when he referred to it as a work in progress. I mean, I don't know how you -- first of all, we finally have stopped fighting about whether or not it's a problem. I come from, as some people facetiously refer to, as the state of duPont. You know, 15 years ago, 20 years ago, in my state, where the chemical industry is big and the automobile industry is big, and it's a small state, there was a great debate about whether this was a problem. There was no problem -- we didn't have any problem. And we have -- it's taken a long time and a lot of scientific data and investigation, and the consensus has been arrived at by those companies and many others that there is a serious problem. And how you get from acknowledging a serious problem -- and we can disagree on the consequences of the problem and how far out it becomes serious -- more serious -- how you get from that acknowledgement to an international code of conduct in effect is a painstaking process. And so I don't know how you could do it any other way than the way you're approaching it.

One of the things you said here today that although Senator Kerry of Massachusetts and the distinguished chairman both have taken intense interests have know a great deal more about this issue than I do, but -- and have differing views or perspectives -- the vast majority of American businesses and American citizens, American farmers -- they assume that what happened in Kyoto was binding. They -- in my state they think that, okay, well, they went over and signed that damn thing, and this means we can't make a Durango in my state anymore, and this means we can't -- all of which is not true -- all of which is not true. And so the important point -- and we only have five minutes -- so I am going to use this as my statement -- is that you've laid out here that nothing is binding upon the United States of America at this moment. And even if and when you sign you cannot -- the president of the United States cannot bind -- cannot bind the United States -- only the United States Senate can do that. And it's crystal clear to you, a man who knows this body incredibly well -- we've been here a long time off and on together -- that this body, to use the vernacular isn't going to ratify a treaty that doesn't deal with the two outstanding more than fine-tuning problems -- that is the issues of the countries in question from Brazil to China and their participation, and others -- many I've left out -- as well as how this emission trading mechanism will in fact work.

But I just want to say to you that I thought it was remarkable that you went to Japan, you prevailed on the timetable, you prevailed on average emissions over the budget period, you prevailed on the inclusion of the six gases that contribute to the greenhouse effect, and you prevailed on dealing with the military -- multilateral operations as well as ones we initiate -- and that you also essentially laid in and accepted market-based practices for trading in emissions. They are significant.

Now, I don't know how you are going to hold onto them, to be blunt about it. I am not sure how you are going to keep them. I'm not sure how other than signing at some point the protocol -- our

signing -- you are going to be able to hold this center together. And you are going to have one hell of a job trying to bring in the largest future polluters in the world. But I have a -- I have great faith in your skills, and I just hope you are able to figure out how in the hell to do that, because stated very plainly -- and I surely cannot speak for the Senate, although my daughter thinks I was born in the Senate, I've been here so long -- the truth of the matter is absent dealing with the two major issues you mentioned, there will be no ratification of this treaty.

And I hope between now and over the next year that we can all work toward trying to help you and the administration in dealing with the few problems -- there are others -- rather than just suggesting that what came out of Japan is dead on arrival. I hope we won't do that, because you've forthrightly acknowledged you know the hurdles you have to get over to send this up to the Senate for any practical prospect of winning, and I just -- I have an open mind -- I think you are correct, and I hope in the meantime by the way -- I know the chairman didn't mean this -- but I hope that we don't suggest that we should not independently, unrelated to any other nation in the world, further deal with emissions issues here in this country for our own sake, regardless of anybody else doing anything at all. And so I am sure there will be suggestions, and I hope there will be suggestions, legislative initiatives and executive initiatives relating to dealing with the environment that may in fact fall under the purview of what is captured in this agreement, but not because it's in the agreement.

Again, I thank you for listening. I apologize for being late, and I will now yield to those who have made it more of their business to be informed in detail of the treaty. But I like the work in progress. I think this is an educational process, and including educating those nations that have not signed on in what their own naked self-interest is.

MR. EIZENSTAT: I appreciate that very much. If I may be permitted just a brief reaction. And I'd like to relate again back to Senator Hagel's statement, as well as Senator Biden's.

When we talk about our own action, I want to be clear. For example, presidents for years, Republican and Democrat, have been trying to put good practices into government procurement, into insulation, into clean-car initiatives. We would continue to do that, so for example the U.S. government is a model. Our military -- and I am proud that they are sitting behind me -- our military has been the leader in energy efficiency. They're already very close to meeting the 1990 targets. Now admittedly some of it is because of base closings. But they have put in real energy efficiencies. So I don't want you to misunderstand. Obviously those would be going on because they are good practices -- not because we are subverting Senate will.

Second, I have had the honor of knowing Senator Byrd for 20 years. There is no state that has a more direct relationship to this problem than West Virginia. And I have been very impressed by the way in which Senator Byrd has worked for this issue. And he no more than me is not a scientist. But he has listened to the science -- I think a lot of us have. And without being in any way impertinent, let me just suggest for those who have legitimate concerns -- and there are real questions that have to be answered -- if one believes these figures, these charts -- and this chart is not a projection; this chart is a projection -- this is not a projection -- these are actual core samples that were done from glaciers and so forth which are melting. And they show this dramatic curve. And the orange is actually taken from measurements in Hawaii on top of a very tall

mountain. If one believes that slope, one believes the science and the likely projections over here, one has to say what is one going to do about it. What do you do about it?

Now, God knows this is not a perfect treaty -- no treaty is. They are always compromises. But it is a reasonable downpayment on the beginning of that process. It's not complete. It is a work in progress, as Senator Biden very eloquently said. The problem is so complex no one agreement can encapsulate everything that needs to be done. We did not succeed as we hoped to with developing countries. We didn't. I'm the first to admit it. But we achieved a lot of other things. We made a first step. And that gives us a foundation to then go to developing countries and say, Now, look, we are willing to do our part if you'll do your part. And if you don't do your part there is not going to be a treaty, period.

SEN. HAGEL: Thank you. Senator Grams.

SEN. GRAMS: Thank you very much, Mr. Chairman. Mr. Eizenstat, again welcome. I'd like to go back to some of the things I mentioned in my opening statement, and that is in this country we rely primarily on fossil fuels and nuclear power to meet our energy needs. This administration however just 11 days ago, as I outlined, failed to meet both its legal and contractual obligations to begin accepting spent nuclear fuel from commercial plants across the country. And as we know this means it could have very permanent effects on plant shutdowns, on the increased use of nuclear energy -- that's very likely. And I've seen figures which show that nuclear power plants are credited with, as I have said, 90 percent of all cuts of carbon dioxide emissions from U.S. electricity production since 1973. Additionally, countries throughout Europe, again like France, are turning more and more to nuclear power. China has plans for substantial use of nuclear energy now and in the future, as does Japan. Meanwhile we continue to hide from nuclear power, and that is thanks to extremist rhetoric and fear.

Now, just how do you and the administration expect the United States to meet our energy needs in the years to come given the limits of Kyoto and our lack of energy policy?

MR. EIZENSTAT: That's a very important question. I was ambassador to the European Union for two and a half years, and was based in Brussels, traveled widely in Europe, and I know what nuclear power means in countries like France where it supplies 70 percent of electricity. I have been a very strong, unequivocal proponent of nuclear power. I believe that under Kyoto and post-Kyoto nuclear power will have to play an increasingly important role, because it does not emit greenhouse gases. I agree that we need therefore to look at our nuclear policy. And I might say when I served as President Carter's chief domestic adviser I had on my desk literally nuclear siting and planning act that would have speeded up permitting. It was within perhaps 48 hours of being submitted to the Congress when Three Mile Island occurred, and we never recovered since.

I cannot speak to the DOE issue, and would defer to them, and I will be glad to try to get them to respond to your legitimate concern.

SEN. GRAMS: We've tried and can't either.

MR. EIZENSTAT: But I will say also on the fuel issue, we were talked in 1977-78, when I was in the White House, about salt domes and other ways. I think this country under Republican and Democratic presidents ought to be doing more, ought to have done more, and I think again nuclear energy has a very real role to play in this climate change issue. And with that I fully agree with you.

SEN. GRAMS: Has the administration in these talks, or in your

consideration then, considered the regional implications of complying with the treaty for areas which will have to replace energy from nuclear reactors? Like my home state of Minnesota -- about 30 percent of our power comes from nuclear, it would be awfully expensive to go to coal-fired or other places to replace that. So has this been part of your consideration in your numbers as well?

MR. EIZENSTAT: It will be factored in. There is a nuclear power initiative in the president's own budget to extend the life of plants -- that is the beginning of the process. It's certainly not the end of it. We would like very much to work with you to plan on how we can make nuclear energy more significant in the years ahead.

SEN. GRAMS: Just another quick question. What type of economic modeling outside of the nuclear issue has the administration done to determine the economic effects of this treaty? And I wanted to just mention a couple of things that the administration attempted I think an economic modeling effort, which I think has been branded as a failure. In fact, the director of the president's Council of Economic Advisers, Dr. Janet Yellen, testified before the House Commerce Committee that, quote, "the administration's efforts were futile." How do you respond to that?

MR. EIZENSTAT: I regret that Janet Yellen was not here. We came very close to being able to arrange our timing. Unfortunately the economic report of the president, which is the council's major activity for the year, came out at the very time of this testimony, or she would have been here to present our economic analysis. That analysis will be ready very shortly -- and when I say very shortly, I mean literally within a week or two -- and in an appropriate congressional hearing we will lay that out. I think you will find from her findings that the costs to the economy are reasonable and that there are indeed many benefits to doing that, as well health and other. And that again delaying action will only increase the costs.

SEN. GRAMS: When you say costs are doable or can be absorbed -- and I know why Senator Byrd is extremely interested -- the United Mine Workers of America commissioned a study which considered economic impact as a result of the reduction only back to the '90 levels. And some of their findings included this: nearly one of every two coal miners will lose their jobs; 1.7 million more American jobs will be eliminated as a result; gas prices increasing 43 percent; fuel oil increases 119 percent; electricity prices by 94. It could go on and on. But how do you answer numbers and statistics like that?

MR. EIZENSTAT: Again, Chairman Yellen will have that analysis very shortly. I think you will find that it is dramatically different than those figures that you've just indicated. And many of the studies, Senator Grams, did not take into account things like offsetting costs of sinks, the offsetting costs of joint implementation with credits, the offsetting costs of emissions trading. And when those are factored in, one sees that the costs go down very, very dramatically.

In addition, over the last several decades we have had these kinds of studies every time there's been an environmental initiative, whether it was clean water, clean air, ozone, acid rain. And what we've found is that we can in fact do both; we can have a cleaner environment and we can have a solid economy. We have now an economy we can all be proud of -- 14.5 million jobs have been created, an under-5 percent unemployment rate -- and yet we have an environment that is infinitely cleaner than it was.

We also have -- and I think these studies don't take that into account, there's something called a five labs study that was done by

the five national labs. They're totally independent -- you know, nobody told them what to come up with -- and they made some findings about what technology can do and how we can reduce the burdens and costs on coal miners and others by coming up with what is the hallmark of America, and that is ingenuity and technology. And we believe that we're going to be able to develop cleaner plants and cleaner cars and that, indeed, having this kind of a target is going to send a signal to the free market to innovate, and that that innovation will itself create jobs.

SEN. GRAMS: Just one final thing. You mentioned over 2,000 leading scientists from 50 countries. I've heard some questions about, you know, the names and everything. Could you just supply me in the near future with their names, their credentials --

AMB. EISENSTAT: Absolutely. And many came from the United States. We'll be glad to. I think this is the most definitive group and represents a basic consensus.

Interestingly, just within, oh, I'd say the last couple of weeks, actually, when we got the 1997 final reports on weather, which made 1997 one of the warmest years in history, and it fell into a pattern where nine of the last 11 years are among the warmest ever recorded, a lot of climatologists who were themselves somewhat doubtful have now said, indeed, there must be something happening here and it must be to some extent occurring from human conduct.

So we'll be glad to supply that to you, senator.

SEN. GRAMS: Thank you.

Thank you, Mr. Chairman.

SEN. HAGEL: Senator Kerry.

SEN. JOHN KERRY (D-MA): Thank you, Mr. Chairman.

Mr. Chairman, I'm going to use a little bit of my time to make a couple opening comments, if I may, and then proceed.

While it's not our responsibility here to provide testimony or anything, I would like to make a few observations as a member of the observer group with you who spent time in Kyoto and has been following this issue. And then I would like to ask a few questions of Ambassador Eisenstat, if may.

Let me begin by saying that I think it's very important to underscore the positive side of the ledger here, and to recognize the circumstances in which we arrived in Kyoto. In my judgment -- and I was in Rio and I was the chairman of the delegation that went to Cairo, so I've been through a few of these -- we were a little less organized than we had been previously, regrettably, and I think some of the groundwork that needed to have been done was still hanging loose, for various reasons. So I thought that we arrived in Kyoto on a precipice. And I was somewhat concerned initially about a change in sort of the personnel and the relationships of who was going to be negotiating.

I must say that Ambassador Eisenstat, I thought, did a superb job, and I think his team did a superb job, of pulling together a rather remarkable step forward in the face of some very, very tricky, complex and difficult negotiating circumstances. I think the team -- negotiated skillfully and diligently with a remarkable stamina. And don't know how they stayed up the hours they did. And notwithstanding the long hours, I think nobody lost sight of the focus of interests that we were trying to protect, the interest that you'd expressed, Mr. Chairman, with Senator Byrd, and the larger economic interests for our country.

So I think we need to look at the positive. A hundred and fifty-nine countries came together, with no argument over the science.

BUREAU OF ECONOMIC AND BUSINESS AFFAIRS
FACSIMILE COVER SHEET

Date Sent: 2/12/98 Number of Pages: ~~18~~ 15
(Including Cover Sheet)

Time Sent: _____

EB FAX #: 202-647-5713 Verification #: 202-647-5973

TO:	NAME	AGENCY	PHONE #	FAX #
	<u>Joe Aldy</u>	<u>CEA</u>	<u>395-1455</u>	<u>395-6870</u>
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____
	_____	_____	_____	_____

FROM: Victoria Greenfield Phone #: 647-6985

SUBJECT: Testimony/Hearing : Part ~~I~~ II

COMMENTS: Please share with Janet/Jeff, as
appropriate - Janet asked for
a copy (or my notes) yesterday &
may be especially interested?

Prime ministers and presidents and whole governments sent their delegations there, with an understanding among all of them that we needed to do something. There was no issue about the need to do something. The question was who takes first steps, by what quantities and methodologies.

And I think it's very important for people in the United States Senate, which seems to be the only place in the world where there is sort of a significant governmental effort to try to rewrite or reinterpret some of the science, ought to take note of this fact of 159 nations making this decision to come together.

Secondly, I think it is important to put on the table the difficulties that Ambassador Eisenstat and others ran into in negotiating. I was personally taken aback by it. In all of the dealings I've had in the 13 years I've served on this committee, I have never in my foreign travels run into quite the degree of anger directed towards the United States as was just palpable in our negotiations in Kyoto. There's always been tension. We have always been, since World War II certainly, the larger player on the block, and we've suffered some slings and arrows for the perceived arrogance of some of the positions that we take. But this was different. And I think Ambassador Eisenstat would agree with me it was different.

And two reasons particularly leapt out as to why it was different. Reason number one, because of our failure to pay our dues at the United Nations and the sense people have that we're, you know, willing to throw our weight around without carrying our portion of that weight; that we are delinquent, and because of that delinquency, I think it has cost us in Kyoto, as I believe many people on the international scene interpret it as costing us now in our efforts with Iraq.

The second point is that we went to Rio and we signed on in Rio and the United States Senate ratified a treaty in Rio which agreed to voluntarily reduce our emissions. And every nation in the world was able to sit in judgment on the fact that not only did we not reduce, not even make some enormous effort to reduce, we significantly increased our emissions in this country. And so they sat there saying, "Who are you kidding? You're telling us less-developed countries we've got to come on board, and you people haven't even made a good-faith, first-step effort to prove you're willing to be serious about this."

So there are serious doubts about the bona fides that we brought to the table, notwithstanding the Clean Air Act, the Clean Water Act and other great efforts we've made in this country, which many of us tried to explain to them. But we were dealing in a very difficult climate.

Third point I want to make. There was a very significant misinterpretation which could not be undone in the circumstances I just described by the developing countries as to what was expected of them. And because of the volatility that was in the air and the pressures of coming to cloture in a short period of time, there just wasn't a capacity, even with all of the delegation meetings that we had, to pull them back from this misinterpretation.

I believe in these ensuing months, before we go to Buenos Aires, we have the opportunity to reach out, with personal diplomacy, with bilateral diplomacy, multilateral, quietly, to bridge that gap. None of these developing countries understood the degree to which we are not requiring them to have the same implementation plans, same timetables, same levels. All of them saw our efforts to include them as a conspiracy to minimize their growth, whereas it is much the

contrary. But because the concepts of joint implementation and emissions trading and others things were wholly new to them, without the time to explain them, we simply weren't able to bridge the gap and bring them on board.

I'm quite convinced that over a period of time they will recognize that what we're really asking them to do is simply sign onto the notion that this is a global problem with varying responses needed by different countries. In fact, China today is taking very positive steps in many, many areas of the environment and embracing whole new technologies, many of which would adequately satisfy already what we're really needing to get in the context of this kind of a treaty.

In addition, there are distinctions between countries. While China was very adamant, many of us found other less-developed countries or developing countries wholly prepared to participate, anxious to take part in the upsides of this treaty, which are the joint implementation and other matters.

There's a golden lining for us, too, with respect to that. I just met two days ago in Massachusetts with the Environmental Business Council. We've got hundreds of companies in our state, as there are in California, Texas, Florida, other states in the country, all of which are pushing the frontier of technology, in remediation, mitigation, in clean air, best use, and so forth.

This notion that this represents a job loss to us is incomprehensible when measured against the technological journey this country has led in since the war. We have enormous ability to be able to produce jobs through this endeavor.

And the experience of the 1980s, when President Reagan came in and pulled the money out of the Energy Institute in Colorado, is one of the clearest examples of what happens when we diminish or relinquish our research and technology-pushing efforts. The Germans and Japanese leapt to the forefront of photovoltaics and renewables. And now, as the former Communist bloc countries come on line seeking those technologies, unfortunately, there are other countries they go to rather than us as the leading technologies in those areas.

If we push the curve, as the president's budget seeks to do, with 6.3 billion of technology effort over the next years, we can regain that lead and we can provide the jobs.

Final two points I quickly make. The joint implementation effort and emissions trading opportunities here ought to also be viewed in their proper light. There's enormous technology transfer available in this treaty. It is groundbreaking in its capacity to take the United States' and other developed countries' technologies and assist the developing countries to avoid making the mistakes we made even as they grow. And that is, I think, one of the most brilliant and important parts of this treaty. And we should look on that as pure opportunity -- economic opportunity and environmental opportunity. And I think it's important for our colleagues in the Senate to understand the full measure of that opportunity.

In addition to that, it can even be argued, and I regret to say this, but if you accept all the science, as these countries have, and you come here looking at these charts with their increasing curves, the truth is that what happened in Kyoto isn't enough, frankly, to turn that around. And most environmentalists and most scientists will regretfully have to swallow hard to tell you that truth.

But this treaty merely tries to get us down towards stabilization and slightly below it. Nobody makes the argument that this is a level sufficient to solve the problem of global warming. So we need to be very, very cautious in whatever measures of opposition we bring to

even these efforts as we think about where we're going in the future.

And the last comment I make in terms of opening is that the benefits always get hidden here. The benefits are always overridden by statistics that don't adequately take into account the kinds of things Ambassador Eisenstat just talked about -- the mitigation, the counter-technologies, the emissions trading, the joint implementation, all of these up sides that are more difficult to measure. But when you read these dastardly figures, they don't take them into account.

But they never take into account the upside benefits of health, of what happens with respect to energy efficiency, and of national security.

We have become far more energy-dependent on foreign oil, not less, since the Gulf War. We fought a war over oil only a few years ago. And even as we become more dependent, we ought to be thinking about how we turn that around. This treaty has the silver lining of actually requiring us to begin to become more energy-efficient and less dependent. And that increases the national security of the United States. So the up-side benefits, it seems to me, need to also be put on the table.

Mr. Chairman, I thank you for your indulgence. I won't ask questions on this round.

SEN. HAGEL: Thank you. Thank you, Senator.

Mr. Secretary, as a matter of fact, I find Senator Kerry's comments interesting. He's right about his sense of the anti-Americanism which you dealt with every second of your time in Kyoto. That seems to me it should give us even more pause, seeing that, living with that, as you did, as Senator Kerry and I saw that strong, intense anti-Americanism there, even more pause as to the issue of fairness and functionality of any kind of an agreement we make here when you are allowing 134 developing nations to essentially have, by the dominance of their numbers, the sway on this treaty.

And I think that is a very important issue. I know it is with American industry, American business, AFL-CIO. Will we be treated fairly? Will this continue this big, ugly American -- "You've polluted the world, you've done us all in, you've taken advantage of our resources"? That's a concern.

Let me shift to a couple of other areas; economic issues. We are all sorry that Dr. Yellen is not here. You may recall that I've asked many times for the administration to send somebody up here who could talk to us about the economy, some of the issues that Senator Grams was referring to, major issues, aside from the debate over the science, whether it's contradictory, whether it's unclear, whether it's there or not.

If, in fact, we would go forward here, it is going to be at some cost to our economy. Now, I'm not disregarding what Senator Kerry is talking about -- initiatives and technology and things that we know about -- but the fact is, when you're talking about the kind of numbers we're talking about here, the administration surely is going to have to come forward with some economics here, some models, some studies.

And one of the biggest problems we have here with the administration on this issue, and I think with generally the people across this country who would be affected most by this, is where are those numbers, who was addressing this, and that we're not focusing on the reality.

The theoretical is one thing and addressing the science is something. But when you're talking about people losing jobs and our

international competitiveness being questioned, being imperiled, being threatened, and all that goes back from that -- standards of living, the future of our children -- I'd like you to deal a little bit with that issue as to when are we going to see something?

MR. EIZENSTAT: Fine. Let me take both aspects, because Senator Kerry led off with it as well. On the anti-Americanism, I think no one bore more of the slings and arrows of outrageous fortune in that regard than I did. And I sometimes frankly thought I was in a 1950s time warp and that we were in the old North-South debate rather than in the globalized economy we all believe we're in.

But there are two aspects to it that give me confidence. First of all, we've worked our way through that. And with our leadership, with the help of Chairman Estrada, who's a tremendous chairman, and with the help of other developing countries who did not take such an extreme position -- because Senator Kerry is right; particularly some of the Latin American countries were much more reasonable -- we were able to work through that anti-Americanism and come up with all these concepts -- flexible market mechanisms and joint implementation with credits and reasonable budget periods and so forth -- that were essential -- and trading rights -- which were essential to us.

A second point on the anti-Americanism. And I agree 110 percent with Senator Kerry. There is a real education issue here. The developing world did misunderstand what it was we were suggesting and somehow thought it was imperiling their industrialization. Their argument is, "Look, you've been polluting the climate for 100 years and now you industrial countries are telling us, just as we're beginning to industrialize, what we can't do."

And we can show them how it is good for their economy to be more energy-efficient, that development has to be sustainable to be real. And I think with that education we'll begin to get countries on board, but that will take time. But it will happen.

With respect to the issue of sort of being overwhelmed, the way in which this is structured, this is a conference of parties. There is not going to be any centralized bureaucracy which tells us what to do. We have a very important say-so. Developing proper rules for trading is absolutely critical. And we'll be working with you and with industry to assure that we get this.

Last, on the cost issue, I assure you that Chairman Yellen's absence here is not due to the fact that we now do not have a model. Quite the contrary, we have done an economic study relying on other models. That study will be available very shortly. Indeed, had her timing worked out with the economic report, she was fully prepared to come here and sit with me. You do have a right to know the cost impacts, and we will provide them.

SEN. HAGEL: Well, that's reality. And you understand that. I'm not sure people in the White House understand that. But that's what real America is looking at here.

MR. EIZENSTAT: Well, they have a right. And may I say again, no one lives in a vacuum. We live in a world of relativism. And we have to look at the commitments we made relative to those that our major -- competitors took. And when you look at that, what did Japan assume? What did the 15 countries of the European Union assume who are our major competitors? You will see that our obligations were essentially the same or even less than theirs. And when you add in (CINCs), things that we have particular advantages with because of our forests, we come out very well compared to our major competitors, and certainly no worse.

SEN. HAGEL: Well, I think that's debatable, but I will take that

back up in another round. But let me add just one thing. In all due respect, Mr. Secretary, to your answer regarding the intenseness of the anti-American feeling over there, the fact is you left Kyoto with not one developing nation signing up. I mean, that is the cold, clear fact that we're dealing with here, which makes all of us very uneasy.

Just a very quick question. Senator Feingold has a number of questions and has been patient. It is my understanding that as you negotiated, and the negotiations prior to the negotiations, there was a master document that the negotiators were working off of. Can you tell me if that is correct, and who, then, produced that? And if there is such a document, would you share that with the committee?

MR. EIZENSTAT: Well, if you're referring to the initial drafts about Chairman Estrada, a sort of working draft, there were working drafts with brackets that had been put on over the course of, oh, perhaps a year of negotiations where we put certain brackets around items we couldn't accept; other countries did. That's the only document --

SEN. HAGEL: This is a document that I've seen that you were working off of that showed each country's baseline emissions, and you didn't have any kind of a master document that you negotiators, not the U.N. or Estrada --

MR. EIZENSTAT: Our team did have information about the emissions levels of other countries. But I never had one sort of master document that I was operating from. I had negotiating instructions, but not something that you refer to there. I'll be glad to try to look and see if there's anything relevant, but nothing that fits the description that you just have given me.

SEN. HAGEL: Thank you. Senator Feingold.

SEN. RUSSELL FEINGOLD (D-WI): Thank you, Mr. Chairman. Let me, first of all, ask that my full statement be placed in the record. And let me also begin by just thanking my two colleagues here who have obviously devoted enormous time to this. In addition to all the other responsibilities, to devote that much effort to something this complicated is impressive, and I am appreciative for it.

And I find myself in a position of obviously not knowing all the details of the impact of the protocol on the country and on Wisconsin. This hearing, which reviews for the committee the evolution of the United States negotiating position, from stabilizing its emissions at 1990 levels to agreeing to a 7 percent reduction, is a first step in developing some understanding of this.

Some of the predictions that have been made regarding the impact of the Kyoto protocol are very serious and concern me and they need to be addressed, and I know the secretary is already doing that. But let me begin for just a couple of minutes by asking you something that's already been raised to me in Wisconsin, Mr. Secretary. You've already touched on it.

Some manufacturers in my state have raised concerns that the administration will be implementing the protocol without the United States actually ratifying the protocol. You've already said, in answer to an earlier question about this, that there are no binding-- agreements to that effect. But the specific question that has been raised to me was whether or not the budgetary proposals having to do with \$6 billion in tax credits are, in effect, a way to implement the protocol without ratifying it. I'd appreciate it if you'd respond to that.

MR. EIZENSTAT: First of all, on your first question or statement with regard to targets, the target we agreed to represents at most a 3

percent real reduction, and possibly less, below the target that the president had initially set before the negotiations. And the remaining 4 percent or so results from changes in the way that gases are treated. We benefited by having six gases in rather than three, and particularly benefited by a factor of 3 percent or more by the inclusion of carbon-absorbing (CINCs); that is, forests and things which will remove a burden from Wisconsin and other industries that they otherwise might have had to assume.

Second, I want to reiterate, we are not implementing binding obligations on this country without Senate ratification, period.

Third, with respect to the president's program of tax credits and R&D incentives, these are to get 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. These are voluntary. Congress has to fully debate and approve them.

They're good energy practices. They're incentives for industry to do more, similar to what other presidents have done in other circumstances. They're not some covert effort to implement obligations or assume binding obligations. They're really to make this country more energy-efficient, and by doing so we'll be in a better position, if and when the Senate ratifies, to meet our obligations. We'll have gotten a head start.

SEN. FEINGOLD: Is it fair to say, then, that we could have expected those tax credits or incentives to have been in the budget --

MR. EIZENSTAT: Indeed --

SEN. FEINGOLD: -- regardless of whether the Kyoto accord had been entered into?

MR. EIZENSTAT: Yes, because the president talked about those before there was a Kyoto protocol. We've enhanced them by another billion dollars to show our earnestness in moving forward. But they already were being planned and talked about well before the Kyoto protocol was signed --

SEN. FEINGOLD: Mr. Secretary, I appreciate --

MR. EIZENSTAT: -- excuse me -- was negotiated. It has not been signed.

SEN. FEINGOLD: I appreciate your directly addressing that, because it is being mentioned to me. Mr. Secretary, do you see any chance that the protocol will enter into force without the U.S. ratifying it?

MR. EIZENSTAT: No.

SEN. FEINGOLD: Okay. How will the administration be seeking additional involvement of developing countries? I think you've touched on this, but if you could say a little more.

MR. EIZENSTAT: We're going to undergo a full diplomatic press. This will include the following: Using multilateral fora like the G-8 to encourage our developed-country partners to get into swing with us and encouraging developing countries to be involved, doing the same in the OECD, using international financial institutions like the World Bank and the regional development banks to agree only to fund projects abroad in the energy area which are greenhouse gas-friendly. --

Bilateral efforts, because, Senator Kerry, I'll tell you, if there's one lesson I drew out of this, it's that if you go back into a G-77 context and try to get this done, it won't get done. We have to deal country by country with the key countries involved. And we will be doing that bilaterally. We already have, for example, with China, the beginnings of that. It's only the beginnings, but the beginnings that Vice President Gore negotiated through a bilateral environmental agreement.

We also will use subregional and regional fora, whether it's the Summit of the Americas, working with Mercosur, to get them to do so. And we're going to do the education job. We're going to point out to them the advantages of assuming real limitations, or at least limitations on their growth to their own economy.

In addition, we're going to point out to them that if they want to take advantage of the benefits of emissions trading, which is a potentially huge advantage for them, that they cannot do that without assuming binding emissions targets. They're going to see, Senator Feingold-- I'm absolutely certain of this -- over time, when they see how emissions trading works and how profitable it is for the companies selling credits, they're going to want to be part of that.

We're also going to work on the joint implementation with credits concept, the clean development mechanism, to implement that. So it will be a multifaceted effort. It is one that will take time. But we're committed to do it. We know how important it is to the Senate. But may I say, if the Senate had never passed Hagel-Byrd, if it had never passed Hagel-Byrd, we would be doing the same thing because we believe that this is a global problem and it can't be solved by the developed countries alone.

SEN. FEINGOLD: Thank you, Mr. Chairman.

SEN. HAGEL: Mr. Secretary, you alluded to this earlier, but take us through how this works with the U.N. The U.N. now has over 50,000 employees. Much of the concern, at least from the people I think many of us hear from across this country is, "My goodness, we are going to allow the United Nations to administer, to enforce and what else what we are doing?"

Would you reassure us how this is going to work? Who enforces? Who administers? What's the recourse? If my farmer out in Nebraska has somebody come in and test soil -- and, by the way, this is not an exaggeration, as you know. You know what the appendix look like in this document and you know that Article 2 deals with agriculture, and you know very specifically what that soil composition is supposed to be. So somebody comes in and tests soil. I don't know how it works, but you tell us. And then what's the recourse? Do we go to The Hague, or how does that happen?

MR. EIZENSTAT: I want to assure every farmer in this country, every person who works in an industry in this country, that there will be no visits by any international body to which the United States government doesn't invite them and that they themselves permit that to occur. It's very important to understand. Second --

SEN. HAGEL: Well, I'm a little confused. If there are legally binding mandates, you are then going to say that if the farmer wants to be tested, even though the United States is part of a legally binding mandated forum here, that he can or can't be?

MR. EIZENSTAT: What I'm saying, Senator, is that compliance under this agreement -- and this is something we insisted on -- is essentially national. It relies on the United States to do the heavy compliance work. Now, there will be teams. These will be intergovernmental teams. They will be review teams that will look at data that we supply -- we, the United States of America, supply.

SEN. HAGEL: United Nations teams? When you say there'll be teams, do you mean -- what kind of teams? United Nations teams?

MR. EIZENSTAT: They will be not from any secretariat. They will be chosen by the countries who will be participating in the reviews; for example, the (Annex 1?) countries. So there'll be Canadians on the team and so forth. But what does the team do?

SEN. HAGEL: So we have the possibility of a multinational team

--

MR. EIZENSTAT: No, sir --

SEN. HAGEL: -- visiting sites in America?

MR. EIZENSTAT: -- not unless we invite them and not unless the person on whose property they wish to go invites them.

SEN. HAGEL: And so if a farmer in Nebraska does not want to invite --

MR. EIZENSTAT: They will --

SEN. HAGEL: -- a United Nations team in to look at his soil, that's all he has to say is, "I don't want them in."

MR. EIZENSTAT: That is exactly correct. What will this intergovernmental team do? They will meet with U.S. government officials, just as they've already met with congressional staff, Senator, under Rio. They will look at our data. They will try to verify the data we supply.

But they will not be able to have the capacity to do intrusive investigations of sites without the approval of our government and without the approval of the person involved. And that's a very important thing to recognize. This is essentially self-reporting and it does not impose some U.N. secretariat swooping down on people, not only not unannounced but uninvited or unwanted.

SEN. HAGEL: But how is this enforced? If these are legally binding mandates, how, in fact, if that is the case, which you just said, how do you enforce this? Any other signatory to the treaty says, "I'm not interested in having you come look at my coal mine or my farm." So where is the enforcement here?

MR. EIZENSTAT: Okay. First of all, Annex 1 parties have to have in place a measurement system for greenhouse gas emissions. We already basically have ours. Most of the developed countries do. But this will be something that will provide a baseline for measurement.

Second, there will be this intergovernmental process, nominated by governments, who will take data from and meet with our officials.

Third, we will try to ensure compliance with the obligations by making it clear that countries that are not in compliance with the reporting requirements can't receive credits for joint implementation projects.

Now, fourth, there is a need -- and this will be elaborated also, and this is why we call it a work in progress -- this will also have to be elaborated, the precise rules that will govern compliance and enforcement, because we have this kind of an outline. It needs to be filled in.

MORE

SEN FOREIGN RELATIONS/EIZENSTAT

PAGE 37

02/11/98

SEN. HAGEL: So we don't yet know how this will work.

MR. EIZENSTAT: We know -- what we do know is there won't be any intrusive, unwanted, uninvited visits. What we do know is that it relies largely on national compliance. What we do know is that there's not going to be some international secretariat insisting on compliance. It will be done through an intergovernmental process in which we're fully involved. Filling out the details of that framework -- and that's why I call this a framework reaction -- will be the work over the next months and years. But we have taken out those concerns that people had, Senator Hagel, that there would be again some intrusive U.N.-mandated search swooping down unannounced, uninvited and unwanted. That will not happen.

SEN. HAGEL: When you say you've taken them out -- you took them out of what?

MR. EIZENSTAT: We assured that that was not in the protocol.

SEN. HAGEL: So those are unfounded concerns?

MR. EIZENSTAT: They are completely unfounded concerns.

SEN. HAGEL: Okay. Senator Kerry?

SEN. KERRY: Thank you, Mr. Chairman. Mr. Secretary, in response to the chairman's comment and inquiry simultaneously about sort of the 134 developing countries and the atmosphere and us being pushed around by that, it struck me to the contrary we were remarkably successful in holding our ground and achieving sort of a common-sense conclusion based on the merits of our arguments. And I thought you might just sort of summarize, if you would please, what you thought with the list of sort of accomplishments with respect to what we went in to fight for and what we came out with, just to make sure we are clear on the record.

MR. EIZENSTAT: I think it's very important, in response to Senator Kerry's comments -- and Senator Hagel, you obviously saw that as well -- that we recognize what was accomplished. The United States of America doesn't allow itself to be pushed around by anybody, and we didn't. We got multi-year budgeting rather than having one year, which other countries did not want. We got our budget period, 2008 to 2012, rather than the secretariat's and the EU's and Japan's, and the developing countries' earlier budgets which they wanted. We got the joint implementation with credit concept through the clean development mechanism. We got emissions trading. All of these and the kind of enforcement and compliance -- all of these were done notwithstanding the opposition, because we had clear positions, we had clear negotiating instructions from the president and vice president. We stuck to those. We achieved reasonable targets and timetables. We got flexible mechanisms. All of those were achieved.

Now, you are absolutely right, Senator Hagel, we did not get the binding obligations by developing countries. That's what we have to work on. But, by goodness, when you look at the opposition we had to all these other things, Senator Kerry, we got all of these, notwithstanding not only the objection of developing countries, but by the European Union. The six gases is another example. We -- this is something that not only our environmental community, but the business community that was in Kyoto insisted on. The EU and Japan didn't want six gases. They only wanted three, because it made their numbers look better, number one; and, number two, they knew they had rapidly growing gases in the other three areas -- more so perhaps than we did. They didn't want to cover it. We said no deal unless six gases. We got six gases covered. That also gives us at least a percent off of our commitment.

The sinks is another example. Again, this is a novel concept -- a notion that good forestry practices would somehow count in favor of our targets so that we could take them as credits -- and, again, we probably four percent or so on that -- three, four percent -- was a new concept -- not something that was immediately approved by either the developed or developing world. We worked through that opposition.

Let me put it very bluntly: every country, however anti-American their rhetoric may have been, knew there wasn't going to be an agreement unless the United States of America was a player, and if the central requirements were provided for. That didn't mean we got everything we wanted, but we got virtually everything that we came looking for, except the developing country piece. We got a downpayment on that, the joint implementation on credits and with other provisions that I mentioned, and that's what we had to work on.

SEN. KERRY: Thank you very much. In addition there were many

CEOs -- there are many CEOs of various companies in this country who are very excited about the prospects of what this treaty can accomplish. There are businesses that are very supportive of it, as there are some that are concerned about it. And you can draw the lines fairly clearly about what interests are represented there. But I wonder if you would share with the committee and those interested for the record why joint implementation, emissions trading and the clean development mechanism are in fact cause for business to view this positive, and what you think the up side for business is as a result? --

MR. EIZENSTAT: There are several up sides. First of all, when I was undersecretary at commerce for international trade, one of the areas that is the fastest growing U.S. export are environmental exports. We indeed created a whole new unit for environmental exports. And with Kyoto we are going to find that the demand under the clean development mechanism under joint implementation with credits as developing countries want more of this technology is going to be fantastic. The number of jobs that will be created through environmental exports, measurement devices and the like, is just going to be tremendous. It's really going to be an enormous growth area.

Second, what our industry said to us is don't impose carbon taxes -- don't put a top-down regulatory system -- give us the flexibility to meet these targets by market-driven mechanisms, and that's what emissions trading really does. It gives a company -- a utility in Nebraska or in Massachusetts the opportunity to joint venture in India or Pakistan, or South Korea or China, and not only provide that country with an incentive to begin to get involved in cleaning this problem up, but in getting a credit to boot so that they don't have to put an additional scrubber on perhaps -- they don't have to take additional demands on their own shoulders. In other words, it's the cheapest most efficient way -- economically, and it's environmentally sound, because it will encourage developing countries who want to sell these credits, and developed countries under Annex I, to do as much possible to have access credits that they can sell. And the same with the joint implementation clean development mechanism. This is a bridge between the developed and the developing world. It's a partnership. And again a company in Nebraska or in Massachusetts can do one of two things: It can invest in that particular power plant or forestry project in a developing country; but if it doesn't want to invest, it can just purchase the credit that comes from it. So in all of these ways we have done what industry wanted, which is provide flexible non-governmentally driven, non-tax-driven mechanisms.

SEN. KERRY: Mr. Chairman, I know my time is up -- can I have just one more question? Because I have to leave. I'd appreciate that.

Recently there was a letter, the so-called compass letter to the president from a number of former national security personnel, and this letter, signed by Jeane Kirkpatrick, Richard Cheney, Caspar Weinberger and others, suggested that the Kyoto treaty threatens to limit the exercise of American military power, quote, "by exempting -- only U.S. military exercises that are multinational and humanitarian, unilateral military actions, as in Grenada, Panama and Libya, will become politically and diplomatically more difficult." I know that is not in fact the case, but I would like to ask you for the record if you would address that question so that we can try to --

MR. EIZENSTAT: Well, first of all, there is not one person on that list that I don't respect. Each has served his country or her country in very positive ways, and what they say has to therefore be

taken seriously. It's unfortunately completely incorrect.

Everybody is entitled to at least one mistake in life. (Laughter.) If they would have checked with our uniformed military and with our Defense Department, they would know that every requirement, the Defense Department and the uniformed military who were at Kyoto by my side said they wanted, they got. This is self-defense, peacekeeping, humanitarian relief. And they even mention in there that this wouldn't have covered Grenada. That is not so. That is not so.. It covers not only multilateral operations expressly authorized by the Security Council, like Desert Storm and Bosnia; it also covers multilateral operations we initiate pursuant to the right of self-defense under the U.N. Charter. It does not have to be authorized by the U.N., and a perfect example of that is Grenada. When President Reagan went into Grenada to relieve that island of its Communist dictators, it was a multilateral effort that we initiated. It wasn't done pursuant to the U.N., but it was in effect pursuant to the charter, but not authorized by them. That's perfectly permissible. We got bunker fuels covered.

There was also a concern by our military, because of our unique situation with NATO, where we have troops based in South Korea and in Europe, and in many other countries, that somehow countries would want to throw out U.S. troops because they'd be concerned that somehow the emissions coming from bases and so forth would count against them. We got that taken care of, by allowing a negotiation. We are willing to assume that ourselves.

So I think it's a fair statement to say that our military really believes that we did what they wanted, that we produced what they wanted. And if there is anything else that is required, which I don't believe there to be, that can certainly be taken care of in implementing legislation.

SEN. KERRY: Mr. Secretary, thank you. I know that people in public life are easily targets these days, and public servants don't get a lot of credit. But I will say that you and your entire team -- I wish people in this country could have seen how hard and expertly and diligently you all labored on our behalf there. I thought it was a terrific job, and I thank you for it.

MR. EIZENSTAT: Thank you, senator.

SEN. KERRY: Thank you, Mr. Chairman.

SEN. HAGEL: Senator Kerry, thank you.

Mr. Secretary, if I could pick up on where Senator Kerry left off, on the military issue, the compass -- and you probably saw the full-page ad --

MR. EIZENSTAT: Yes, sir, I did.

SEN. HAGEL: -- in the paper this morning. And there's another aspect of it -- it's national sovereignty. And I would like very much to ask you to respond to that as well. But let's keep on the military point for a moment.

Are you saying that what essentially we've agreed to here would cover all United States unilateral military activity, that there is in fact a blanket exemption for our national defense forces?

MR. EIZENSTAT: What I am saying is that if we took care of those concerns the military has, and that includes those actions we unilaterally initiate that have a multilateral component, as almost everything we do does. For example, in Grenada we didn't go to the Security Council -- President Reagan didn't go to the Security Council, but he involved some of the Caribbean countries in that process, because we obviously want to have that kind of coalition.

Those are fully covered, even if the U.N. Security Council never approves it. So --

SEN. HAGEL: So in essence there is a blanket exemption for the United States military here?

MR. EIZENSTAT: There is the kind of exemption that they wanted, yes, sir.

SEN. HAGEL: Does that mean a blanket exemption? Did they ask for a blanket exemption?

MR. EIZENSTAT: They asked for what we gave them. That's what they asked for. I'm not trying --

SEN. HAGEL: They asked for what you gave them?

MR. EIZENSTAT: -- to be coy. We asked them, What do you need?, and this is what they told us, and this is what we --

SEN. HAGEL: So if I would ask any of our commanders, they would give me the same answer?

MR. EIZENSTAT: Well, if they were the same ones that were with me they certainly would, and I hope that that is the case. But --

SEN. HAGEL: You hope that's the case --

MR. EIZENSTAT: Yes, sir, because --

SEN. HAGEL: I want a little more precise answer than that, Mr. Secretary. I'm asking a question --

MR. EIZENSTAT: Well, I'll give --

SEN. HAGEL: -- of whether in fact they asked for a blanket exemption. And I don't know that answer.

MR. EIZENSTAT: I can tell you that in the meetings I participated in -- I don't know what happened in Virginia -- I can tell you in the meetings I participated in we asked them, What do you need? -- they told us, and we got them for us. And I also understand, although I was not privy to this, that there was a briefing by our uniformed military in our Defense Department of the committee that is responsible, the Armed Services Committee, in the either the Senate or House, that asked these questions, and that our military said that they were satisfied. Now, I have only that to go on.

SEN. HAGEL: Would you do this --

MR. EIZENSTAT: That's as precise an answer I can give you. They told me this is what they needed, this is what they produced, and I'm told they are satisfied with it.

SEN. HAGEL: When we say "they," or you say "they," who does that mean? Does that mean the chairman of the Joint Chiefs of Staff, or each of the chiefs of the various services, or you don't know?

MR. EIZENSTAT: I know that there was in Kyoto a representative of the Joint Chiefs of Staff who represented himself as representing the views of the Joint Chiefs of Staff, and I wouldn't say he kissed me, but he came darn close to it in terms of telling me how much he appreciated what we had done, and that they were satisfied with what was done.

SEN. HAGEL: Well, if you would provide for the record, since there's I think some unclear communication here as to, number one, what in fact was requested by the military; number two, who in fact requested it from the military; number three, was there any change or deviancy from that request. And I think if we got those three questions answered that would give us a clearer understanding of what exactly they asked for and who asked for it. Thank you.

May I go back, Mr. Secretary, to a previous conversation we had on administration implementation of this, and you've made it pretty clear that the United Nations -- still unclear as to what exactly their role is, but you made very clear that they would not be administering or implementing this treaty. So that then leads me to

believe that there would be agencies of our government that would be implementing the treaty -- I suspect agencies such as the EPA. If that in fact is correct -- and please direct me in the right area here as to how we comply -- what new laws and regulations will be required, and how will you move on those new laws and regulations in order for us to be in compliance?

MR. EIZENSTAT: That is something that we will be working on in the coming months, and we will be able to give you a more precise indication of that. I can give you one example of something that would require legislation if you ratify the treaty; and that is we would want to do not only an international trading regime, but we would have to do a domestic trading effort, and that would require legislation.

In terms of the enforcement process, I am not immediately aware of anything that would require new legislation. I think it can all be done within existing authorities. But certainly if something arises we will be working very closely to tell you. But I am not aware in the enforcement area that we require new laws.

SEN. HAGEL: And, as you said earlier, we don't need to worry about that now, because that won't happen, and it will not happen until the president would sign the treaty and the Senate would ratify it -- is that correct?

MR. EIZENSTAT: That is correct.

SEN. HAGEL: Any idea on the cost of compliance by industry or by region? Do we have any of those numbers? Have we looked at any of those things?

MR. EIZENSTAT: With your permission, again I am not an economist -- I have got enough problems being a lawyer, and don't have to take that additional burden on. But Janet Yellen will be testifying at the next available opportunity. Again, she would have been able to testify here had we been able to work the timing out with the economic report -- and we'll try to give you the best macroeconomic analysis we can.

SEN. HAGEL: But surely, Mr. Secretary, as you negotiated this -- and those prior to your tenure -- would have had to factor in some costs. I mean, the costs --

MR. EIZENSTAT: Yes, sir, we did, and we had with us a representative, John Gruber (sp) from the Treasury Department who had his handy computer, who at every turn, every time we made any significant proposal, or we received one, factored the costs in. He was in constant contact with Washington, with Treasury, and with the Council of Economic Advisers. And we didn't sneeze without getting an economic analysis of it.

SEN. HAGEL: You know, that's all interesting, but I find it even more interesting that you use those numbers, and you use some format for modeling -- had to -- certainly there is something available, but yet we have never been able to get any of that.

MR. EIZENSTAT: Well, as the World Resources Institute has indicated, there are scores of models. The models depend on different assumptions. And --

SEN. HAGEL: But I'm talking about the ones that you used --

MR. EIZENSTAT: Yes, sir.

SEN. HAGEL: -- to negotiate the deal in Kyoto.

MR. EIZENSTAT: Yes, sir.

SEN. HAGEL: And that's the only one I've ever been interested in -- and my colleagues -- as to how did you then use the economic piece of this, and how was that factored in, and what numbers did you use and where did they come from?

MR. EIZENSTAT: They came from Treasury and the Council of Economic Advisers, which in turn relied on other models which they will be prepared -- which Janet Yellen will be prepared to testify --

SEN. HAGEL: And we'll look forward to that.

MR. EIZENSTAT: -- about in great detail.

SEN. HAGEL: Mr. Secretary, we kept you a long time. As always, we are grateful for you and the work you do for this country.

MR. EIZENSTAT: Thank you, senator.

SEN. HAGEL: And thank -- am I supposed to do anything else? Well, I guess just remind you that all comments, additional points, anything for the record -- we'll keep it open for a couple of days, and then I'll be sending up some additional questions as well.

MR. EIZENSTAT: Thank you for your courtesy.

SEN. HAGEL: Mr. Secretary, thank you. (Sounds gavel.)

END

**COMMITTEE ON SCIENCE
U.S. HOUSE OF REPRESENTATIVES**

HEARING CHARTER

*The Road from Kyoto—Part 2:
Kyoto and the Administration's Fiscal Year 1999 Budget Request*

**February 12, 1998
10:00 a.m.-Noon
2318 Rayburn House Office Building**

1. Purpose of the Hearing

This hearing will examine the Administration's Fiscal Year (FY) 1999 budget proposals related to the Kyoto Protocol and the Protocol's requirement that the U.S. reduce its net greenhouse gas (GHG) emissions by 7 percent below 1990 levels. In particular, the hearing will consider the Climate Change Technology Initiative (CCTI)—a five-year (FY 1999-FY 2003), \$2.710 billion research and technology initiative and a \$3.635 billion package of tax credits—to reduce U.S. GHG emissions. In addition, the testimony will be presented on the FY 1999 budget request for the U.S. Global Change Research Program (USGCRP).

2. Background

On October 22, 1997 President Clinton announced the U.S. position with respect to the climate change negotiations to be held at the Third Session of the Conference of Parties to the UN Framework Convention on Climate Change (COP-3) in Kyoto, Japan from December 1-11, 1997. The President's proposal contained three elements. First, the U.S. would commit to a binding target of returning emissions to 1990 levels in a budget period between 2008 and 2012, to reducing net emissions of all GHGs below 1990 levels in the five-year period thereafter (between 2013 and 2018), and would work for further reductions in the years beyond that. Second, it called for a series of flexible market mechanisms, including emissions trading and joint implementation. And third, the U.S. would not assume binding obligations without the "meaningful participation" of key developing countries.

President Clinton also announced a domestic program—including a \$5 billion series of tax incentives and research investments—to encourage energy efficiency and the use of cleaner energy, and proposed the creation of a domestic market-based system for reducing emissions tying national efforts into a global emissions market. Subsequently, on December 11, 1997, the U.S. negotiators agreed to the terms of the Kyoto Protocol, which included a 7-percent cut below 1990 in U.S. net GHG emissions in the period 2008-2012.

During his State of the Union address on January 27, 1998, President Clinton said that the "overriding environmental challenge tonight is the worldwide problem of climate change, global

warming, the gathering crisis that requires worldwide action.” And he proposed “\$6 billion in tax cuts and research and development to encourage innovation, renewable energy, fuel-efficient cars, energy-efficient homes.”

3. FY 1999 Budget Proposals

The President’s FY 1999 budget request released on February 2 includes: (1) the Climate Change Technology Initiative (CCTI) —a five-year (FY 1999-FY 2003), \$2.710 billion research and technology initiative and a \$3.635 billion package of tax credits—to reduce U.S. GHG emissions; and (2) \$1.864 billion for the U.S. Global Change Research Program (USGCRP).

3.1 Climate Change Technology Initiative (CCTI)

The CCTI research and technology effort is led by the Department of Energy (DOE) and the Environmental Protection Agency (EPA), and also includes activities of the National Institute of Standards and Technology (NIST) and the Departments of Agriculture (USDA) and Housing and Urban Development (HUD). As shown in Tables 1, 2, and 3, the FY 1999 budget proposes a combined \$2.710 billion increase over five years for these agencies for energy efficiency, renewable energy, and carbon-reduction technologies impacting a number a key sectors. In addition, the budget proposes \$3.635 billion in tax credits over the same five-year period; and Table 4 includes a brief description of each of these credits.

Table 1. CCTI (Agencies)
(Direct Programs and Tax Credits in Millions of Dollars)

AGENCIES					
Selected Agencies	1997 Actual	1998 Estimate	1999 Proposed	Total Increase 1998- 1999	Total Increase 1999- 2003
DOE.....	657	729	1,060	+331	+1,899
EPA.....	86	90	205	+115	+677
Commerce (NIST).....	0	0	7	+7	+38
HUD.....	0	0	10	+10	+10
USDA.....	0	0	10	+10	+86
Subtotal, budget authority.....	743	819	1,292	+473	+2,710
Tax Credits.....	0	0	421	+421	+3,635
Total Initiative.....	743	819	1,713	+894	+6,345

Table 2. CCTI (Sectors)
(Direct Programs and Tax Credits in Millions of Dollars)

SECTORS						
Key Sectors/Topics	1998 Estimate	1999 Proposed	1999 Tax Credits	Total 1999	Total Increase 1998- 1999	Total Tax Credits 1999- 2003
Buildings.....	146	264	136	400	+254	1,696
Transportation.....	246	356	4	360	+114	744
Industry.....	156	216	275	492	+336	1,004
Electricity.....	220	332	5	317	+97	191
Carbon Sequestration and Cross-Cutting						
Research	0	42	0	42	+42	0
Policy Analysis, Market Incentives	6	26	0	26	+20	0
Program Direction.....	45	57	0	57	+12	0
Total	819	1,292	421	1,713	+894	3,635

Table 3. CCTI TAX CREDITS (Sector)
(In millions of dollars)

Sector/Tax Credit	Estimate						Total 1999- 2003
	1998	1999	2000	2001	2002	2003	
<u>Buildings</u>							
Provide tax credit for energy-efficient building equipment.....	0	123	223	283	341	409	1,379
Provide tax credit for the purchase of new energy-efficient homes.....	0	0	23	38	54	75	197
Provide tax credit for rooftop solar equipment.....	0	6	16	4	31	43	160
<u>Transportation</u>							
Provide tax credit for high-fuel-economy vehicles.....	0	0	0	60	200	400	660
Equalize treatment of parking and transit benefits.....	0	4	11	16	23	30	84
<u>Industry</u>							
Provide investment tax credit for combined heat and power (CHP) systems.....	-10	270	281	113	95	183	942
Provide tax credit for replacement of certain circuitbreaker equipment.....	0	3	9	11	8	5	36
Provide tax credit for certain perfluorocompound (PFC) and hydrofluorocompound (HFC) recycling equipment.....	0	3	7	7	6	3	26
<u>Electricity</u>							
Extend wind and biomass tax-credit.....	0	5	20	38	55	73	191
Total, Tax Credits.....	-10	421	590	590	813	1,221	3,635

Table 4. DESCRIPTION OF CCTI TAX CREDITS

Sector/Tax Credit	Description
Buildings	
Provide tax credit for energy-efficient building equipment	No income tax credit is provided currently for investment in energy-efficient building equipment. The Administration proposes to provide a new tax credit for the purchase of certain highly efficient building equipment technologies, including fuel cells, electric heat pump water heaters, natural gas heat pumps, residential size electric heat pumps, natural gas water heaters, and advanced central air conditioners. The credit would equal 20 percent of the amount of qualified investment, subject to a cap. The credit generally would be available for equipment purchased over the five-year period beginning January 1, 1999 and ending December 31, 2003.
Provide tax credit for the purchase of new energy-efficient homes	No income tax credit is provided currently for investment in energy-efficient homes. The Administration proposes to provide a tax credit to taxpayers who purchase, as a principal residence, certain newly constructed homes that are highly energy efficient. The credit would equal one percent of the purchase price of the home, up to a maximum of \$2,000. The full credit would be available for homes purchased between January 1, 1999 and December 31, 2003. A credit of up to \$1,000 would be available for homes purchased between January 1, 2004 and December 31, 2005.
Provide tax credit for rooftop solar equipment	Current law provides a 10 percent business energy investment tax credit for qualifying equipment that uses solar energy to generate electricity, to heat or cool, to provide hot water for use in a structure, or to provide solar process heat. The Administration proposes to make a new tax credit available for purchasers of rooftop photovoltaic systems and solar water heating systems located on or adjacent to the building for uses other than heating swimming pools. (Taxpayers would have to choose between the proposed credit and the current-law tax credit for each investment.) The proposed credit would be equal to 15 percent of qualified investment up to a maximum of \$1,000 for solar water heating systems and \$2,000 for rooftop photovoltaic systems. It would apply only to equipment placed in service after December 31, 1998 and before January 1, 2004 for solar water heating systems and after December 31, 1998 and before January 1, 2006 for rooftop photovoltaic systems.
Transportation	
Provide tax credit for high-fuel-economy vehicles	No income tax credit is provided currently for purchases of highly fuel-efficient vehicles. The Administration proposes to provide a credit of \$4,000 for each vehicle that gets three times the base fuel economy for its class. The \$4,000 credit would be available for purchases of qualifying vehicles after December 31, 2002. This credit would phase down beginning in 2007 and phase out in 2010. A \$3,000 credit would also be provided for purchases of vehicles achieving two times the base fuel economy for their class. The \$3,000 credit would be available for purchases of qualifying vehicles after December 31, 1999. This credit would phase down beginning in 2004 and phase out in 2006.
Equalize treatment of parking and transit benefits	Under current law, employer-provided transit and vanpool benefits are only excluded from income if such benefits are in addition to, not in lieu of, other compensation. Under the Taxpayer Relief Act of 1997, however, parking benefits are excluded from income even if offered in lieu of other compensation. The Administration proposes to allow employers to offer their employees transit and vanpool benefits in lieu of compensation, beginning January 1, 1999, thus granting transit and vanpool benefits the same treatment as parking benefits. Also under current law, up to \$155 per month (in 1993 dollars) in employer-provided parking benefits and \$60 per month (in 1993 dollars) in employer-provided transit and vanpool benefits are excludable from income. The Administration proposes to raise the monthly limit on employer-provided transit and vanpool benefits excludable from income to be the same as the limit on parking.
Industry	
Provide investment tax credit for combined heat and power (CHP) systems	Combined heat and power (CHP) assets are used in the production of electricity and process heat and/or mechanical power from the same primary energy source. No tax credits are currently available for investment in CHP property. The Administration proposes to establish a 10-percent investment credit for CHP systems in order to encourage and accelerate investment in such equipment. The credit would apply to property placed in service in the United States after December 31, 1998, and before January 1, 2004.
Provide tax credit for replacement of certain circuitbreaker equipment	The chlorofluorocarbon substitute sulfur hexafluoride (SF ₆) is used in some large power circuit breakers used in the transmission and distribution of electric power. The Administration proposes to make a tax credit available for the installation of new power circuit breaker equipment to replace certain circuit breakers that are prone to leak SF ₆ . The credit would be equal to 10 percent of qualified investment. To be eligible for the credit, the replaced power circuit breakers must be dual pressure circuit breakers with a capacity of at least 115kV, contain SF ₆ , and have been installed prior to December 31, 1985. The replaced equipment must be destroyed so as to prevent further use. The credit would apply only to new equipment placed in service in the five-year period beginning January 1, 1999 and ending December 31, 2003.
Provide tax credit for certain perfluorocompound (PFC) and hydrofluorocompound (HFC) recycling equipment	Under current law, semiconductor manufacturers who install equipment to recover or recycle PFC and HFC gases used in the production of semiconductors may depreciate the cost of that equipment, but no tax credit is provided for the purchase of such equipment. The Administration proposes to provide a 10 percent tax credit for the installation of qualified PFC/HFC recovery or recycling equipment to recover gases used in the production of semiconductors. Equipment would qualify for the credit only if it recovers at least 99 percent of the PFCs and HFCs and the equipment is placed in service in the five-year period beginning January 1, 1999 and ending December 31, 2003.
Electricity	
Extend wind and biomass tax-credit	Current law provides taxpayers a 1.5-cent-per-kilowatt-hour tax credit, adjusted for inflation after 1992, for electricity produced from wind or "closed-loop" biomass. The electricity must be sold to an unrelated third party and the credit applies to the first 10 years of production. The current credit applies only to facilities placed in service before July 1, 1999, after which it expires. The Administration proposes to extend the current credit for five years, to facilities placed in service before July 1, 2004.

Agency Programs

DOE: +\$331 Million

DOE has yet to provide a detailed breakdown of its CCTI programs. However, major increases include the following:

- *Buildings Energy Conservation*—+\$39.5 million, including +\$19.7 million to increase the efficiency of lighting, refrigerators, air-conditioning systems and other building equipment and +\$13.4 million to improve whole building designs.
- *Transportation Energy Conservation*—+\$52.8 million, the bulk of which is to accelerate efforts under the Partnership for a New Generation of Vehicles (PNGV) and for work on light and heavy trucks.
- *Industry Energy Conservation*—+\$30.4 million, including +\$23.2 million for Industries for the Future and +\$4.8 million for Motor Challenge.
- *Electricity*—+\$100.0 million for solar and renewables, +\$22.6 million for coal, +\$10.0 million for a Nuclear Energy Plant Optimization program, and +\$24 million for a Nuclear Energy Research Initiative.
- *Energy Research (+11.0 million)*—Expansion of ongoing basic research programs.

EPA: +\$115 Million

EPA's FY 1999 budget requests \$231 million and 331 workyears for Climate Change, of which \$205.4 million and 252 total workyears are for the CCTI. According to EPA's budget justifications the CCTI effort include the following initiatives:

- *Buildings Initiatives (+\$39.3 million)*—promote greenhouse gas reduction and improve energy performance of facilities by increasing awareness of energy efficient technology that is applicable for both residential and commercial buildings, including its Energy Star Buildings, Energy Star Homes and Energy Star appliance labeling programs.
- *Transportation Initiatives (+\$37.1 million)*—accelerate efforts the PNGV and development of a low-NOx methanol-fueled diesel engine.
- *Industry Initiatives (+\$30.7 million)*—consult with key industries to develop greenhouse gas reduction strategies, promote the deployment of clean technologies, and build a program that credits industry for early action.

- *Domestic and International Implementation (+\$5.4 million)*—outreach to State and local entities to integrate Climate Change into programs and policies and engage developing countries in the implementation of Climate Change protocols.
- *Carbon Removal (+\$3.4 million)*—work with forest products sector to achieve greater reliance on biomass fuels as an energy source and to be a supplier of carbon sequestration credits through afforestation and reforestation activities.

NIST: +\$7 Million

NIST's CCTI contribution is to improve GHG measurements and data. NIST will also support biotechnology work on plant metabolism and carbon use.

HUD: +\$10 Million

HUD is to manage the new Partnership for Advancing Technologies in Housing (PATH) in conjunction with DOE and EPA. PATH's purpose is to develop, demonstrate and deploy housing technologies and practices so that homes can be built cheaper, more environmentally sustainable, more disaster resistant, and provide a safer working environment.

USDA: +\$10 Million

USDA, in partnership with DOE, will support additional research on the conversion of wood and crop wastes and energy crops to fuels and electricity. In addition, USDA will initiate research on enhancing the carbon-sequestering capabilities of agricultural species.

3.2 U.S. Global Change Research Program (USGCRP)

The U.S., through the multi-agency U.S. Global Change Research Program (USGCRP), established in 1989, supports the largest global change research program in the world. The current (FY 1998) program funding totals \$1.867 billion, including more than \$1.12 billion for NASA's Mission to Planet Earth program. NASA also funds an additional \$295 million in scientific research related to global climate change. Other major global change research funding includes \$167 million for the National Science Foundation, \$113 million for the Department of Energy, \$62 million for the National Oceanic and Atmospheric Administration, and \$58 million for the Department of Agriculture.

The FY 1999 USGCRP request, shown in Table totals \$1.864 billion, or \$3 million less than the current year level of \$1.864 billion.

Table 5. USGCRP
(in Millions of Dollars)

Agencies	1997 Actual	1998 Estimate	1999 Proposed	Total Increase 1998- 1999
<u>Scientific Research</u>				
USDA.....	57	58	59	+1
DOC/NOAA, DOC/NIST.....	62	62	71	+9
DOE.....	109	108	113	+5
DOI.....	29	29	29	0
EPA.....	14	15	21	+6
HHS.....	4	4	5	+1
NASA.....	252	295	275	-20
NSF.....	166	167	187	+20
SI.....	7	7	7	0
TVA.....	1	0	0	0
Subtotal, Scientific Research.....	701	744	767	+23
<u>Space-Based Observatiuon Programs</u>				
NASA.....	1,116	1,123	1,097	-26
Total USGCRP.....	1,818	1,867	1,864	-3

* economic benefits

**TESTIMONY OF
DAVID M. GARDINER
ASSISTANT ADMINISTRATOR FOR
POLICY, PLANNING AND EVALUATION
U.S. ENVIRONMENTAL PROTECTION AGENCY
BEFORE THE
COMMITTEE ON SCIENCE
UNITED STATES HOUSE OF REPRESENTATIVES**

February 12, 1998

Mr. Chairman, and Members of the Committee, thank you for this opportunity to testify on the Administration's plans to address global warming. Our goal is to develop, in consultation with the Congress and the American people, international and domestic strategies to address global warming that are environmentally sound and economically sensible.

I am pleased to report that we have made substantial progress towards that goal in the last several months. On October 22 of last year, President Clinton announced his climate change proposal. He described the Administration's international negotiating goals and our plans to move ahead to address climate change domestically. In December, U.S. negotiators reached agreement with other nations on the Kyoto Protocol. Although more work remains to complete the agreement, it bears the unmistakable imprint of U.S. demands for realistic targets and timetables, coverage of all greenhouse gases, national flexibility and market-based mechanisms for control. Finally, just last week in his budget announcement, the President unveiled the Climate Change Technology Initiative, a \$6.3 billion, five-year package of tax credits and investments in technology that make sense right now and will put the Nation on a smooth path to meeting our international obligations.

Decisions on what to do about any environmental problem *begin* with the science. The President's Science Advisor, Dr. Jack Gibbons, has given the Committee a comprehensive presentation of the scientific evidence for global warming and for the broad range of serious adverse impacts that lie in wait for us if we do not begin to reduce greenhouse gas emissions. Let me emphasize several points that are particularly important from the standpoint of the Environmental Protection Agency, which is charged with the responsibility to protect the health and the environment of the American people.

First, global warming endangers Americans' health, especially the health of our children, grandchildren, and future generations. Unless we begin to act:

- ▶ According to the Intergovernmental Panel on Climate Change, representing 2,000 leading scientific experts from around the world: "Climate change is likely to have wide ranging and mostly adverse impacts on human health, with significant loss of life."
- ▶ There will be more frequent and more intense heat waves. Deaths directly attributable to heat waves in the U.S. could more than double by the middle of the next century.
- ▶ Hotter weather may lead to more frequent and more intense smog episodes, causing more deaths and illnesses from air pollution.
- ▶ Pest-borne tropical diseases may spread across our borders as warmer temperatures expand the range of disease-carrying insects and rodents.
- ▶ There will be more frequent and severe droughts and floods, causing deaths and injuries, as well as huge property losses.
- ▶ Sea level will rise, exposing coastal areas to higher storm surges, with greater threats to health and safety, and more property damage. Salt water intrusion into coastal aquifers will endanger the drinking water supplies for millions of Americans.

Second, global warming endangers Americans' environment. If we do not act, our children and grandchildren will see our forests, rivers, and other natural resources stressed and threatened as never before.

- ▶ By the end of the next century, rising sea levels could drown 4000 square miles of our ecologically-critical coastal wetlands. Five thousand square miles of dry land in states like Louisiana and Florida could be lost under water.
- ▶ Trout and other fish species could be entirely wiped out in many states -- depriving millions of our children and grandchildren of the simple pleasures of fishing.
- ▶ Forests and habitats will be lost in many states as climatic ranges shift faster than plant or animal species can migrate. Maple trees could die out in the Northeast, wiping out the fall colors of New England forever. Glaciers may disappear from Glacier National Park. About one-third of the Florida Everglades, now being protected at significant cost, has an elevation of less than 12 inches and is highly vulnerable to sea level rise.

Third, health and environmental impacts such as these will have profound economic costs as well. Simply put, if we do not act, global warming will threaten the cleaner and healthier air, water and natural resources which the last six Presidents and 14 Congresses have worked so hard to restore and protect. We cannot allow this to happen.

In short, the immense threat posed by global warming is why the achievement in Kyoto is so important. Without repeating the detailed explanation of the Kyoto Protocol this Committee heard last week, I would note only that the Kyoto agreement embodies our key proposals for an achievable target on a realistic timetable, maximum national flexibility, and maximum use of market-based implementation tools. The agreement allows American businesses and consumers a decade of lead-time to adopt the technologies and practices needed to meet our emissions target. The agreement also includes the flexibility of a five-year budget period, covers all six important pollutants (allowing the flexibility of greenhouse-gas trade-offs), and includes three forms of international market-based emissions trading. The agreement rejected proposals by other countries for overly ambitious targets, unattainably short deadlines, and inflexible mandatory policies and measures.

To be sure, there is much more work to be done. In the coming year and beyond, we will work with other nations, both multilaterally and bilaterally, to fill in key implementation details and to obtain greater participation from key developing nations.

The question before us now is what should be done domestically while we pursue this agenda for further international work. Some may say that we should do nothing at all at home until all countries are fully on board and all the details are filled in. But such a course has two big drawbacks.

First, there are many voluntary steps to cut greenhouse gas emissions that make complete economic sense to undertake now, regardless of any international agreement. Improving the energy-efficiency of our businesses, homes, and vehicles and taking other steps to reduce greenhouse gas pollution can save large amounts of money and make our economy more productive.

Second, reasonable people who differ on the need for the Kyoto Protocol can still agree that it would be prudent to use the decade of lead-time provided by the Protocol to take reasonable steps to reduce greenhouse gas emissions that have numerous other benefits to the economy and the environment, and that will best position American businesses and the American economy for further action as the science evolves.

Third, as the most innovative economy in the world and the largest contributor to greenhouse gas pollution, the United States must take the lead in responding to this immense global environmental threat. By acting, and not just talking, we can assume moral leadership,

send an important market signal to the rest of the world, and make it easier to recruit other nations to do their share.

That is why last October President Clinton proposed the Climate Change Technology Initiative (CCTI). The President has proposed \$6.3 billion in targeted tax cuts and program investments over five years to speed the adoption of today's cost-effective energy-efficient and low-carbon technologies throughout the economy, and to hasten the development of even more advanced technologies for tomorrow.

Through our current programs implemented under the 1993 Climate Change Action Plan (CCAP), EPA and the Department of Energy (DOE) are already helping American businesses and consumers save money by employing energy efficient technology when replacing obsolete equipment or expanding. These technologies also can often enhance businesses' overall productivity.

The latest example, announced by Vice President Gore last month, is the new "Energy Star" partnership, under which the major TV and VCR manufacturers will make products that use less energy. Your current TV uses energy even when it is turned off as circuits respond instantly when you press the remote control. The new machines will sharply cut the amount of energy used when off, reducing pollution by up to a million tons of carbon per year, and saving consumers up to \$500 million per year on their electric bills. TVs and VCRs with the "Energy Star" label soon will be in stores across the country.

EPA's existing CCAP programs are expected to reduce U.S. greenhouse gas emissions by more than 40 million tons of carbon equivalent (MMTCE) in 1999. EPA's partnerships are expected to reduce annual U.S. energy expenditures by more than \$25 billion by 2010. The

President's Climate Change Technology Initiative includes funds for EPA to expand these technology deployment partnerships to reach more businesses and consumers, and to cover more products and technologies. The CCTI also includes funds to carry out the President's call for industry-by-industry consultations to develop voluntary but aggressive strategies to reduce emissions of greenhouse gases.

At EPA, we know from experience that voluntary and partnership programs work.

Several recent successes demonstrate the potential from these approaches:

- ▶ *Aluminum Industry Partnership.* EPA has forged agreements with 90% of the aluminum industry to reduce their emissions of perfluorinated compounds (PFCs), which are potent greenhouse gases, by 40-60% by 2000. With key technical support from EPA, the companies are well on their way to meeting their commitments.
- ▶ *Metal Finishers Agreement.* Through EPA's Common Sense Initiative, the metal finishing industry has committed to improving energy efficiency by 25% by the year 2002, while reducing other toxic chemicals.
- ▶ *Green Lights and Energy Star Buildings.* U.S. companies and organizations joined EPA's Green Lights and ENERGY STAR Buildings Programs, they could reduce the carbon dioxide emissions due to the energy used in commercial buildings by 35 percent and reduce commercial buildings' energy bills by \$25 billion per year.
- ▶ **Quad Graphics, Pewaukee, WI.** Through EPA's Green Lights program Quad Graphics has installed energy efficient lighting in its buildings, preventing more than four thousand tons of carbon dioxide emissions -- equivalent to eliminating the emissions of more than 1,000 cars. The company is saving more than \$250,000 every year on its energy bills -- and enjoying better lighting quality.
- ▶ **New York State.** These opportunities are available not only to private companies, but to all types of organizations. Through EPA's Energy Star Buildings and Green Lights programs, the State of New York is currently saving New York taxpayers more than \$2.5 million per year on state energy bills, while preventing more than 16 thousand tons of carbon dioxide emissions.
- ▶ *Climate Wise.* Since 1994, 392 companies, representing 8.5% of U.S. industrial energy use, have joined Climate Wise, including: British Petroleum, DuPont, 3M, Johnson & Johnson, General Motors, Boeing and more than 200 small and medium-sized companies.

Companies have submitted Action Plans detailing more than 700 emissions reductions actions that they estimate will reduce greenhouse gas emissions by more than 5 million metric tons of carbon equivalent by the year 2000. In the process they expect to save more than \$300 million. Here are some examples of what they're doing:

- ▶ **General Motors** reduced more than 54,500 metric tons of carbon per year by switching to natural gas at five steam-generating facilities. In addition, the first of 11 facility energy audits has identified procedural changes and projects saving 19% of total energy use.
- ▶ **DuPont** estimates that its actions will reduce emissions of greenhouse gases equivalent to 18 million metric tons of carbon dioxide by the year 2000. DuPont's energy efficiency improvements include switching boiler fuels, improving steam balance, decreasing waste heat and optimizing system performance in aeration blowers. Energy efficiency actions saved the company \$31 million in 1995 alone.
- ▶ **IBM** estimates that their energy efficiency projects will reduce greenhouse gas emissions by 60,000 metric tons and save the company \$5.5 million in the year 2000. Their actions include changes in process and facility design and improvements in energy metering and monitoring that will help them to better identify energy efficiency opportunities.
- ▶ **Motorola-Austin** reduced annual carbon emissions by more than 4,740 metric tons per year and saved more than \$1 million in 1996 alone by optimizing the performance of their boilers, insulating steam lines and repairing faulty insulation.
- ▶ **Lockheed Martin** estimates that it will achieve annual cost savings of \$175,000 and prevent the emission of 1,750 tons of carbon dioxide each year by committing to efficiency measures including boiler and process cooling efficiency, and the development of an energy automation program at facilities around country.

The Initiative also includes additional resources for research and development in key areas of energy-efficient technology. These R&D resources will allow EPA to accelerate its work under the Partnership for a New Generation of Vehicles (PNGV) to help develop cars and light trucks that get three times the fuel economy of current models, with comparable performance, safety, amenities, and cost. Working with industry and with DOE and other agencies, we will

also undertake a partnership to develop delivery and long-haul trucks that achieve significantly greater fuel economy while meeting stringent emissions targets.

The Initiative also includes \$3.6 billion over five years in targeted tax cuts to help businesses and consumers buy and adopt these technologies.

- ▶ Tax credits for highly fuel efficient vehicles: This credit would be \$4,000 for each vehicle that gets three times the base fuel economy for its class beginning in 2003. A credit of \$3,000 would be available beginning in 2000 for vehicles that get double the base fuel economy for its class. These credits would be available to jump start these markets and would be phased out over time.
- ▶ Tax credits for energy efficient equipment: These credits (all of which are subject to caps) would include a 20% credit for purchasing certain types of highly efficient building equipment, a 15% credit for the purchase of rooftop solar systems, and a 10% credit for the purchase of highly efficient combined heat and power systems.

Under the CCTI, EPA will expand its efforts in each sector of the economy in order to target the key opportunities for win-win emissions reductions that protect the environment while promoting economic growth. Key areas where EPA is expanding its efforts include the following:

1. Industry Initiatives -- the President has invited entire industries to work with the Federal government and develop greenhouse gas plans. In addition to its partnerships with individual companies, EPA will consult with key industries to develop voluntary but aggressive strategies for further greenhouse gas reductions that improve overall productivity and promote the deployment of clean technologies such as the use of industrial combined heat and power, and to build a program that appropriately rewards early action. EPA will seek dialogue with key stakeholders throughout industry and the NGO community.

2. Transportation Initiatives -- EPA will accelerate its efforts under the Partnership for a New Generation of Vehicles (PNGV), and will develop enabling technology for production

prototypes for delivery and long-haul trucks that would achieve significant increases in fuel economy while meeting stringent emissions targets. The National Academy of Sciences has determined that EPA's renewable fuels application for 4SDI engines is the lead PNGV candidate technology. When complete, EPA's design will provide the basis for a viable and proven concept vehicle for commercialization. It will also provide a strong technical base from which to initiate additional EPA research into similar technologies for light truck application. EPA will also expand its work with state and local decision-makers to develop and implement transportation improvements that encourage "livable communities" -- compact, walkable and mixed use development -- while reducing the growth in vehicle travel, emissions, and congestion.

3. Buildings Initiatives. The buildings sector, which includes both homes and commercial buildings, offers a large potential for carbon reductions using technologies that are on the shelf today. However, consumers and businesses continue to invest substantial resources in equipment that is relatively energy inefficient, resulting in higher energy bills and higher pollution levels. One of the key challenges over the next decade will be to overcome market barriers, such as the lack of reliable information, and improve the markets for energy-efficient products. EPA will expand its partnerships with equipment manufacturers and building owners in order to provide reliable, easily understood information to a greater segment of the residential and commercial markets. EPA will also expand its work to support other Federal agencies in improving the energy performance of their facilities.

4. Carbon Removal. EPA working with the U.S. Department of Agriculture will encourage the forest products sector to achieve greater reliance on biomass fuels as an energy source and be a supplier of carbon sequestration credits through afforestation and reforestation

activities. EPA will accelerate efforts to promote the use of livestock based fertilizer products and more efficient use of nutrients from all sources.

5. Crosscutting Analysis and Approaches. To build support for and the institutional capacity needed to implement a domestic and international carbon emissions trading program, EPA will work with developing nations and states and localities. Emissions from developing countries are growing rapidly and are projected to exceed those of developed countries within the next forty years. An effective, efficient global solution to climate change must be market-based and must involve both developed and developing countries. The Administration and EPA will work to secure additional international support for the American vision of global climate protection reflected in the Kyoto Protocol by assisting key developing countries in their efforts to reduce greenhouse gas emissions and address global climate change. EPA will also expand its work with states, which are key players, in efforts to reduce greenhouse gas emissions. EPA will provide support to states to help develop emission inventories and voluntary action plans, and implement and expand promising policy options identified by states in the greenhouse gas mitigation plans.

While these actions are justified on the economics and their contribution to climate change, they also help the environment in other ways. Fossil fuel combustion is not only the major source of US greenhouse gas emissions, but also of conventional air pollutants (e.g., particulate matter, oxides of nitrogen, volatile organic compounds, carbon monoxide, etc.). A vast, peer-reviewed scientific literature has conclusively linked U.S. air pollution with heightened risks of mortality, chronic bronchitis, congestive heart failure, ischemic heart disease, and other serious illnesses. Children and the elderly are the most vulnerable to the effects of poor air

quality. Thus, if we take these measures to combat global climate change, we will also reap immediate public health benefits in the form of cleaner air and cleaner water. Let me give you some examples:

- ▶ The Lancet, a highly respected British medical journal, recently published a peer-reviewed study of the particulate matter-related health impacts of fairly aggressive, worldwide greenhouse gas mitigation. The analysis found that an estimated 8 million deaths globally due to exposure to fine particles could be avoided between 2000 and 2020 if substantial steps were taken to limit greenhouse gas emissions from burning fossil fuels. In the United States alone, the study reports that thousands of deaths annually could be avoided during the 2000-2020 period. EPA's recently promulgated fine particulate standard begins to address this public health concern and should result in both some reductions in greenhouse gas emissions along with reducing the number of deaths associated with exposure to fine particles.
- ▶ In addition to health benefits, greenhouse gas mitigation would lead to improved visibility, more and better recreational opportunities, and reduced nitrogen deposition in vulnerable water bodies (such as the Chesapeake Bay). These benefits, however, have not yet been studied as thoroughly as the health impacts cited above.
- ▶ In 1999, EPA's CCTI programs alone are expected to also reduce NOx emissions by 90,000 tons per year, improving both air and water quality.

The President's CCTI makes sense right now: it hedges our risk of climate change and puts us on the right path should the science dictate more rapid reductions would be required in the future, it saves businesses and consumers money, and it reduces other dangerous forms of pollution.

In closing, I think it's clear that the Administration is delivering on its commitment to an environmentally sound and economically sensible approach. We are closely monitoring the science to make sure that our actions are proportionate to the risks we face. Internationally, we successfully negotiated a definitively American blueprint for the global response to climate change: targets and timetables, national flexibility, market-based approaches and developing

country participation. The tax credits and programs in the President's Climate Change Technology Initiative will provide economic and environmental benefits right now, while stimulating early action and positioning the United States to prosper in the global market for clean technologies that will provide the solution to global warming. We look forward to continuing to work with the Congress, the private sector and the American people as we move forward. I will be happy to answer any questions that you may have.

* * *

TESTIMONY OF
JOHN H. GIBBONS
ASSISTANT TO THE PRESIDENT FOR SCIENCE AND TECHNOLOGY
BEFORE THE
COMMITTEE ON SCIENCE
UNITED STATES HOUSE OF REPRESENTATIVES

HEARING ON GLOBAL CLIMATE CHANGE
FEBRUARY 12, 1998

Introduction

Thank you for providing the opportunity to talk to you today about the U.S. Global Change Research Program's (USGCRP) current and planned activities. The best way to describe how these activities relate to the Kyoto Protocol is to describe the current state of scientific knowledge of climate change, a significant portion of which is the product of our Nation's strong support for the USGCRP since its inception.

The USGCRP began as a Presidential Initiative in 1989, and was codified by the Global Change Research Act of 1990. The program has been strongly backed by every Administration and Congress since its inception. The FY 1999 Budget Request demonstrates President Clinton's ongoing commitment to the program, with an overall request of approximately \$1.86 billion dollars. The President and the Vice President believe that global change research is one of the foundations of a sustainable future. The Administration looks forward to working with the Congress to carry on this bipartisan tradition of support for sound science.

I want to emphasize that the planning of the USGCRP budget and research programs for this year, or any year, were not directly impacted by the Kyoto negotiations. The USGCRP is not a policy-driven program, but rather is driven by critical science questions and the need to develop a long term understanding of the scientific information that is of most relevance to U.S. policy makers. The results obtained through the sustained USGCRP research effort over the past decade have been very helpful in U.S. government climate change policy deliberations. As we look ahead to the next decade of global change research, it is apparent that much of the USGCRP research effort is addressing questions of ecological impacts and rates of change, both of which are relevant to the decisions the world must make about long term emissions trajectories beyond 2010.

The USGCRP, along with the global change research efforts supported by other countries such as Japan and the European nations, has provided the knowledge base for national and international decision making on climate change issues, both by providing research results directly to national governments and to the international process of the Intergovernmental Panel

on Climate Change (IPCC). The IPCC draws upon the best science from around the world to produce state-of-the-art syntheses of information required by policy makers. The IPCC involves more than 2000 scientists from more than 50 countries. The IPCC process has provided compelling evidence of changes in atmospheric composition that are occurring now, the future changes we can expect if we don't take action to reduce emissions of greenhouse gases, and the implications of these changes for socio-economic and ecological systems.

Over the past decade, a series of global environmental changes have been documented in increasing detail. We have demonstrated that climate change, the loss of biodiversity, stratospheric ozone depletion, alteration of the land surface, and changes in the nitrogen balance of the Earth's soils and waters are all occurring and changing the environment on a global-scale. We have also established beyond reasonable doubt that human activities are among, and in some cases are the dominant, driving forces of such change. We recognize that these changes are interrelated, and that they form a suite of multiple stresses affecting people and the Earth's ecosystems.

The USGCRP addresses the broad suite of global change issues. The USGCRP has four priority areas: short term climate variability -- such as El Niño; climate change over decades to centuries; changes in atmospheric chemistry; and changes in land cover and terrestrial and aquatic ecosystems. Components of these four research priorities are directly relevant to increasing our understanding of climate change and its effects. The USGCRP has also made and continues to make a very large investment in the creation of new observing and data management systems (primarily in the NASA Earth Science Program) that hold the promise of achieving a new level of understanding of the Earth system and the relationships of its components. I have included attachments that summarize the USGCRP's major achievements in FY1997 and the level of investment proposed for each participating agency for FY1999 (attachments).

As I will describe below, the scientific evidence that climate change is occurring, and that human activities are playing a significant role in causing such change, is clear and compelling. Without the USGCRP and its companion programs in other nations, we would not have the objective information we need to recognize and deal with this issue. This evidence has led the nations of the world to begin working together in the Framework Convention on Climate Change to mitigate the effects of climate disruption. The United States has led the world in addressing this global environmental issue by supporting the scientific research that continues to increase our understanding of climate change and its effects, by negotiating an agreement at the Third Conference of Parties to the Framework Convention, in Kyoto, Japan. This Convention features market mechanisms and flexibility to assure cost effective mitigation, and the development of the clean energy technologies that will benefit the economy while reducing greenhouse gas emissions. President Clinton's leadership has been instrumental to U.S. achievements in each of these areas. The President's 1999 budget request, which strongly supports climate change research and technology development and deployment, demonstrates the ongoing commitment of the Administration to confront the challenge of climate disruption.

The Science of Climate Change

We've known for about a century that a natural greenhouse effect keeps the Earth's temperature about 60 degrees F warmer than it otherwise would be. Water vapor, CO₂, and other trace gases, such as methane, nitrous oxide, and hydrofluorocarbons (HFCs), trap heat, and keep it from being re-radiated from the Earth back to space. Without this natural warming effect, life as we know it would not be possible.

The problem is that over the past century, human activities have added to the natural greenhouse effect by releasing enormous quantities of greenhouse gases into the atmosphere. These emissions have led to a steady increase in the atmospheric concentrations of such gases.

- The atmospheric concentration of carbon dioxide (CO₂) has increased by about 30 percent.
- Methane concentration has more than doubled.
- Nitrous oxide concentration has risen by 15 percent.

The burning of fossil fuels (coal, oil, and gas) for energy is the primary source of anthropogenic CO₂ emissions. Emissions of other greenhouse gases from a variety of industrial and agricultural processes effectively add about 20 percent to the U.S. CO₂ total. On a global scale, burning of fossil fuels now releases about 6 billion metric tons of carbon into the atmosphere each year. Changing land use patterns, such as agriculture and deforestation, also contributes a significant share, amounting to about another 1-2 billion metric tons per year. The rate at which atmospheric concentrations of greenhouse gases are now increasing is unprecedented.

The increased concentrations of greenhouse gases trap more heat at the Earth's surface. This means that there is more energy available to the climate system. This extra energy can do two things. It can increase the temperature of the atmosphere, which increases the atmosphere's water holding capacity. Or, where water is available, the heat energy can evaporate water, which is, in fact, where much of the extra energy goes. The result is that the water content of the atmosphere is also increased. The increased water vapor in the atmosphere, in general, not only enhances the greenhouse effect but also produces enhanced amounts and rates of precipitation. In addition, because storms feed on energy and atmospheric moisture, storm duration and size is increased. On the ground, there is likely to be increased runoff and flooding. All of this is based on simple physics.

So, what does this all mean? Here is some of what we know:

- Without changing the way we operate, the level of emissions and concentrations of greenhouse gases will continue to increase, resulting in a variety of global, regional and local effects.
- Global average temperature will rise, although there will be considerable variation in how much temperature changes in specific regions.

- The Earth's water cycle will intensify, with an overall increase in evaporation and transpiration (water loss from plants), as well as precipitation -- both rain and snow.
- More precipitation is likely to occur in "extreme" downpours, where large amounts of rain fall in a short period. Some areas will be threatened by increased flooding, while others will suffer through an increased incidence of drought, as continental interiors become warmer and drier.
- Over time, sea level will rise, due primarily to the thermal expansion of the oceans and the melting and retreating of glaciers.

It is very important for you to understand that the changes I am discussing are already taking place. The Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) describes a series of changes that have already been observed:

- Over the last century, the global mean (average) surface temperature increased by about 0.5 - 1° F.
- Over the same period, global mean sea level has already risen 4 to 10 inches, and further rise is inevitable.
- Mountain glaciers have retreated worldwide this century.
- The surface temperature this century is as warm or warmer than any century since at least 1400 AD.

When the IPCC report was written, 1995 was the warmest year on record, but new results from the National Oceanic and Atmospheric Administration (NOAA) show that 1995 has been surpassed by 1997, and that nine of the last eleven years are among the warmest ever recorded (Figure 1). 1997 also shows up as the warmest year in data records maintained by the United Kingdom Meteorological Office and the NASA Goddard Institute of Space Studies, meaning that the three most comprehensive and accurate long-term surface data records all indicate continued warming of our planet.

In addition, the Earth's ecosystems may already be reacting to these changes. A paper published in the April 17, 1997 issue of *Nature* presented compelling evidence for significant regional ecosystem response to warming experienced during the period 1981-1991:

- Over that 10 year period, high latitudes (between 45° and 70° North) sustained a longer growing season, and an advance of up to seven days in "greening" in spring and summer.
- These latitudes appear to be experiencing an increase of approximately 10 percent in photosynthetic activity, possibly due to the longer growing season, as well as increased CO₂ fertilization.

Rainfall data for the last century show that global precipitation has increased. Change can also be seen in United States precipitation trends. NOAA's Tom Karl has reviewed the records of total rainfall and extreme rainfall for the United States over the last century and reached some very interesting conclusions.

- If we look at the record of the last century, we see that U.S. precipitation has increased by 5-10 percent. To put this in perspective, this increase is equivalent to the annual amount of water that flows out of the Mississippi River.
- This increase has a lot of regional texture. Some states are suffering from lack of rain, but in many parts of the U.S., the increases have been several times greater than the average. In 1996 alone, six states set "all-time high" records for precipitation.
- Furthermore, since the beginning of this century, the frequency of intense precipitation events, where more than two inches of rain falls in a 24-hour period, have increased by about 20 percent. Such events lead to flooding, soil erosion, and even loss of life.

We know only too well how costly weather disasters can be. Since 1980 we have had 30 weather or climate events with price tags of at least \$1 billion. Nineteen of the events have occurred in the last 5 years. Among the most costly were Hurricane Andrew in 1992 (\$30 billion); the Mid-West floods of 1993 (\$20 billion); 1995's hail storms and floods in Texas, Oklahoma, Louisiana, and Mississippi (\$5.5 billion); the Southern plains drought of 1996 (\$4 billion); and Hurricane Fran in 1996 (\$5 billion). The winter storms that struck the Pacific Northwest in December 1996 and January 1997 are now estimated to have resulted in over \$3 billion in costs and the estimated cost of Northern Plains floods that occurred in April and May of 1997 is about \$2 billion and still rising. California is being ravaged by flooding this week from El Niño-associated storms with more to come.

We are seeing dramatic evidence of the costs associated with climate variability as the Western U.S. deals with this year's unprecedented El Niño event. I want to be clear that we can't say that El Niño is itself a consequence of climate change. We are gratified that we now have tools to predict El Niño conditions up to a year in advance, but I hasten to add that we still do not understand what causes such oscillations in the first place. However, we do have good long-term records and better instrumental records of this phenomena in modern times, and these indicate that the behavior of El Niños in the last twenty years or so has been quite anomalous. The disruption of what was a more regular El Niño cycle has been coincident with the recent pronounced warming of the Earth surface temperatures, and some scientist believe there may be a relationship, but no-one has produced any conclusive evidence. We have made great progress in explaining the effect of El Niño on the global climate, and our skill at predicting these events is improving markedly (e.g. we predicted nearly a year ago the Pacific storms we are now experiencing, and that Atlantic hurricanes would be diminished during this period. Yet even advance warning that makes it possible to undertake advance mitigation measures, the impacts are significant. Damage estimates in California are already very high, and we expect this total to grow over the next several months. El Niño provides a kind of case study of the vulnerability of our society to climate disruption, and should serve as a warning to us of the potential consequences of climate change.

The costs of such extreme events have doubled or tripled in each of the last few decades. This is partly because our urban and technologically advanced society has become extremely dependent on a massively integrated infrastructure for power, communications, transportation

and fresh and wastewater treatment and distribution. This infrastructure is extremely vulnerable to extreme weather events. I want to emphasize that one can't point to any single extreme weather event today and say for sure that global warming caused it. But we can say that such events are examples of the kinds of impacts we expect to occur with greater frequency in a warmer world. There are likely to be more "storms of the century," "100-year floods," and severe droughts in the future than there were in the past.

The temperature increases, intensification of the water cycle, and sea-level rise already observed over the past century are all consistent with theoretical predictions of the consequences of an enhanced greenhouse effect. They are also consistent with the projections from simulations of global climate by general circulation models.

The IPCC "business as usual" scenario indicates that even with continued technological improvement (such as energy efficiency increases of about 1 percent per year), unless policies to control emissions of greenhouse gases are implemented, the atmospheric concentrations of these gases will be much higher by 2100. Assuming "business as usual" CO₂ concentrations will reach about 710 parts per million by volume (ppm), a level higher than any seen on this planet in the last 50 million years (Figure 2). For context, the pre-industrial level of CO₂ was about 280 ppm, and has increased to the current level of about 360 ppm. If realized, this increase is expected to result in significant future climate changes:

- Global surface temperature would increase an average of another 2-6 °F by 2100, with a best estimate of 3.5 °F. Higher Northern latitudes are projected to warm by more. Temperature change of this magnitude would be faster than any observed changes in the last 10,000 years.
- Global mean sea level would rise another 6 to 38 inches by the end of the 21st century.
- The rate of evaporation would increase as the climate warms, leading to an increase in average global precipitation as well as frequency of intense rainfall and floods in some regions. In some regions, the soil moisture will decrease, leading to increased frequency and intensity of droughts.

Most of the climate impacts have been evaluated for a world at equilibrium after greenhouse gases have reached either 550 or 700 ppm. But stabilizing at double the pre-industrial concentration of greenhouse gases, or 550 ppm, would require massive intervention. On the other hand, a continuation of "business as usual" implies a world with far higher concentrations and far greater effects. The Geophysical Fluid Dynamics Laboratory at Princeton has recently modeled the effects of doubling and quadrupling the level of greenhouse gases:

- A quadrupling of such concentrations (to about 1100 ppm) is likely to increase temperatures in North America by 15 - 20° F, as opposed to the 5-10° F expected from doubling.
- In the growing season, soil moisture deficits would approach 30 - 50 percent for quadrupling, as opposed to 10 - 30 percent for doubling.

The implications of this amount of greenhouse gases in the atmosphere are only dimly perceived, but would be grave.

Although there is scientific uncertainty about exactly how and when the Earth's climate will respond to increased concentrations of greenhouse gases in the future, observations clearly show that detectable changes are underway. Numerous efforts are underway to assess the vulnerability of ecological, social and economic systems to future changes by defining plausible future scenarios of climate change and using model simulations to evaluate sensitivities to various levels and types of change.

The Current Situation

I find the scientific evidence for climate change in the coming decades to be compelling, and the implications for the future, without intervention, potentially disastrous. I believe that we need to confront this growing challenge now. It is clear that emissions of greenhouse gases from human activities are amplifying the Earth's natural greenhouse effect, and are leading to a warming of the planet's surface. It is also clear that this warming will, in turn, lead to a series of further climate disruptions as sea-levels rise, patterns of precipitation change, atmospheric and potentially ocean currents shift, and ideal ranges for plants and animals change faster than nature can accommodate them. Climate change is a long-term challenge, and solving this problem will require a sustained, long-term effort. Thoughtful reaction to lessen the undesirable impacts of climate change can simultaneously alleviate other problems such as air pollution and growing dependence on fossil fuels.

The longer we continue "business as usual," the faster the rate of climate change, the greater the degree of warming, and the more severe the negative effects for human and ecological systems. The sooner we leave the "business as usual" path, the sooner we can slow the rate of change and avoid more negative impacts, and the more likely it is that natural systems will be able to adapt to change, and the less probable such unanticipated events as ocean current instabilities linked both to El Niño and Northern European climate.

Climate change will force shifts in the range and distribution of many individual plant and animal species, and thus will alter many of the ecosystems, including forests and wetlands, that provide the support systems for all life on Earth. The present systems, like the present human infrastructure, evolved and optimized over about 10,000 years of relatively constant climate. If CO₂ concentration rises to 700 parts per million, as I believe it almost certainly will if we do not take action, fully one third of forests worldwide are likely to experience shifts in species composition. As a small example, in the U.S., sugar maples and beech trees may move completely into Canada, with considerable economic impact. The tourism, maple syrup production, and wood production which are so important to New England's livelihood are at risk. Ideal ranges for crops will change and agricultural pests may increase. Species that cannot migrate fast or far enough may face extinction.

We spend \$2 - 3 billion dollars annually to operate and maintain our parks and refuges as unique assemblages of plants and animals. Climate change threatens this substantial national investment. Coastal flooding and storm damages may increase due to rising sea levels. One third of Florida's Everglades may be inundated, and much of the Louisiana and Mississippi coastal lands may be lost. In some Western and Northeastern areas, 50 percent or more of brown trout may be lost as waters warm too much to support them. Malaria mosquitoes may be able to survive year-round in much of the U.S., and drought may become more frequent even as total rainfall and extreme precipitation events increase. Functions provided by the natural environment, such as flood control and purification of air and water, can only be provided by intact ecological systems, and when those systems are disrupted or lost we lose the enormous benefits they provide.

The potential cost of such disruption is very serious. Several recent analyses have addressed the issue of valuation of ecosystems. Refining and extending this initial work is a necessity, as was just reinforced by a report by the President's Committee of Advisors on Science and Technology, "Teaming with Life: Investing in Science to Understand and Use America's Living Capital." Initial estimates of the total value of global ecosystem services suggest they could be in the trillions of dollars annually.

For ecosystems, the rate of temperature change may be even more significant than its eventual magnitude. As the distinguished ecologist Professor Jane Lubchenco told the President earlier this year: "The slower the rate of change in climate, the less catastrophic the results. Species are more likely to be able to migrate, to grow, and evolve if the rate of change is slow." The sooner we reduce emissions, the slower the rate of climate change we can expect.

The Framework Convention on Climate Change, to which the United States is a party, seeks to stabilize atmospheric concentrations at levels that "prevent dangerous anthropogenic interference with the climate system. Such a level should be achieved within a time frame sufficient to: (i) allow ecosystems to adapt naturally to climate change; (ii) ensure that food production is not threatened; and (iii) enable economic development to proceed in a sustainable manner." Greenhouse gas concentrations are already beyond the range seen in the last 160,000 years, and one could argue that the rate of climate change is already outside that range as well. Even if emissions were kept at today's levels, temperatures would rise at about 2 degrees F per century because greenhouse gas concentrations would continue to rise. The historical pollen record shows that this rate is about the fastest ecosystems migrate.

Atmospheric concentrations of CO₂ have increased thirty percent since the onset of the industrial revolution. Analyses that model global economic conditions and technological change suggest that to hold atmospheric concentrations to 550 ppm of CO₂, which represents about a doubling of pre-industrial levels, reductions in the growth rate of worldwide annual emissions must begin by about 2015. That is, if we want to follow a least-cost, long-term adjustment path, it appears that the whole world must begin to "apply the brakes" within the next 2 decades, and

global emissions must begin declining steeply during the second quarter of the next century (Figure 3).

The results that give us cause for concern come from numerous studies of past climate change, from observations of ecosystems changing over time, and from model simulations that project future conditions. An important aspect of interpreting such results, especially model simulations, is accounting for uncertainty, which is often done in a very selective way by climate change skeptics. Uncertainty cuts both ways: outcomes could be less dramatic than expected based on our current understanding, but could just as well be more severe. We must remember that the current generation of impact projections is focused on a limited number of variables, and that this may result in an overly benign picture of the future.

For instance, a series of projections that includes carbon dioxide increases, temperature change, and precipitation changes now indicate that while there might be no "net" effect on global agricultural productivity, significant regional dislocations are expected, with the poorest countries experiencing the greatest losses. However, these analyses do not include potential water constraints or changes in the distribution of pests. As the scientists told us at the White House Conference on Climate Change last October 6, the impacts we have not been able to include are more likely to make the net results worse rather than better.

Further, climate change may not occur gradually. Most climate model simulations to date have assumed that climate will change relatively steadily as a result of human-induced emissions of greenhouse gases. Over the past few decades, however, there have been some indications that this might not be the case -- that instead climate might change in abrupt jumps.

Past climate conditions reconstructed from ice core records in Greenland, from ocean sediment cores in the neighboring oceanic regions, and from pollen records on land areas bordering the North Atlantic have found that climates of the past have changed dramatically over very short periods of time -- namely, over a few decades or even less. We have discovered that the apparent mechanism for the climate shifts is change in the large-scale ocean circulation of the North Atlantic (which is coupled to the circulation for much of the world). The evidence shows that in the past, the Gulf Stream has basically stopped carrying heat northward, causing significant cooling in Europe and northeastern North America. The risk of such a catastrophe exists but has been little studied; similarly the potential for abrupt sea level rise from collapse of the West Antarctic ice sheet or runaway warming from dramatic heating of the polar regions and subsequent release of methane cannot be ruled out.

If we do not alter our emissions trajectory, we will pass atmospheric concentrations of double the pre-industrial level by the middle of the next century, on the way toward a tripling, or even quadrupling. We could very well take the planet to levels that have not been seen for 50 million years in a single century, a geological blink of an eye. The Administration has received letters signed by thousands of scientists in the last few months urging action on this issue --

warning that nonlinearities or unexpected events, such as the Antarctic ozone hole, are more likely when rates of change are very fast.

We have received similar letters urging action from the economic community. They point out that paced actions can reduce costs and buy insurance against climate change. It is important to point out that the challenge of climate change poses a tremendous opportunity for American industry. It is absolutely clear that more benign technologies must begin replacing existing energy and agricultural technologies and practices, the primary causes of global climate change. Technological innovation is the key to our response to the climate challenge, and technological innovation is among America's greatest strengths. Reducing emissions requires development of clean sources of power and more efficient machines, structures, and industrial processes. There will be ancillary benefits of reduced air pollution and increased energy security at the same time. The consequences of our near-term technology choices are significant and long lasting. An appliance or an automobile lasts about 15 years, residential and commercial buildings are designed to last 20-30 years or more and power plants last 30-40 years.

In developing countries, there is a \$100 billion annual market in energy supply technologies alone. Setting emission targets, providing economic incentives, and investing in research will spur the process of innovation and development of cost-effective technologies needed to address this problem and benefit the economy both here and abroad. The longer we continue "business as usual," the longer we delay the development and deployment of technologies that could provide a major competitive advantage to the U.S. in the 21st century. The time to begin investment and innovation is now. Let us unleash the power of American ingenuity and entrepreneurship to solve this problem and prove once again that environmental quality and economic prosperity go hand in hand.

Shifting the Focus of the U. S. Global Change Research Program

Until recently, the U. S. Global Change Research Program (USGCRP) has focused on observing and documenting change in the Earth's physical systems and understanding why these changes are occurring. It is now appropriately shifting from a nearly exclusive focus on physical systems to a much broader effort to understand what global change means for the Earth's biological systems and for the human societies that are dependent upon them. Even with aggressive actions implemented today to reduce future climate change, some further change is inevitable in Earth's climate. The USGCRP is currently focusing on how these climatic changes will impact the various regions of the U.S., and how we can best adapt to these changes and prepare for the future. In particular, we want to accomplish two things. First, we need to move from the global to the regional level to understand what impacts are likely to result from climate change both on its own and in concert with all the other human-induced stresses we are placing on the environment, such as pollution and resource extraction. Second, we must now move to approaches that are designed to achieve an integrated understanding not only of the nature and extent of physical and biological effects, but of their ramifications for our social and economic systems.

In the past year, the USGCRP established several new activities to address these critical concerns. In cooperation with OSTP, the program is sponsoring a series of regional workshops, the purpose of which is to examine the vulnerabilities to climate change and variability that are unique to each area. A table of these workshops is attached. This information will then be aggregated across regions to support the first National Assessment of the Consequences of Climate Change for the U.S., as called for by the U. S. Global Change Research Act. During 1997, the leaders of our workshops, stakeholders with a broad range of interests, and members of the scientific community have worked together to develop a blueprint for a national assessment process that examines the vulnerabilities of the United States, its ecosystems, major economic system sectors, and its social infrastructure to climate variability and climate change. A National Forum on Climate Change Impacts was held on November 12-13, in Washington, D.C. to integrate results obtained so far and continue the process of defining the National Assessment. We expect the assessment activity to take place over the next two years, with a major report issued in 1999.

Regional Vulnerabilities in the U.S.

The reports from our regional workshops provide a set of compelling statements on U. S. regional vulnerabilities, and further examine possible adaptation options. In particular, the workshops have examined how we might best cope with current environmental stresses in light of future climate change.

Alaska: The state's economic dependence on natural resources makes it highly vulnerable to climate change. Global warming will be most pronounced in northern regions. Probable consequences include drying of Alaska's interior, inundation of fragile coastal delta areas, and, most seriously, melting of permafrost, which is already underway. Continuation of Alaskan warming will lead to the disappearance of most discontinuous permafrost over the next 100 years. In many places, ground level can collapse 5 yards or more, leading to significant damages to ecosystems and human infrastructure. Houses, roads, airports, military installations, pipelines, and any other facility built on ice-rich permafrost are at risk. The melting of permafrost and the warming of tundra will lead to the release of carbon and methane deposits from the formerly frozen lands, which could make them an additional source of atmospheric greenhouse gases. Ecosystem effects include destruction of trees and caribou habitat; clogging of salmon spawning streams; reduction in forested areas; expansion of lakes and wetlands; and increased rates of coastal and riverbank erosion, slope instability, landslides and erosion.

Pacific Northwest: The dependence of the Northwest on reliable water supplies provides this region's most significant vulnerability to climate change. Model projections indicate that regional consequences of warming are likely to include changing patterns of precipitation and drought, timing of runoff, and increased inundation of coastal areas due to sea level rise. Peak runoff would come earlier in the spring because of more rain and less winter snow. Late winter-early spring flows would be enhanced, increasing the chance of spring flooding. Survival of salmon egg and smolt stages will also be impacted by increased wintertime flows. There would

be reduced summer and early fall flow, particularly west of the Cascades Mountain range, due to the warmer, drier summers. This will hurt western salmon migration and spawning. In the Columbia River basin, where an overall decrease in annual run-off is likely, competition among hydropower production, fisheries protection, and irrigation will probably increase. Coastal erosion, landslides and bluff failures are also major risks to ecosystems, urban centers, and coastal development. Existing wetlands will disappear faster than new ones appear, leading to loss of coastal habitat for outmigrating salmon, spawning oceanic species, and mammals and seabirds.

Great Plains: All sectors of life in the Great Plains are dependent on a very limited water supply, and water shortages there are already a problem. The further drying expected from climate change poses the region's most significant risk. Agriculture is the base of the economy, despite the constraints of the dry and variable environment. Because agricultural water needs often exceed rainfall, water for irrigation is commonly supplied from deep aquifers, which are experiencing overdrafts and dropping water tables. As climate change leads to warmer conditions and an intensified hydrological system, the soils of the area are anticipated to further dry. The simultaneous drop in aquifer levels, greater run-off from extreme downpours, and shorter duration of snow cover will exacerbate the region's water supply problems. Drier soils could be subject to increased wind erosion, which has led to "dust bowl" conditions in the past. Better soil tillage practices would simultaneously improve soil fertility, soil carbon storage capacity, and soil moisture holding capacity. Native species will face increasing levels of competition from introduced species, such as cheat grass, Japanese brome, Russian thistle, and leafy spurge, which already account for extensive economic losses. Riparian areas (wetlands and prairie potholes), which are used intensively by hunters, anglers, and bird watchers, are extremely vulnerable to warmer, drier climate.

Southeast: The Southeast is a region of abundance, with numerous wetlands, an extensive coastline, and productive agriculture, fisheries, and forestry. Urbanization and rapid population growth are already exerting significant stress on some fragile ecosystems. The Florida Everglades have been significantly altered by human encroachment, with approximately half of the ecosystem lost or severely altered by drainage for development as well as pollution from agricultural run-off. While the Southeast's long coastline makes it a recreational playground, its low elevation renders it extremely vulnerable to sea level rise and storm surges during extreme weather events, such as hurricanes, which are expected to worsen with climate change. A 1 foot rise in sea-level, the best estimate over the next century, could erode 100 to 1000 feet of Florida beaches, damaging property as well as tourist interests.

Southwest: Rapid population growth in this arid or semi-arid region make the Southwest extremely vulnerable to water supply problems that are likely to worsen under climate change. The region is naturally subject to large climate fluctuations, which have produced fairly robust adaptation mechanisms in ranching and agriculture. The native flora and fauna are also well adapted to life in this harsh and dry environment. Surface water supplies are insufficient; forcing reliance on groundwater, use of which already exceeds recharge and is leading to subsidence in

many areas. Climate change will pose serious challenges and is likely to result in significant impacts to the region's traditional economic sectors as well as tourism, development, and retail sectors that now make up much of the region's economy. Expected conditions include more extremely hot days, fewer cool days, and decreased winter precipitation. Alteration of the region's hydrologic cycle would affect quantity and quality of the water supply, with major implications for continued development in the region. Significant changes in vegetation are also predicted, with Gambel oak, Piñon pine, and Douglas fir largely disappearing from the region. Saguaro would die off in its current range, but might find a new home further east and at higher elevations.

New England: New England's economy is diverse, and many aspects are indirectly dependent on climate. Its natural areas are prized, and its fall foliage draws visitors from all over the world. The region is vulnerable to drought and severe storms, which modify its vegetation and impact production of forest and fisheries products. Warmer, drier climate could reduce ski tourism and shift optimal climatic conditions north into Canada for the tree species prized for their fall foliage and maple syrup. Coastal areas are likely to be affected by intensifying storms, sea level rise, and reduced freshwater input to estuaries. Air quality, already poor in the region's major urban areas, could decline even further as hot, humid weather increases, leading to increased incidences of respiratory illness.

Sectoral Vulnerabilities and Impacts

The USGCRP is also developing an extensive body of research that suggests that human health and ecological systems are vulnerable to climate change. The human-induced climate changes that are expected will add important new stresses on ecological and socioeconomic systems that are already affected by pollution and increasing resource extraction. The degree of vulnerability, and the amount and rate of change that is experienced in addition to existing stresses will determine the magnitude of climate change impacts.

Health Effects: According to the World Health Organization, the vulnerability of human populations to climate change varies across populations depending on environmental circumstances, social resources, and preexisting health status. In general, developing countries are more vulnerable to climate change than developed countries because of their limited capital and their greater dependence on natural resources. Climate change increases the risk of heat-related mortality and the potential for the spread of vector-borne diseases, such as malaria, dengue and yellow fever, and encephalitis, and non-vector borne diseases such as cholera and salmonellosis. The incidence of infectious diseases, which are still the world's leading cause of fatalities, may also increase.

- A study of deaths associated with summer time heat stress and winter time illnesses in 44 U.S. cities estimated that climate change could double the number of weather-related deaths. The elderly are at greatest risk in the U.S., and urban populations in developing countries are also especially vulnerable to heat stress.

- Climate change is likely to extend the geographic ranges and increase the rates of transmission of disease-carrying vectors such as mosquitoes, which can increase the populations exposed to diseases such as malaria, dengue and yellow fever. Globally, the population exposed to malaria could increase by one-third. There could be 50-80 million additional malaria cases per year, assuming no change in public health protection.
- Climate change can reduce air quality and increase levels of air borne pollen and spores, which exacerbate respiratory disease, asthma, and allergic disorders.

Water Resources: Among the most fundamental effects of climate change is an intensification of the hydrological cycle. Changes in precipitation, and increased evaporation and transpiration due to higher temperatures, can be expected to reduce water runoff, affecting the quantity and quality of water supplies for domestic and industrial uses, irrigation, hydropower generation, navigation, stream ecosystems and water based recreation. These effects will vary region by region. Increased variability in the hydrologic cycle is expected to result in more severe droughts and/or floods in some places. Impacts and mitigation expenses for such events are significant; damage estimates from the Mississippi flood of 1993 range from \$10 billion to \$20 billion. Areas of greatest vulnerability are those where water supplies and quality are already problems, such as arid and semi-arid regions of the world and some low lying coastal areas, deltas and small islands.

- Climate change would likely add to the stress in several U.S. river basins, such as the Great Basin, California, Missouri, Arkansas, Texas Gulf, Rio Grande, and Lower Colorado.
- The Colorado River Basin would suffer decreased summer runoff, coinciding with peak demand for irrigation, unless precipitation also increases substantially. Reductions in runoff of up to 25 percent in the basin are projected under some scenarios.
- Water scarcity in Middle Eastern and African countries also is likely to be exacerbated by climate change. Countries that are highly dependent on water originating in areas outside their borders include Syria, Sudan, Egypt and Iraq.

Forests: Climate change can dramatically alter the geographic distributions of individual tree species and of forest and vegetation types. One-third of the Earth's forests would undergo a major change in the type of vegetation that could be supported as a result of an equivalent doubling of CO₂. In northern forests, which are the forests most vulnerable to climate change, two-thirds of the currently forested area may undergo a change in vegetation type. Mountaintop species and isolated populations are particularly vulnerable. Over the next century, the ideal range for some North American forest species will shift by as much as 300 miles to the north, exceeding the ability of many species to migrate. In some instances, a change in vegetation type will result in a loss of forest area as the land converts to grassland or shrub land, while in other areas forest cover may increase.

- In the United States, western conifer forests could decrease in area and be replaced by broadleaf forests; eastern hardwood forests may be replaced by grasslands along their

western boundary because of mid-continental drying. Forest damage from fire and diebacks driven by drought, insects and disease could increase.

Other Natural Areas: Natural ecosystems are highly vulnerable to degradation from climate change. Federally protected natural areas have become a repository for the Nation's rarest species and are critical for the conservation of biological diversity. The composition, geographic distribution, and productivity of many ecosystems will shift as individual species respond to changes in climate. These will likely lead to reduction in biological diversity and in the goods and services ecosystems provide for society, such as clean water and recreation. Freshwater wetlands are particularly at risk from climate change. IPCC findings show that:

- Precipitation changes and salt water intrusion from sea level rise could adversely affect the ecological communities of the Florida Everglades and degrade the habitat for many species of wading birds.
- The wetlands of the prairie pothole region of North America, which support half the waterfowl population of this continent, could diminish in area and change dramatically in character in response to climate change, significantly exacerbating the destruction already caused by agriculture.

Coastal Areas: Even if concentrations of greenhouse gases are stabilized in the future, sea level would continue to rise long after, perhaps for several centuries, and reach levels much higher than projected for the next 100 years. For example, after an equivalent doubling of CO₂, the IPCC expects sea level to rise by 6 - 38 inches over the next century, with a "best estimate" of 20 inches, but the equilibrium sea level rise several centuries in the future is estimated to be at least 6 feet. Rising sea level erodes beaches and coastal wetlands, causes the gradual inundation of low lying areas, leading to human habitat loss and increasing the vulnerability of coastal areas to flooding from storm surges and intense rainfall. The IPCC estimates that 20 inches of sea level rise would double the population at risk from storm surges, from roughly 45 million at present to over 90 million world-wide. A three foot rise would triple the number of people exposed. Increases in coastal area populations are likely to further increase the number of people at risk.

- Along U.S. coasts, a 20 inch rise could inundate more than 5000 square miles of dry land and an additional 4000 square miles of wetlands if not protective measures are taken. A three foot rise would have greater impact, inundating much of the Southern tip of Florida among other areas.
- Internationally, low-lying areas, such as parts of the Maldives and Bangladesh, would be completely inundated by a three foot sea level rise, creating large numbers of environmental refugees, which put stress on governments and social structures. 72 million people in China would be affected, assuming existing levels of coastal development.

Agriculture and Food Supply: Agriculture is highly dependent on a number of variables that are likely to be affected by climate change, including weather patterns, longer term patterns of climate variability, and, most importantly, water availability. Climate change is likely

to lead to increased crop yields in many areas, but decreased yields in others, even for the same crop. The magnitude of these changes can exceed +/- 30 or 40 percent for some crops and locations. Despite these potentially large changes in yields, average global food production is not expected to change substantially. This is because farming practices are considered to be highly adaptable to different climates, because production of important food crops can shift to new locations in response to changes in climate, and because CO₂ has beneficial effects for plant photosynthesis and water use efficiency that can offset some deleterious effects of changes in climate. Impacts are likely to vary considerably across regions and some regions may suffer substantial reductions in agricultural production. In general, developing countries are more vulnerable to losses than are developed countries.

- Large reductions in soil moisture could significantly reduce flexibility in crop distribution and increase demands on water resources infrastructure.
- Increases in the range of pest habitat could increase vulnerabilities to pests and demand for, and use of, pesticides.
- In the United States, large areas of the eastern and central regions of the country face moderate to severe drying. Drought could become more frequent, particularly in the Great Plains.

Conclusion

The USGCRP and its companion programs have provided us with a substantial level of understanding of climate change and a substantial body of evidence of the seriousness of this problem and its effects.

The rates of change already imposed on the climate system are faster than any experienced over the last 10,000 years, the time period during which human civilization has developed and modern ecosystems have evolved. Current emissions trajectories, if not altered, could take us before the end of the next century -- a moment in history -- to an atmospheric concentration of CO₂ not seen on this planet during the last 50 million years. We cannot preclude some major positive feedback effects -- the collapse of the West Antarctic ice sheet which would cause a 15 foot sea-level rise; the stopping of the ocean conveyor belt which would significantly lower European average temperatures, or the runaway melting in the Arctic which holds frozen several orders of magnitude more carbon than is in the atmosphere today.

While much work remains to be done to improve the precision of impact estimates, the increasingly apparent risk of the rapidly changing atmosphere argues that near-term mitigation and adaptation measures are needed. The future plans of the USGCRP are to place an increasing emphasis on providing more detailed understanding of impacts and of the regional variation of change, both of which are directly relevant to crafting effective responses to global climate change. The USGCRP represents a prudent investment in the creation of the knowledge we need to assure a sustainable future.

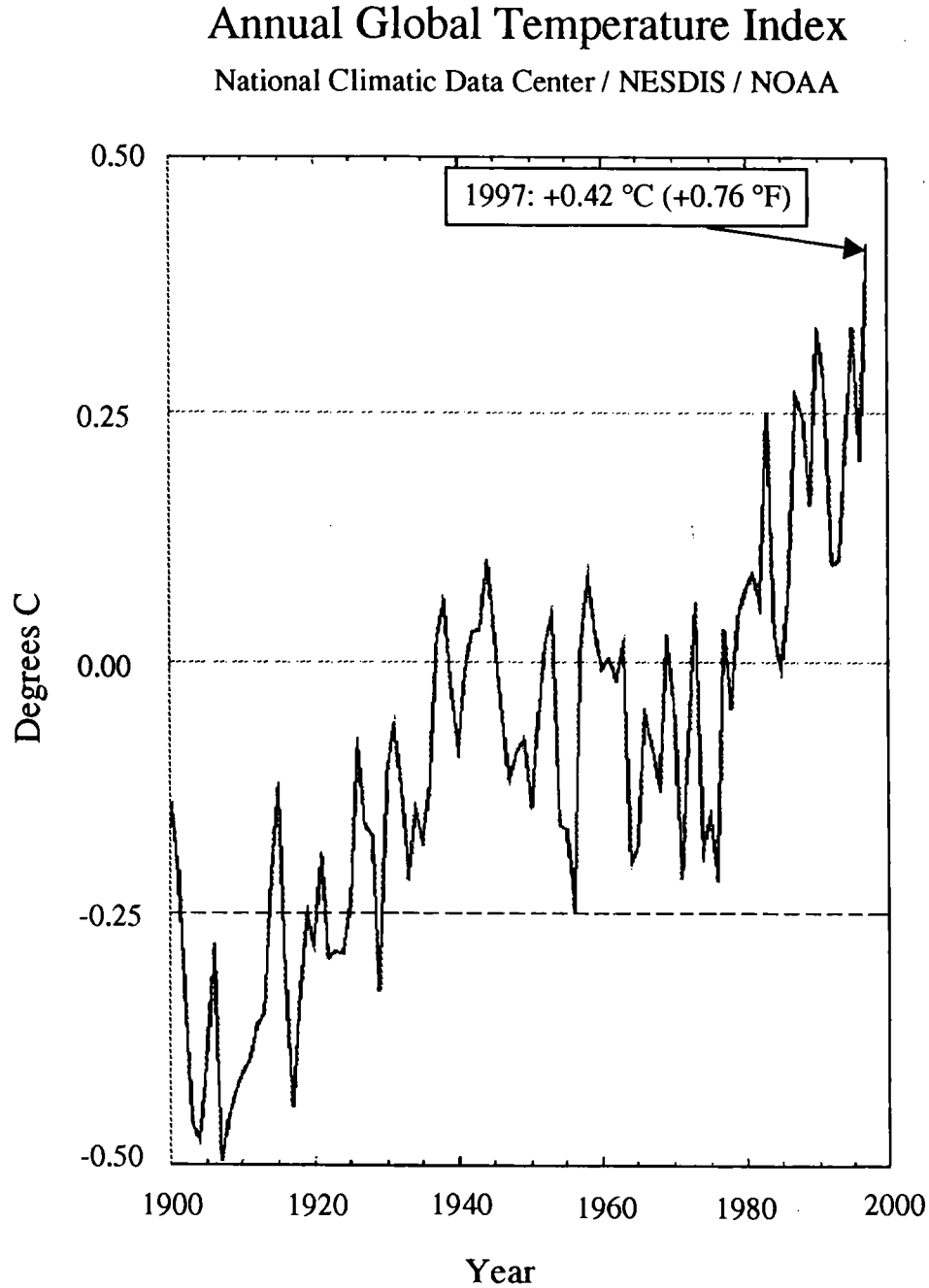
US Global Change Research Program 1997 Accomplishments

- A national assessment of the consequences of climate change for the United States was begun during 1997. Eight regional workshops and the U.S. Climate Forum, a major national workshop with over 400 participants, examined the likely consequences of climate change for U.S. regions and ecological and economic sectors.
- Development of the first global synthesis of information on land cover at a spatial resolution of 1 km (about 0.6 miles) was completed. These data are helping improve understanding of land cover, ocean productivity, and the cycling of carbon through the Earth system, and thus contributing to better predictions of climate change on national and global scales.
- There was continued improvement in the accuracy and lead times of predictions of seasonal climate fluctuations associated with the El Niño-Southern Oscillation, with several forecasting activities successfully predicted the onset of the 1997-98 El Niño event early enough to support effective flooding mitigation actions.
- A new 300-site survey of borehole temperatures on four continents produced a detailed record of the climate of the last five centuries and confirmed that the Earth is warming and that the rate of warming has been accelerating rapidly since 1900.
- Scientists from the NOAA National Climatic Data Center found that 1997 was the warmest year on record since measurements began, and that 9 of the last 11 years are among the warmest on record.
- Another NOAA analysis showed an average 5-10% increase in the overall amount of U.S. rainfall in the last 100 years. The frequency of heavy downpours, where more than 2 inches of rain falls in a day, has increased by about 20%. Such events lead to flooding, soil erosion and even loss of life.
- The Tropical Rainfall Measuring Mission (TRMM, a joint NASA-Japanese project) was successfully launched in November of 1997, and is providing rainfall observations that are improving our understanding of the global hydrological cycle and its role in climate change and variability.
- Ocean productivity images from the SeaStar satellite, launched in 1997 as part of an innovative public-private partnership, are playing a major role in understanding the behavior and consequences of the ongoing El Niño and in other global change research.
- Following the failure of the Japanese ADEOS spacecraft in mid-1997, NASA successfully changed the orbit of another satellite to allow resumption of near-global daily mapping of ozone, as well as stratospheric sulfur dioxide produced from large volcanic eruptions.
- USGCRP research continued to play a leading role in the Intergovernmental Panel on Climate Change (IPCC) during 1997, and was an important contribution to the IPCC special report entitled The Regional Impacts of Climate Change: An Assessment of Vulnerability and to several IPCC technical papers on other key issues.
- U.S. citizen Robert T. Watson was elected overall Chair of the IPCC, replacing Bert Bolin of Sweden, and James McCarthy of Harvard University was elected Co-Chair of IPCC Working Group II, which will assess impacts and adaptation options.

**National Science and Technology Council
U.S. Global Change Research Program
Budget (\$millions)**

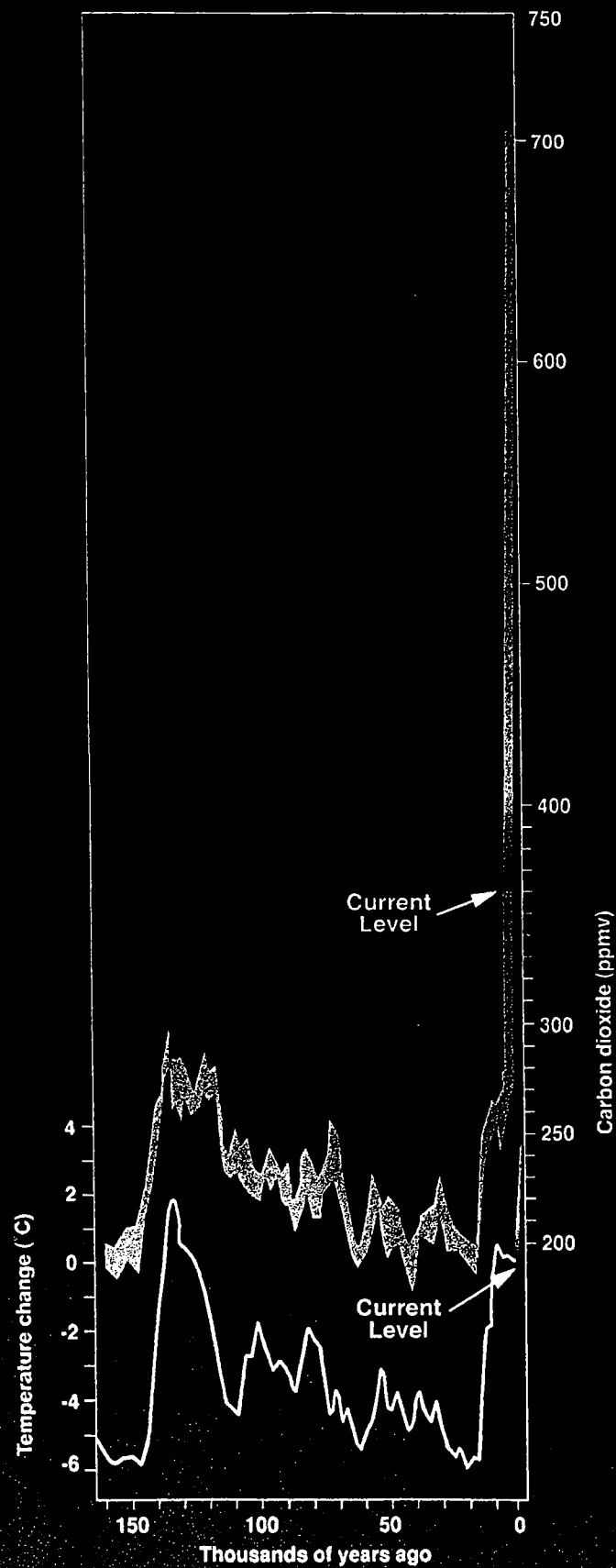
	1997 Actual	1998 Estimate	1999 Proposed	Dollar Change 1998-1999	Percent Change 1998-1999
Health and Human Services	4	4	5	+1	+25%
National Aeronautics and Space Administration	1,369	1,417	1,372	-45	-3%
Energy	109	108	113	+5	+5%
National Science Foundation	166	167	187	+20	+12%
Agriculture	57	58	59	+1	+2%
Commerce	62	62	71	+9	+15%
Interior	29	29	29	--	--
Environmental Protection Agency	14	15	21	+6	+40%
Smithsonian	7	7	7	--	--
Tennessee Valley Authority	1	--	--	--	--
total	1,818	1,867	1,864	-3	-.2%

*less than 1%



The global average temperature of 62.45 degrees Fahrenheit for 1997 was the warmest on record, surpassing the previous record set in 1995 by 0.15 degrees Fahrenheit. The chart reflects variations from the 30-year average (1961-1990) of the combined land and sea surface temperatures.

Atmospheric Carbon Dioxide Concentration and Temperature Change

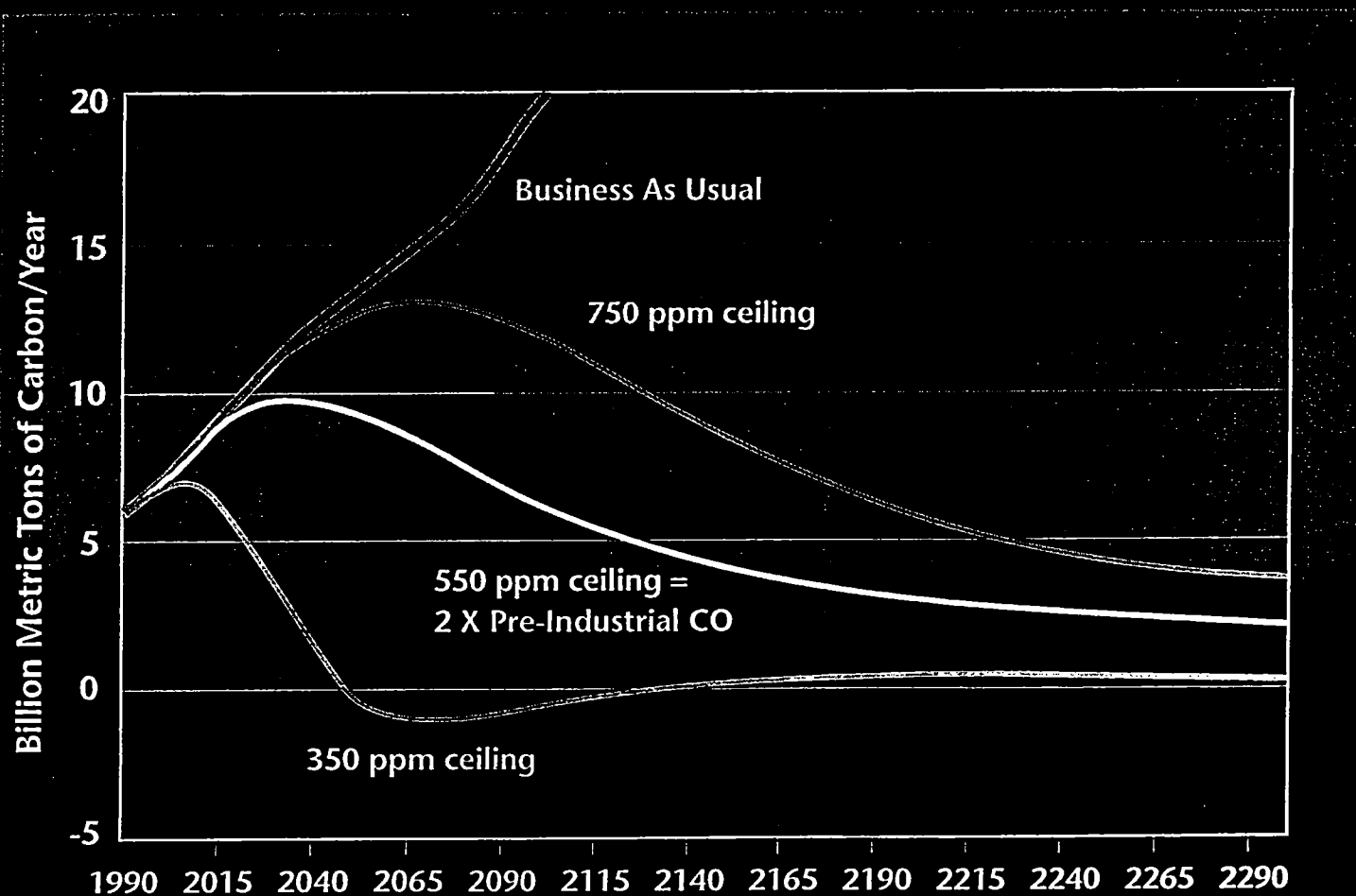


CO₂ concentration in the atmosphere (Antarctic Ice Core)

Temperature changes through time compared to the present temperature

Figure 3

Atmospheric Stabilization Emissions Paths



OSTP/USGCRP Regional Climate Change Workshops
Regional workshops being convened as part of the start-up phase of the National Assessment

1997 Workshops

Region	Organizing Institution(s)	Site	Dates	Coordinating Agency(s)
Central Great Plains	Colorado State University and University of Nebraska/NIGEC	Fort Collins, CO	May 27-29	DOE
Alaska	University of Alaska	Fairbanks, AK	June 3-6	DOI
Southeast	University of Alabama, Huntsville, and Florida State University	Nashville, TN	June 25-27	NASA, NOAA
Pacific Northwest	University of Washington	Seattle, WA	July 14-16	NOAA, NASA
Southwest	University of Arizona	Tucson, AZ	September 3-5	DOI, NOAA
New England	University of New Hampshire	Durham, NH	September 3-5	NSF
Middle -Atlantic	Pennsylvania State University	State College, PA	September 9-11	EPA
Northern Great Plains	University of North Dakota	Grand Forks, ND	November 5-7	NASA

1998 Workshops

Region	Organizing Institution(s)	Site	Tentative Dates	Coordinating Agency(s)
Rocky Mountains and Great Basin	Utah State University	Salt Lake City, UT	February 16-18	DOI
Gulf Coast	Southern University and A&M College	Baton Rouge, LA	February 25-27	EPA
Hawaii and Pacific Islands	CARE; University of Hawaii	Honolulu, HI	March 3-6	FEMA, NOAA, DOI
California	University of California, Santa Barbara	Santa Barbara, CA	March 9-11	NSF
Metropolitan East Coast	Columbia University	New York City, NY	March 23-24	NSF
Southern Great Plains (Parts I and II)	University of Texas - El Paso and Texas A&M University	El Paso, Texas and TBD	March 2-4 and late March	USDA, NASA
Appalachians	West Virginia University	Morgantown, WV	May 26-29	USFS
Upper Great Lakes	University of Michigan	Ann Arbor, MI	May	EPA
Caribbean/Southern Atlantic Coast	TBD	TBD	Spring	NOAA
Eastern Midwest	Indiana University	TBD	Spring	USDA

For Additional Information, Contact:

*Environment Division, Office of Science and Technology Policy
Fax: 202-456-6025, or

*US Global Change Research Program Coordination Office
Fax: 202-358-4103
regional.workshops@usgcrp.gov
<http://www.usgcrp.gov>

Testimony of

GARY R. BACHULA

Acting Under Secretary for Technology

Technology Administration

U.S. Department of Commerce

before the

COMMITTEE ON SCIENCE

U.S. HOUSE OF REPRESENTATIVES

on the subject of

THE DEPARTMENT OF COMMERCE'S

CURRENT AND PLANNED

GLOBAL CLIMATE CHANGE INITIATIVES

February 12, 1998

Mr. Chairman, members of the House Science Committee, thank you for inviting me here today to talk about the Commerce Department's part in the President's climate change initiative.

Global climate change is the primary environmental challenge facing not only the United States, but the world. Building on a solid foundation of climate science, President Clinton is committed to strong and sensible action to reduce greenhouse gas emissions. A key element of the President's program is a \$6.3 billion investment in tax cuts and R&D for new technologies over five years. Under the President's FY 1999 budget, the Commerce Department would receive \$7 million for new climate change technology initiatives.

My remarks this morning will focus on the Commerce Department's current research efforts to alleviate the causes of global climate change, as well as proposed activities under the President's Global Climate Change Initiative.

First, however, let me begin with a few words about the Department of Commerce's National Oceanic and Atmospheric Administration (NOAA)—recognized around the world as an authority in the science of the environment—whose work is focused on gaining a better scientific understanding of the nature of climate change.

NOAA has played a key role in the development of periodic state-of-science assessments and professional literature developed by the United Nations and professional scientific bodies, such as the recently published special report, "Regional Impacts of Climate Change: An Assessment of Vulnerability," of the 1998 Intergovernmental Panel on Climate Change. NOAA also plays a key advisory role to the President and other Federal policy makers. For example, a NOAA laboratory director served as science advisor to the U.S. delegation at the December 1997 meeting at Kyoto on climate change, playing a critical role in ensuring climate change discussions were informed by objective scientific input.

NOAA programs have been monitoring, collecting data, and carefully analyzing changes in the environment for many years. One especially valuable program periodically collects air samples from some 50 locations worldwide to enable a better understanding of the global carbon cycle and its effect on climate. The station at Mauna Loa, Hawaii, has maintained the world's longest continuous record of atmospheric carbon dioxide monitoring. This information is a key benchmark for climate change studies.

The Department of Commerce, through NOAA, is also a key participant in the U.S. Global Change Research Program—a multiagency effort to improve our understanding of medium and long term climate fluctuations and climate change. NOAA's work helps ensure that objective scientific knowledge informs decision making about Federal environmental policies and programs.

The Department will be happy to provide answers to any questions you may have about NOAA's programs.

Now, before I get to a detailed discussion of the Commerce Department's programs, let me take a minute to establish the global economic and environmental context for our efforts.

Global Economic Growth, Industrialization Stressing the Environment

Mr. Chairman, globalization and the rapid advancement of technology are driving worldwide economic growth and rapid industrialization in nearly every corner of the world. However, robust economies, new jobs, and individual prosperity, are also placing increased stress on our global environment—on our lakes, streams, rivers, oceans, land, and air.

In the emerging industrial nations, economic growth is lifting millions out of poverty. In East Asia alone, the number of poor fell from 400 million in 1970 to 180 million in 1990, and China has lifted an estimated 175 million people out of poverty. These nations are preparing for further growth, expanding their road systems and establishing other infrastructure. As time goes on, standards of living will rise for more and more people and consumer demand will grow.

For example, China projects that its domestic market for automobiles will grow from 180,000 autos in 1992, to 1.5 million in 2003—an annual average growth rate of more than 66 percent. Auto sales in South Korea already reached 1.5 million in 1993, and 15 percent average annual growth is projected for several years.

And while the most rapid growth is taking place in emerging economies, growth in the United States is also having an impact on the global environment. By the end of 1993, there were 194 million registered motor vehicles in the United States. These vehicles contribute about third of our smog-related air pollution, and one-third of our carbon dioxide emissions contributing to global climate change. According to some projections, there could be nearly 270 million registered vehicles in the United States by the year 2010.

Economic Growth and Environmental Protection: Compatible Goals

For decades the public debate on economic growth and environmental protection was framed by the belief that progress in either area came at the expense of the other. In many minds, the linkage between global growth and environmental impact has seemed clear—more growth, more pollution; less growth, less pollution. Those who stood strongly for economic growth were deemed opponents of the environment, while those who stood for environmental protection were deemed opponents of progress and prosperity.

Five years ago, President Clinton brought to office a new way of thinking—a solid belief that we, as a Nation, could—and must—pursue both economic growth and environmental protection simultaneously. He recognized that a choice between a higher standard of living and a cleaner environment was a false choice—Americans want both.

And so he committed the United States to a new course, one that rejects the notion that we must choose between jobs and the environment. In *Technology for a Sustainable Future*, the President sets out the challenge before the United States and the world—sustainable development—and the path to success—an effective partnership between the public and private sector to develop and deploy technologies that will protect the environment while sustaining economic growth. This path is built on a foundation of faith in our ability to “do good” and “do well” at the same time.

Doing Good, Doing Well

We believe the record speaks for itself. During the President's five years in office, the United States has generated 14 million new jobs—over 3 million jobs in just this past year. Real GDP grew 3.8 percent for 1997 as a whole—the highest growth rate in nine years—and measures of income have been growing even faster. We have the lowest unemployment in over 24 years, with the unemployment rate below 5 percent for the last eight months. Inflation has declined to its lowest level since 1965. And this month, after years of national red ink, President Clinton has submitted a plan that not only balances the Federal budget, but includes a surplus. And, at the same time all this was accomplished, we were able to make substantial Federal investments to protect our environment, including \$111 billion on natural resources and the environment, of which more than \$33 billion was spent specifically on pollution control and abatement. And these figures don't even include environmental clean-up programs at the Department of Energy and Defense.

The latest figures show that as of 1996, the U.S. environmental industry employed 1.3 million Americans and has revenues of over \$180 billion. The global market for environmental technologies, which stands today at about \$450 billion, is expected to grow to some \$600 billion by the year 2010. And as the global market grows, so do U.S. exports of environmental technology—\$16 billion in 1996, a 60 percent increase since 1993.

But despite this growth, our firms still export only 8 percent of their total production, a far smaller percentage than our competitors in Europe and Japan. This untapped exporting potential represents a great opportunity for our environmental industry to grow and create more high-wage jobs for Americans.

In addition, environmental technologies contribute to the vitality of other U.S. industrial sectors by enhancing their competitiveness in the increasingly environment-sensitive international marketplace.

A Paradigm for Public-Private Partnerships to Address National Goals

Achieving economic growth and stronger environmental protection has meant building strong public-private partnerships to demonstrate the reality that economic and environmental progress can go hand-in-hand. One particular effort—the Partnership for a New Generation of Vehicles—illustrates how government and industry, working together, can accomplish goals beyond what either could achieve separately, and do it in a way that is timely, cost-efficient, and collegial.

The Partnership for a New Generation of Vehicles

Shortly after his inauguration, President Clinton and his team began considering how best to address difficult policy problems involving transportation—specifically, the environmental and energy policy problems posed by our ever-increasing reliance on the automobile. This work was also informed by a recognition of the importance of the auto industry to the U.S. economy.

Since vehicle miles traveled has increased at a rate of about 3% per year over the last decade, and consumers are favoring ever-larger and less fuel efficient vehicles, we recognized that the environmental and energy policy issues were not being addressed by the marketplace. We realized that only a truly bold research project could provide the technology to address these policy issues, and that the auto industry needed to be committed to that project in order for it to work.

After six months of discussions, President Clinton and the CEOs of the Chrysler Corp., Ford Motor Co., and General Motors Corp. announced the formation of the Partnership for a New Generation of Vehicles on September 29, 1993, an historic partnership to develop a new generation of vehicles with very low emissions and up to three times the fuel efficiency of conventional cars.

Public Policy Objectives of PNGV

PNGV advances three important public policy objectives: environmental protection, energy security, and U.S. economic competitiveness.

Environmental protection— Motor vehicles contribute about a third of the United States' human-origin greenhouse gas emissions that are contributing to global climate change. And this contribution is growing. Since carbon dioxide emissions are directly related to fuel efficiency, a three-fold improvement in fuel efficiency—a key PNGV goal—would reduce carbon dioxide emissions by two-thirds per vehicle mile traveled.

U.S. energy security— The U.S. is becoming more dependent on foreign oil with each passing year. In 1995, imports accounted for 50 percent of U.S. oil consumption. Petroleum imports make up ten percent of the Nation's import inventory and account for a large percentage of the Nation's trade deficit. With domestic consumption growing 1.1 percent a year, and domestic production falling 1.4 percent a year, the Energy Information Administration predicts that by the year 2000, imports will make up 56 percent of our consumption. By 2010, imports are expected to exceed 60 percent of domestic consumption. As the economies of the emerging nations continue to grow, so too will their demand for oil.

Fuel for ground transportation accounts for 43 percent of our petroleum-based energy demand. When we find ways to get more for each dollar spent on a barrel of oil, it helps us reduce our growing dependence on this finite resource.

U.S. competitiveness—The U.S. auto industry accounts for 4.5 percent of GDP, and one-in-seven American jobs is tied to this industry. Recently, several major foreign competitors have demonstrated advanced technologies and vehicles that significantly improve fuel efficiency and reduce emissions. In the absence of a continuing, effective PNGV program, these advances could represent a competitive challenge to our domestic automobile companies, American jobs, and the U.S. economy.

PNGV Goals

The Department of Commerce chairs the Operational Steering Group of the Partnership for a New Generation of Vehicles because of our long history of partnership with the private sector. A highly ambitious 10-year research and development program, PNGV has three goals:

1. Improve the productivity of the U.S. manufacturing base through the adoption of new technologies;
2. Pursue technology advances that can lead to improvements in fuel efficiency and reduction of emissions in current vehicle designs; and
3. Develop the technologies for new generation, mid-size family sedans that get up to 80 miles per gallon, carry up to six passengers and 200 pounds of luggage; meet or exceed current safety and emissions requirements; provide ample acceleration; are at least 80 percent recyclable; and provide range, comfort, and utility similar to today's models, and cost no more to own and operate.

Under PNGV, teams of scientists and engineers from 19 Federal government laboratories have been working with counterparts at Chrysler, Ford and GM—under their U.S. Council for Automotive Research umbrella organization—automotive suppliers, and universities. The centerpiece of the Partnership is a coordinated portfolio of hundreds of research projects underway at government, auto company, supplier, and university research facilities.

Four years into the 10-year partnership, PNGV has made solid progress toward developing the enabling technologies for affordable, midsize, family sedans capable of achieving up to 80 miles per gallon with very low emissions. Last month, at the 1998 North American International Auto Show in Detroit, Chrysler, Ford and GM unveiled advanced concepts that reflect our progress toward PNGV goals.

However, while the new concepts unveiled in Detroit are impressive, significant additional technology breakthroughs and advancements will be required to achieve the ambitious PNGV goals. Chrysler, Ford, and GM are all working on high-mileage concept vehicles to debut in 2000, to be followed by production prototypes in 2004. The government partners and their national laboratories are continuing to pursue high-risk, cooperative research and development with the auto industry to advance critical enabling technologies for possible use in these vehicles.

PNGV Benefits

Clearly, a successful PNGV program would have profound effects for the United States and the world:

- creating a healthier global environment by reducing vehicle pollution,
- improving U.S. national security by reducing our reliance on oil,
- improving the Nation's balance of trade by reducing oil imports,
- extending the life of the world's petroleum resources by using them more efficiently,
- increasing the competitiveness of the U.S. auto industry,
- opening new markets across the globe, and
- protecting existing high-wage jobs and create new ones.

These factors indicate a clear convergence of public and private interests. And it is this convergence that established the foundation for a partnership between the Federal government and U.S. automakers to work together to achieve the technological breakthroughs required to produce a new class of highly energy-efficient and environmentally-compatible vehicles.

PNGV Characteristics: A Model for Public-Private R&D Partnerships

But aside from the laudable goals and prospective outcomes of the program, PNGV stands as a model for future public-private partnerships for several other reasons:

- replaces a long-running, adversarial relationship between a U.S. industry and the Federal government, with one grounded in cooperation and partnership,

- a partnership grounded in market-based principles,
- a cost-sharing arrangement under which the Federal government funds a proportionately larger share of fundamental research, and industry funds a proportionately larger share of R&D as it moves closer to commercial viability,
- the virtual aggregation of multiple government R&D programs, under the management of several Federal agencies, to create synergy and to establish a common purpose,
- the inclusion of a broad array and multiple tiers of suppliers,
- the inclusion of multiple components of America's innovation system—industry, government, and universities,
- industry involvement in crafting an R&D agenda that spans the spectrum of R&D, from basic science to production prototypes,
- clear goals and a clear timeframe for their achievement;

And finally, my last words on the effectiveness of PNGV come from an article published this week in one of America's leading business publications—Business Week:

"This shift [toward more fuel efficient vehicles] in Detroit's thinking can be credited substantially to the U.S. government, both through its antipollution regulations and the Administration's Partnership for a New Generation of Vehicles....

"Now, at the midpoint of the 10-year effort, the alliance is paying real dividends. The progress, Detroit recently claimed [at the Detroit auto show], would not have occurred without a government policy commitment to cleaner air. Washington deftly used the CAFE standards as stick and the PNGV as a carrot....

"It took substantial public research and development funding, as well as a goal that seemed far-fetched to create a serious commitment to entire new technologies....

"Public regulation and public research must both play a role, or pollution will be excessive. So don't count government out. Detroit didn't."

Other Department of Commerce Climate Change-related Programs

In addition to our role in PNGV, the Commerce Department has a number of other activities currently underway to address global climate change, as well as \$7 million in new initiatives proposed in the President's FY 1998 budget.

The Commerce Department's National Institute of Standards and Technology supports a wide range of activities that contribute to the Administration's efforts to understand and address global climate change. Although NIST's activities are driven primarily by economic considerations, we recognize their potential for improving the global climate. Let me illustrate how these economic and environmental goals can be complementary.

NIST Research in CFC Alternatives—A Case Study: NIST's research in support of the development of alternatives to chlorofluorocarbons—better known as CFCs—provides an excellent example of how a modest Federal investment in R&D can yield substantial environmental and economic benefits for the nation.

Until the past decade, most refrigerants used throughout the world were made up of CFCs due to their desirable physical and economic properties. However, research showing the detrimental effects of CFCs on the Earth's ozone layer—which provides protection from the sun's harmful rays—resulted in an international accord in 1987 to phase out production and consumption of CFCs, and to replace them with other, more environmentally-friendly compounds.

NIST helped industry cope with this fast changing regulatory environment by identifying the basic requirements for new refrigerants, then started research to determine the physical properties of such candidates. The results of these efforts were made available to industry. NIST's most effective work came in the form of a computer program—REFROP, available to the public through NIST's Standard Reference Data Program—that enables manufacturers and users of refrigerants to model the behavior of alternative refrigerants.

NIST data and REFROP provided a standard that enabled industry to make important decisions. Without these standards, each company would have had to develop their own—incurring time-consuming delays and millions of dollars in costs. And in the end, each company probably would have made different choices about refrigerants, a scenario that would lead to a technical “Tower of Babel” for the maintenance and repair community and a nightmare for consumers.

An analysis of the economic benefits of NIST’s alternative refrigerants research program showed an extremely high internal rate of return and a benefit-to-cost ratio of almost 4-to-1. And this analysis does not include the incalculable benefits that result from protecting our planet’s ozone layer.

Manufacturing Extension Partnership (MEP) Program: Our Manufacturing Extension

Partnership is a promising mechanism for helping the Nation’s smaller manufacturers reduce or eliminate pollution in their operations, and we are integrating environmental technical assistance into the broader array of services provided by MEP centers. For example, through these environmental services, manufacturers can receive advice and direction to reduce their dependence on fossil fuels and their use of ozone depleting substances.

The President is requesting \$1 million to add to these services a strong focus on the transfer and diffusion of climate change technologies. In addition, MEP centers plan to build upon our existing relationship with the Department of Energy’s Industrial Assessment Centers which focus on energy efficiency. We envision a two-tiered program for promoting the use of such technologies among smaller manufacturers. In the near term, we will promote the dissemination and diffusion of existing off-the-shelf and state-of-the-market technologies. In the longer-term, advanced technologies developed by NIST would be introduced to more sophisticated companies, or as major capital improvements and replacements to energy-intensive systems become necessary. Today, eight percent of NIST interactions with manufacturers in the MEP program focus on environmental issues. By the year 2000, the MEP is expected to reach approximately 36,000 manufacturers annually, establishing promising channels for the dissemination and diffusion of climate change technologies.

Advanced Technology Program (ATP): The Advanced Technology Program encourages high-risk research on enabling technologies which have strong potential for economic benefit to the Nation. ATP does not have a focused program in global climate change, although it does have a strong portfolio of promising research that could generate significant improvements in energy efficiency and the global climate. ATP has invested \$90 million in about 60 projects that address five broad categories of environmental technology development: pollution prevention, clean and efficient engines, clean energy, energy use and management, light-weight automotive materials, and renewables and recycling projects.

The bridge to a sustainable future will be built with lots of contributions that address our environmental challenge from many different angles. Accordingly, our ATP portfolio of projects holds the potential for lots of individual contributions that could add up to a significant benefit for the environment and our economy.

Partnership for Advancing Technology in Housing: Buildings produce 35 percent of U.S. greenhouse gas emissions. For example, the energy used in the typical home causes more greenhouse gas emissions than does a typical car. New technologies offer us an opportunity to reduce energy demand and emissions, while holding the line on housing costs.

The Administration's Partnership for Advancing Technology in Housing (PATH), led by the Department of Housing and Urban Development, brings together a number of government agencies and industry to develop, demonstrate, and deploy housing technologies, designs, and practices that can significantly improve the quality of housing without raising the cost of construction. A number of PATH goals address climate change and environmental issues. These include targets for reducing carbon emissions, water use, and construction materials; increasing the use of recycled materials; and improving indoor air quality. PATH also seeks to identify and remove barriers that have reduced incentives for innovation in housing design and construction. NIST is supporting numerous R&D activities that can contribute to PATH goals, and will play a key leadership role in the initiative.

New NIST Climate Change Initiatives

Finally, the President is requesting \$6 million to improve the measurements and data underpinning the next generation of climate change technologies that will reduce greenhouse gas emissions and produce more efficient industrial processes. Enormous amounts of energy are consumed, with concomitant greenhouse gas emissions, in many areas of industrial manufacturing and power generation. We know technology holds the potential to enable significant improvements. For example, from 1970-1996, the energy required to produce each dollar of GDP dropped 32 percent as a result of improved technologies and conservation.

We propose to invest in developing the measurements and data that will help enable large-scale carbon dioxide removal from the atmosphere, industrial reductions of carbon dioxide emissions, and replacement of industrially important ozone-damaging gases with environmentally acceptable and better performing alternatives. These investments would focus on three key areas.

Biotechnology for Increased CO₂ Consumption: First, NIST would undertake research in biotechnology to provide data on structure-function relationships that could be used to enhance biomass production and to manipulate metabolic pathways for increased carbon dioxide consumption. For example, the enzyme that captures carbon dioxide during photosynthesis is relatively inefficient; it's activity can be enhanced using extensive characterization of its biochemical properties and genetic engineering. Methods for integrating the optimized enzyme into plants and microorganisms will be developed for enhanced biomass production. This approach offers the opportunity not only to significantly reduce the carbon dioxide in the air, but also offers economic benefits to the agrochemical industry through improved crop yields. This effort will be made in coordination with related research at the U.S. Department of Agriculture.

Membrane-based Alternatives to Distillation: Our second area of focus is membrane-based alternatives to distillation. Large-scale separations based on distillation--the process by which different components in chemicals are separated--consume an estimated 43 percent of the primary energy used by the U.S. chemical process industry annually, and 9 percent of the energy used by U.S. industry as a whole. Membrane-based separations have much lower energy requirements than distillation processes, and offer vast improvements over other chemical

separation processes in the trade-off between purity and productivity. As the U.S. chemical process industry moves to cut greenhouse gases, its needs for measurements and data on the performance characteristics of membranes will grow accordingly. To help encourage the development and adoption of membrane-based separation processes, NIST proposes to develop a membrane technology database, conduct experimental and modeling studies of transport in membrane materials, and produce characterization techniques useful to both developers and end-users of membrane technology.

Alternative Working Fluids for Energy-efficient Processes: Our third area of focus for measurements and standards for climate change involves alternative working fluids for energy-efficient processes and reduced global warming effects. Fluid systems are pervasive in many important industrial processes such as electrical power generation, heating and cooling systems, industrial cleaning, and microelectronics manufacture. Often these fluids have significant global warming effects. In other cases, the use of a fluid in a particular application wastes energy because the fluid or fluid systems are not the best for the task at hand. In these cases, the process indirectly produces additional carbon dioxide in proportion to its inefficiency, thus contributing to global warming. Our goal is to address the measurements and data needed to develop energy-efficient and environmentally-acceptable alternative working fluids in several applications. These include power generation systems, next generation refrigerants and insulating gases, cleaning fluids in the semiconductor industry, and industrial-scale use of carbon dioxide to replace harmful organic solvents used in chemical processing.

Power generation provides a good example of what we hope to enable. The United States relies almost entirely on water steam to transfer energy from a primary energy source to the rotation of a turbine, and then to electricity, with the primary energy usually coming from fossil fuels that release carbon dioxide. Alternatives to this approach, involving different thermodynamic cycles and working fluids, may provide significant potential for reducing carbon dioxide emissions. For example, if we could replace that water with an ammonia and water mix, we may be able to reduce coal consumption by 20 percent in coal-fired applications. Such a system may also make geothermal energy production competitive and an entirely non-polluting source of power. NIST's

role would be to provide U.S. industry with the thermophysical property data and models needed to advance such technology.

In the Advanced Technology Program, the Manufacturing Extension Partnership program, and the Measurements and Standards program, NIST has the staff expertise, experience, and industry partnerships to contribute to technology-driven economic growth and, at the same time, helps us reach our Nation's environmental goals.

Conclusion

In conclusion, let me ask you to examine the programs I have discussed today in the context of broad national policy objectives that I think we can all agree upon:

- a strong U.S. competitive position across a broad array of industries,
- a growing standard of living for all Americans,
- less reliance on foreign sources of oil, and
- a cleaner environment for ourselves, for our children, and for generations of Americans to come.

Throughout our Nation's history we have made investments in research and development to meet critical national needs: to provide for the nation's defense, to ensure an adequate supply of food, to protect our health, and to ensure our safety. The linkage between sustained Federal R&D investments to meet these needs and U.S. global leadership in key industries—agriculture, aerospace, satellites, computing and communications, and biotechnology—is clear.

In the same way, we must commit our Nation to the development of environmental technologies to ensure U.S. global leadership in an industry that is so closely tied to the vitality of our economy, the health of our people, and the future of our children.

These programs make sense for America.

**TESTIMONY OF DR. JANET YELLEN
CHAIR, COUNCIL OF ECONOMIC ADVISERS
BEFORE THE HOUSE COMMERCE COMMITTEE
ON THE ECONOMICS OF THE KYOTO PROTOCOL
MARCH 4, 1998**

Thank you, Mr. Chairman. The President has said that we can work to avert the grave dangers of climate change, while at the same time maintaining the strength of our economy. I agree and am pleased to have this opportunity to appear before the Committee to elaborate on the Administration's views on these issues.

The international agreement that was reached in Kyoto this past December is a crucial step forward in addressing global climate change. But it is only one step in a journey. Since the international effort to reduce greenhouse gas emissions is still in some respects a work-in-progress, it is not yet possible to provide a full authoritative analysis of it. Many of the specifics in several crucial areas are not completely resolved in the diplomatic arena, forcing analysts to make a variety of assumptions about the ultimate form of the international regime. In my testimony today, I will attempt to identify key elements of the agreement and the Administration's policy, such as international emissions trading, meaningful developing country participation, inclusion of land-use activities that absorb carbon ("sinks") and six categories of gases, as well as domestic initiatives, that together can ensure that reductions in global greenhouse gas emissions are consistent with continued strong economic growth. I will explain the reasoning underlying our conclusion that, under these conditions, economic impacts are likely to be modest.

The Administration is strongly committed to ensuring that these key elements are reflected in our domestic and international climate change policies. We are firmly committed to

of inaction. These costs --and they are significant-- provide the primary motivation for actions to reduce greenhouse gas emissions.

The Intergovernmental Panel on Climate Change (IPCC) jointly established by the World Meteorological Organization and the United Nations Environment Programme, concluded in 1995 that "the balance of evidence suggests that there is a discernible human influence on global climate." Current concentrations of carbon dioxide, methane, nitrous oxide, and the other so-called greenhouse gases have reached levels well above those of preindustrial times. Of these, carbon dioxide (CO₂) is the most important: net cumulative CO₂ emissions resulting from the burning of fossil fuels and deforestation account for about two-thirds of potential warming from changes in greenhouse gas concentrations related to human activity.

Climatic Impact

If growth in global emissions continues unabated, the atmospheric concentration of CO₂ will likely double relative to its preindustrial level by midway through the next century and continue to rise thereafter. As a result of the increased concentration of CO₂, the IPCC estimates that global temperatures will increase by between 2 to 6 degrees Fahrenheit in the next 100 years, with a best guess of about 3.5 degrees Fahrenheit. While scientists believe that human activities are leading to a gradual warming of the *average* temperature of the earth, the change in temperature in a given region at a given time may differ substantially from this average. Indeed, models predict warming will be greater in high latitudes than in the tropics, and greater over land than ocean.

Potential consequences associated with this shift in climate include a rise in sea levels, greater frequency of severe weather events, shifts in agricultural growing conditions from

terms by scaling it to current GDP.) William Nordhaus of Yale University has likewise computed estimates of the dollar loss attributable to a doubling of greenhouse gas concentrations. Although he uses methods that differ from Cline's in several respects, Nordhaus estimates that a slightly larger temperature change of 5.4 degrees Fahrenheit would impose losses equal to about 1 percent of GDP. A third independent estimate reported by Nordhaus is close to Cline's. It must be noted, however, that this similarity among aggregated estimates masks the true uncertainty associated with forecasts of the damages from given increases in global warming -- the estimates are all fundamentally based on extrapolations from current and past experience, and may not fully incorporate effects that will unfortunately become apparent only with future experience.

One key difficulty in interpreting and monetizing these estimates of damages is uncertainty over the extent that they should be discounted because they occur in the distant future. Since the benefits of stemming future climate change accrue over not only decades but centuries, small changes in the discount rate can produce substantial changes in the results. But the precise discount rate that should be used to evaluate questions as important as the future climate of the planet remains a subject of intense debate. It is safe to say that there is, as yet, no professional consensus on the issue. Indeed there can be no technical answer to the ethical question how we should value the welfare of future generations.

A similar difficulty with such estimates is that they do not include potential nonlinearities in the relationships between greenhouse gas concentrations and temperature, between temperature and economic damages, or in the various other complicated relationships governing interactions between greenhouse gas emissions, the climate, and the economy. Current estimates

III. Addressing Global Climate Change in an Efficient Manner

The costs of unabated climate change may thus be difficult to quantify, but they are nonetheless real and provide the motivation for reducing greenhouse gas emissions. In taking action to reduce those emissions, economic analysis suggests that two elements are absolutely essential:

- The effort must be global, to address the global externality inherent in the nature of the problem.
- The effort must be flexible and market-based, to ensure that we achieve our objectives in the most efficient manner possible.

Need for Global Action

Climate change is a global problem requiring a global solution. As I mentioned earlier, no single country has an incentive to reduce emissions sufficiently to protect the global environment against climate change. Each has an economic incentive to “free ride” on the efforts of others. Even if the United States sharply reduced its emissions unilaterally without an international agreement limiting emissions abroad, greenhouse gas emissions from all other countries would continue to grow, and the risks posed by climate change would not be significantly reduced. It is important to emphasize that emissions of different gases anywhere in the world have very similar effects on global climate.

The threat of disruptive climate change has led to coordinated international efforts to reduce the risks of global warming by reducing emissions of greenhouse gases. A landmark international agreement to address global warming was the Framework Convention on Climate

position. The targets for the European Union and Japan are 8 percent and 6 percent below 1990 levels, respectively. Australia, New Zealand, Norway, Russia, and Ukraine all have limits somewhat less ambitious when phrased as cuts relative to their 1990 levels. In sum, over the period from 2008 to 2012, the industrial countries are expected to reduce their average emissions of greenhouse gases to about 5 percent below their 1990 levels.

The President has made clear that he will not submit the Kyoto Protocol to the Senate without meaningful participation from key developing countries (who are not included in Annex I).

There are several reasons why meaningful participation from developing countries is essential. First, developing countries are projected to contribute a majority of world emissions around 2030 under a continuation of business-as-usual. Without the participation of developing economies, efforts by the industrialized countries to limit emissions will therefore not provide adequate protection from climate change.

Second, developing country participation is crucial because it would permit relatively low-cost emissions reductions to be internationally recognized as a substitute for more expensive emissions reductions that might otherwise be achieved domestically by U.S. companies and those in other industrialized countries. Since greenhouse gas emissions have the same basic impact on the climate regardless of where they occur, emission reductions in developing countries have the same environmental benefit as reductions in the U.S. But these reductions are much less costly than reductions in the U.S. or in other developed nations, because of the very inefficient and carbon-intensive uses of energy in these countries today. It thus makes sense, from both an environmental and an economic perspective, to incorporate emissions reductions in

developing country participation because the problem is global and cost-effective solutions are essential, than to avoid adverse effects on competitiveness.

Flexibility and Market Mechanisms

A global solution is thus critical to the global problem of climate change. Globalizing the solution is not, however, enough by itself. We must also ensure that our efforts to reduce global greenhouse gas emissions reductions in the most efficient manner possible. The nature of the climate change problem suggests three basic methods to lower costs of achieving given levels of environmental protection. They can be characterized in terms of three categories of flexibility: (1) “when” flexibility; (2) “what” flexibility; and (3) “where” flexibility, which may be the most important of all. Such methods have long been championed by economists interested in increasing the efficiency of protection. Indeed, over 2,500 economists from academia, industry, and government alike urged such approaches in a letter they signed last year advocating action on climate change:

“Economic studies have found that there are many potential policies to reduce greenhouse gas emissions for which the total benefits outweigh the total costs...The most efficient approach to slowing climate change is through market-based policies.”

1. “When flexibility” (timing)

First is “when flexibility” or timing. Since climate change is a long-term problem, the exact timing of emissions reductions is, within some range, not of primary importance. Thus the freedom to delay or accelerate reductions within an agreed upon time frame -- while ensuring credibility of emissions reductions -- lowers costs.

As a result of U.S. leadership, the Kyoto Protocol incorporates this principle of “when

conversion factors for all greenhouse gases by estimating their global warming potentials, reductions in emissions of one gas can be used to substitute for increases in emissions of another by an amount that has equivalent environmental effects. Again at U.S. urging, all six gases are included, while Japan and the EU had insisted until the end on covering only three. Thus the U.S. succeeded in having the Kyoto Protocol stipulate that countries with binding targets are to reduce their *total* greenhouse gas emissions by certain percentages, but does not require specific reductions for specific gases. Since a molecule of sulfur hexafluoride is 23,900 times more potent over 100 years than a molecule of CO₂, it may be cheaper to achieve the same environmental benefit by eliminating one molecular unit of SF₆ than nearly 24,000 units of CO₂.

Some initial analysis indicates that a strategy of reducing non-CO₂ greenhouse gas emissions by a greater percent than CO₂ emissions could lower prices by as much as 10 percent. Thus allowing countries flexibility in what gases they reduce -- essentially trading emissions reductions across gases -- can help lower significantly the costs of meeting their targets.

The second source of "what flexibility" is the treatment of sinks, i.e., land use activities that promote the removal of carbon from the atmosphere through the growth of plants. At the urging of the U.S. delegation, sinks can be used to offset emissions targets. Promoting such sinks through afforestation and reforestation may reduce atmospheric concentrations of CO₂ at much lower costs than reducing emissions of greenhouse gases.

3. "Where flexibility" (international)

The third type of flexibility, and perhaps the most important, is "where flexibility" (international). As I have already emphasized, emissions have the same environmental consequences regardless of where in the world they occur. Therefore, the least-cost approach to

emission credits, Joint Implementation, and the Clean Development Mechanism can lead to substantial reductions in costs relative to alternative policies that do not exploit the power of market incentives. To illustrate briefly the ability of U.S. industry to perform beyond expectations when given appropriate economic incentives, consider further EPA's highly acclaimed sulfur dioxide (SO₂) program, which relies, among other things, on a system of tradeable permits to reduce emissions of SO₂ from electric utilities. The SO₂ program has been successful in several ways: a large number of utilities participate, SO₂ emissions and ambient concentrations have fallen and the costs of reducing emissions are considerably lower than originally forecast.

As has been frequently noted, the average cost of SO₂ emissions reductions has recently been significantly lower than was originally forecast, in part due to the role of incentives in fostering innovation. Emission permit prices, currently at approximately \$100 per ton of SO₂, are well below earlier estimates of around \$250 to \$400 per ton.

Trading programs may not always bring cost savings as large as those achieved by the SO₂ program; trading programs will not always be accompanied by the discovery of much cheaper control strategies. However, the SO₂ experience demonstrates clearly how programs like international permit trading, Joint Implementation, and the Clean Development Mechanism will lead firms to find cheaper ways of reducing emissions that can lead to unexpectedly low costs.

IV. Difficulties of Economic Analysis of the Kyoto Protocol

Now that we have a Protocol -- even if it is not yet fully complete nor ready for the President's submission to the Senate -- it is possible to examine it in somewhat more detail from

discussions including future negotiations in Buenos Aires next fall, because they had not been definitively settled by the end of the Kyoto talks.

Finally, and most importantly, we have not yet negotiated international agreements to limit emissions beyond the 2012 window. The emission cuts agreed upon at Kyoto are only a first step on a long journey. The first step that we propose to take over the next 15 years is critical. But the reason it is critical is *not* that, by itself, it will solve the climate change problem -- emissions during any given decade are small compared to the cumulative concentrations in the atmosphere. Rather, the first step is critical because we can not take the second and third steps until we have taken the first. At the same time, any analysis is complicated by the lack of knowledge over what the subsequent steps will be.

Inherent Limitations of Models

In addition to these uncertainties about the details of the international effort to address climate change, are the inherent limitations of the models used to evaluate that effort. Even within a given model, answers depend critically on the precise nature of the question asked. For example, the costs of emissions reductions depend critically on the extent of global participation and international trading that a treaty is assumed to feature. But in addition to the dependence of the results from a given model on the precise assumptions, different models can give different answers even when all the assumptions are specified to be the same -- a concrete illustration of the range of uncertainty to which we must assign the predictions of any one individual model.

One area in which the uncertainty is particularly large is the pace of technological progress --especially the diffusion of existing energy-efficient technologies, but also the development of new technologies -- and the extent to which the pace will accelerate in response

V. Assessing the Kyoto Protocol

In order to evaluate the likely net economic impact of the Kyoto Protocol, *excluding the benefits of mitigating climate change itself*, we have drawn upon a variety of tools to assess the various possible costs and non-climate benefits of the Administration's emissions reduction policy. To give away the punch line, our conclusion is as follows: the net costs of our policies to reduce emissions are likely to be small, assuming those reductions are undertaken in an efficient manner and we are successful in securing meaningful developing country participation as well as effective international trading, and the Clean Development Mechanism in future negotiations. That potential small net premium, even excluding the benefits of mitigating climate change, in effect, purchases a partial insurance policy against a serious environmental threat.

Because the results from any model must be treated with caution, the Administration has employed a broad set of economic tools to assess the Kyoto Protocol. We have drawn on the insights of a wide range of models of the energy sector and economy over the next 25 years, including but not limited to the results of the Stanford Energy Modeling Forum exercises, the IPCC's review of the economic and social dimensions of climate change, the work of the OECD on Economic Dimensions and Policy Responses to Global Warming, and the staff-level Interagency Analytical Team analysis produced last year. Other tools include simple relevant statistics, "meta-analyses" such as work by the World Resources Institute, models, and basic economic reasoning. Drawing on this broad array of analytical tools is crucial to an intelligent evaluation of the policy alternatives.

To our knowledge, no model -- whether used inside the government or not -- has yet been set up to analyze the implications of the Kyoto Protocol, since this agreement is only a few

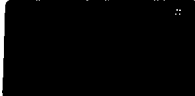
how features of the Kyoto legal language can be translated into terms recognizable to economic modelers. We expect that the group will conduct a full scale analysis of the Kyoto Protocol. The Energy Modeling Forum believes that its members will need at least until mid-year to update their results.

VI. Assessing the Potential Costs of Emissions Reductions

I said in Congressional testimony last July that we can do this smart or we can do this dumb. I was referring to the point that the costs of cutting emissions can be much reduced if flexible, market-based mechanisms are used. Our economic analysis highlighted the importance of such flexible, market-based mechanisms -- which are therefore reflected, at the President's insistence, in the Kyoto Protocol and our ongoing diplomatic strategy.

Within the Kyoto Protocol, this means an insistence on international trading, Joint Implementation, the Clean Development Mechanism, and, ultimately, on meaningful developing country participation. Domestically, this means that we implement any emissions reductions through a market-based system of *tradeable* emissions permits, which ensures that we achieve reductions wherever they are least expensive. But this also means taking serious and responsible steps in the short run to prepare us to meet our obligations in the longer term.

The first such step is the inclusion in this year's budget of an aggressive, \$6.3 billion program of tax cuts and R&D investments -- \$1.3 billion more than the \$5 billion package the President promised in his October 22 speech on this issue. The goal is both to stimulate the development of new energy-saving and carbon-saving technologies and to encourage the dissemination of those that exist already. The proposed package contains \$3.6 billion over the



in his address to the National Geographic Society on October 22. An electricity sector freed from government regulation would be a more efficient energy sector. Costs to consumers would fall. In addition, stronger incentives for improved generation efficiency in conjunction with appropriate market based provisions could achieve modest reductions in emissions. A reasonable overall estimate of the contribution of federal electricity restructuring to the rest of the President's program to address climate change is that it would make further progress to the same emission reduction goals at a cost saving of roughly \$20 billion per year. These steps should be taken regardless of Kyoto, because they make sense in terms of energy efficiency. But they have the added benefit of preparing us for Kyoto.

Estimated Reduction in Costs from Annex I Trading

In the language of the treaty, "Annex I," is the set of countries that have agreed to take on binding limitations in emissions of greenhouse gases. Even without meaningful developing country participation -- which, again, the President has emphasized is essential before the treaty would be submitted for ratification -- costs could be reduced substantially by emission trading among the Annex I countries. To provide some indication of the possible efficiency improvements, Russia and Ukraine consume six times as much energy per dollar of output as does the United States. Such large international differences in energy efficiency suggest that adoption of existing U.S. technology would yield very large emissions reductions in these countries.

Estimates derived from the SGM model confirm 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 relative to a situation in which such trading was not available. This

for the first budget period 2008-2012.

Estimated reduction in costs from developing country participation

The next consideration is participation by developing countries. The President has said that he will not submit the treaty for ratification without meaningful participation by key developing countries. Such participation would further reduce the costs involved.

The substantial potential gains from meaningful developing country participation are highlighted by the significant benefits that will likely accrue from the limited role that the developing countries have already agreed to: the Clean Development Mechanism (CDM), modeled after the U.S. joint implementation concept. The CDM cannot realistically be expected to yield all the gains of binding targets for developing countries, but it might shave costs by roughly another 20 to 25 percent from the reduced costs that result from trading among Annex I countries.

Another possibility is that we persuade some of the key developing countries that are the largest emitters to commit to targets, and allow us to buy emission reductions from those paths. Simulations with the SGM model suggest that full participation by non Annex I countries could cut roughly 55 percent off the reduced costs that result from Annex I trading. The actual cost reduction would depend on the extent of developing country participation that is ultimately obtained, as well as the effectiveness of international trading arrangements. The more developing countries that take on modest binding targets and trade in international permit markets, the lower will be costs.

These cost-saving opportunities are fundamental tenets of the U.S. position. The promise of Kyoto cannot be achieved without effective emissions trading. Moreover, if we do

even tried to take into account that government policies can help increase the activities qualifying as allowable sinks, like some tree-planting.) Because the quantitative uncertainty is so large, we do not yet have an estimate with which we are comfortable. But we expect that complete modelling of the Kyoto provision pertaining to sinks will likely have favorable and potentially large effects on projected costs.

Accounting for the role of improvements in energy efficiency

Another issue in analyzing the Kyoto protocol concerns future improvements in energy efficiency due to innovation and diffusion of existing technology. The parameter that figures most prominently in analysis of energy efficiency is the rate of improvement in the so-called Autonomous Energy Efficiency Index (AEEI), that is the rate at which the total use of energy falls relative to GDP. A plausible assumption on the AEEI is an improvement of 1.0 percent per year. Reflecting a conservative interpretation of the 15-year impact of various climate change initiatives, this is only a small increase above the 0.9 percent number in the Energy Information Administration's Annual Energy Outlook. That assumption is not the most optimistic outcome that might occur. Some authorities in the field of energy policy forecast more rapid technological progress. Experts at five national laboratories managed by the Department of Energy, using an engineering approach rather than an economic paradigm, found that a third of the emissions reductions necessary to return to 1990 levels by 2010 could be achieved through the adoption of existing energy-efficient technologies at no net resource cost, or even some savings. The National Academy of Sciences reached qualitatively similar conclusions in a 1992 report.

The President's FY 1999 budget, as I have noted, includes a \$6.3 billion package of

Generation of Vehicles between the Administration and the U.S. auto companies and their suppliers.

Such progress may be replicated in other sectors. VCRs and TVs, while switched off, consume about \$1 billion worth of electricity annually. EPA has established a partnership with major manufacturers that has a goal of achieving up to a 70 percent reduction in energy use by VCRs and TVs while they are switched off, without sacrificing product quality, usefulness, or increasing costs. This partnership offers promise of substantial improvements in energy efficiency.

Non-Climate Benefits

A final factor that should be included in any comprehensive assessment of the economic implications of the Kyoto protocol are the benefits of the agreement. The literature has emphasized that any relative price shifts that prove necessary to reduce emissions should produce non-climate benefits in three areas: traffic congestion, highway accidents, and air pollution unrelated to climate change. These benefits are hard to quantify precisely but are potentially significant: our rough estimates suggest that these three benefits could offset approximately a quarter of the resource cost of the climate change policy.

Synthesis

A comprehensive evaluation of the economic impact of the Kyoto Protocol must integrate all of the factors described above: reliance on flexible market-based mechanisms domestically; international trading and Joint Implementation among Annex I countries; the Clean Development Mechanism; meaningful developing country participation; the potential cost-mitigating role of including six gases and carbon sinks; the benefits of electricity restructuring;

above, is an emissions price in the range of \$14 to \$23 per ton of carbon equivalent. This translates into an increase in energy prices between 2008 and 2012 at the household level of between 3 and 5 percent, an increase in fuel oil prices of about 5 to 9 percent, natural gas prices of 3 to 5 percent, gasoline prices of 3 to 4 percent (or around 4 to 6 cents per gallon), and electricity prices of 3 to 4 percent. This increase in energy prices at the household level would raise the average household's energy bill in ten years by between \$70 and \$110 per year, although such predictions may not be observable because they would be small relative to typical energy price changes, and nearly fully offset by electricity price declines from Federal electricity restructuring. In particular, this increase in energy prices is small relative to the average of *year to year* real energy price changes experienced by U.S. consumers since 1960: such *annual* changes have averaged 3.8 percent. In addition, by 2008-2012, the anticipated 10 percent decline in electricity prices from the restructuring that is part of our climate change agenda is projected to lead to expenditure reductions of about \$90 per year for the average household.

As highlighted earlier, there are substantial but unavoidable uncertainties surrounding estimates like these. For example, the estimate just discussed is predicated, among other things, on the developing country participation that we are insisting upon as a condition for our ratifying the Kyoto Protocol, but which is not yet part of that Protocol, and on effective international trading. Moreover, other models will yield other answers and much work remains to be done by the modeling community to test the robustness of these results. Preliminary comparisons of the SGM model to the few other models that have attempted to evaluate the Kyoto accord, suggest that its predictions concerning the impact of the Kyoto Protocol on carbon permit prices are neither the most conservative nor the most optimistic of the models that have been developed.

VII. Conclusion

In conclusion, the Kyoto Protocol and the President's general approach to climate change reflect the insight of economic analysis. The Kyoto Protocol includes key provisions on international trading and Clean Development projects. The President's approach relies on market incentives -- first, with a system of tax cuts and R&D investments, and then later with a market-based system of tradeable permits -- to ensure that our objectives are achieved as efficiently as possible.

Our overall conclusion is that the economic impact of the Protocol will be modest under the conditions we have identified. The purpose of this testimony has been to explain the reasoning underlying this conclusion, which draws insights from not only the forecasts of individual models, any one of which has its own strengths and limitations, but also a broad variety of additional analyses.

I look forward to continuing to work with members of this Committee, as well as other interested parties, in further analyzing the Kyoto Protocol and evaluating the net effects of reducing greenhouse gas emissions. It is my hope that economic analysis will continue to play a key role in designing policies in this area.

I welcome your questions.

Preliminary and incomplete: Draft 6, 3/3/98

**ORAL TESTIMONY OF DR. JANET YELLEN
CHAIR, COUNCIL OF ECONOMIC ADVISERS
BEFORE THE HOUSE COMMERCE COMMITTEE
ON THE ECONOMICS OF THE KYOTO PROTOCOL
MARCH 4, 1998**

Thank you, Mr. Chairman. The President has said that we can work to avert the grave dangers of climate change, while at the same time maintaining the strength of our economy. I agree and am pleased to have this opportunity to appear before the Committee to elaborate on the Administration's views on these issues.

The international agreement that was reached in Kyoto this past December is a crucial step forward in addressing global climate change. But it is only one step in a long journey. Since the international effort to reduce greenhouse gas emissions is still in some respects a work-in-progress, it is not yet possible to provide a full authoritative analysis of it. In my testimony today, I will attempt to identify key elements of the agreement and the Administration's policy, such as international emissions permit trading, meaningful developing country participation, the inclusion of land-use activities that absorb carbon ("sinks") and six categories of gases, as well as domestic initiatives, that can ensure that reductions in global greenhouse gas emissions are consistent with continued strong economic growth.

Effects of Climate Change

The Intergovernmental Panel on Climate Change (IPCC) jointly established by the World Meteorological Organization and the United Nations Environment Programme, concluded in 1995 that "the balance of evidence suggests that there is a discernible human influence on global climate." Current concentrations of carbon dioxide, methane, nitrous oxide, and the other

Preliminary and incomplete: Draft 6, 3/3/98

so-called greenhouse gases have reached levels well above those of preindustrial times. As a result of the increased concentration of greenhouse gases, the IPCC estimates that global temperatures will increase by between 2 to 6 degrees Fahrenheit in the next 100 years, with a best guess of about 3.5 degrees Fahrenheit. The IPCC reports that a doubling of carbon dioxide levels would lead to approximately 10,000 additional deaths per year for the current U.S. population from higher summer temperatures, even after netting out the effects of warmer winters and acclimatization. The IPCC also predicts sea level increases of about 20 inches by 2100, with greater increases in subsequent years. Despite the difficulties of deriving quantitative assessments of the damages from climate change, researchers have nonetheless developed monetary estimates of damages that prompt substantial concern, and range in tens of billions of dollars per year for temperature changes projected to occur in the next century. If left uncontrolled, disruption of the Earth's climate may thus pose substantial costs in terms of harm to commerce and the environment alike. These costs--and they are significant--provide the primary motivation for actions to reduce greenhouse gas emissions.

These estimates do not, and cannot, accurately reflect the value of reducing the unknown risk of large-scale and potentially irreversible events with potentially catastrophic consequences, such as warming of the Northern tundra sufficient to release very large amounts of methane from the permafrost and thereby leading to accelerated warming. There is thus a strong argument for the Kyoto Protocol as a form of insurance against a serious environmental threat.

Kyoto Protocol

To address climate change, the United States and approximately 160 other nations agreed

Preliminary and incomplete: Draft 6, 3/3/98

in negotiations held in Kyoto, Japan, last December, to reduce emissions of greenhouse gases. The Kyoto Protocol, which requires the advice and consent of the Senate, would place binding limits on each industrial country's combined emissions of the six principal categories of greenhouse gases. These limits apply to the 38 so-called Annex I countries, which are the industrialized countries, defined to include Russia, Ukraine, and most Eastern European countries.

In taking action to reduce emissions, economic analysis suggests that two elements are absolutely essential: the effort must be flexible and market-based, to ensure that we reduce emissions in the most efficient way; and the effort must be global, for without global emissions reductions the effort would be ineffective. The nature of the climate change problem--that greenhouse gas emissions have the same effect on the climate regardless of how, where, and, within limits, when they occur--suggests three basic approaches to lower the cost of achieving given levels of environmental protection. We term these “when”, “what”, and “where” flexibility.

As a result of U.S. diplomatic efforts, all three forms of flexibility are broadly reflected in the Kyoto Protocol. The choice of a multi-year budget period, ending later than many countries proposed, with allowance for “banking” of emissions reductions, constitute key elements of “when flexibility.” These provisions mitigate costs by permitting reductions at times when they are less rather than more costly. The inclusion of all six greenhouse gases and certain sink activities that promote removal of carbon from the atmosphere provide substantial “what flexibility”. The U.S. succeeded in having the Kyoto Protocol stipulate that countries with

Preliminary and incomplete: Draft 6, 3/3/98

binding targets are to reduce total greenhouse gas emissions by certain percentages, but does not require specific reductions for specific gases. Moreover, sinks can be used to offset emissions targets. The inclusion of international emissions trading among countries that take on binding targets, coupled with an agreement allowing industrial countries to receive emissions reduction credit for certified investments in “clean development” projects in the developing world, are the critical forms of “where” flexibility incorporated in the Kyoto Protocol. Although details of these provisions need to be finalized in negotiations in Buenos Aires later this year, we believe that these mechanisms can produce substantial reductions in the costs of attaining our environmental objectives.

The problem of climate change is global and so requires a global solution. Around 2030, under a continuation of business as usual, a majority of world emissions are projected to come from developing countries. Without developing country participation we cannot achieve adequate climate protection. In addition, developing country participation would permit relatively low-cost emissions reductions to be internationally recognized as a substitute for more expensive reductions in many industrial countries. The President has made clear that he will not submit the Kyoto Protocol to the Senate without meaningful participation from key developing countries (who are not included in Annex I).

Economic Effects

An economic analysis of climate change faces three broad categories of difficulties. First are the uncertainties that still remain over the terms of the ultimate treaty. Second are the inherent limitations of available models to analyze even short-term costs and benefits. And

Preliminary and incomplete: Draft 6, 3/3/98

finally is the impossibility of putting a single monetary number on the long-term benefits of climate change mitigation.

Mindful of the limitations of any single model as a tool for evaluating the economic impact of the Kyoto Protocol, we have employed a broad array of techniques to assess the various possible costs and non-climate benefits of the Administration's emissions reduction policy. Ignoring the benefits of mitigating climate change itself, our conclusion is that the net costs of our policies to reduce emissions are likely to be small if those reductions are undertaken in an efficient manner and we are successful in securing meaningful developing country participation as well as effective international trading and clean-development mechanisms in future negotiations. As I explain in my written testimony, this conclusion is not entirely dependent on, but is fully consistent with, formal model results. For example, given the factors, such as trading, delineated above, but excluding the benefits of acting and the impact of electricity restructuring, estimates derived using Battelle's Second Generation Model suggest that the resource costs of attaining the Kyoto targets for emission reductions might amount to just \$7 to \$12 billion per year in 2008 to 2012 -- or just 0.1 percent of projected GDP. That small net premium, in effect, purchases a partial insurance policy against a serious environmental threat.

A comprehensive economic evaluation of the Administration's climate change policies must also take into account the potential payoffs from the full package of proposed Administration climate change initiatives. As you know, the President's FY 1999 budget includes a \$6.3 billion package of tax cuts and R&D over the next 5 years; this package makes good sense in terms of energy policy and will jumpstart our efforts. A second responsible step

Preliminary and incomplete: Draft 6, 3/3/98

entails industry-by-industry consultations to prepare emission reduction plans in key industrial sectors. A final component of the President's climate change policy is his support for electricity restructuring in a manner that will offer approximately \$20 billion in cost savings to electricity consumers, while offering modest reductions in greenhouse gas emissions.

I look forward to continuing to work with members of this Committee, as well as other interested parties, in further analyzing the Kyoto Protocol and evaluating the effects of reducing greenhouse gas emissions.

I welcome your questions.

**Statement of
Stuart E. Eizenstat
Under Secretary of State
for Economic, Business and Agricultural Affairs
before the
Subcommittee on Energy and Power
House Commerce Committee
March 4, 1998**

Thank you, Mr. Chairman.

At the outset, let me thank those members of Congress, in this chamber and in the Senate, who participated with us in the Kyoto Conference and who lent their advice and support to our efforts there. Rarely has there been an environmental issue more important or complex than global warming, and rarely has there been a greater need for the Executive Branch and the Congress to work closely together.

It is with great pleasure that I appear here today to explain the Administration's position on global warming. To this end, I will divide my testimony into four parts: (1) a short discussion of the science – the driving force for all the efforts we have taken to date to mitigate a significant and growing global environmental problem; (2) a discussion of the results of the recent Kyoto Conference and key features of the Kyoto Protocol; (3) an effort to correct misperceptions; and (4) a brief review of the President's Climate Change Technology Initiative. I hope to leave you with a clear understanding of why we believe that it is necessary to act, of how we intend to proceed internationally, and of what the President plans to do here at home.

The Science

Human beings are changing the climate by increasing the global concentrations of greenhouse gases such as carbon dioxide, methane and nitrous oxide. Burning coal, oil and natural gas to heat our homes, power our cars and illuminate our cities produces carbon dioxide and other greenhouse gases as by-products – more than 6 billion metric

people) and can exacerbate air quality problems such as smog, and lead to an increase in allergic disorders. Diseases that thrive in warmer climates, such as dengue fever, malaria, yellow fever, encephalitis, and cholera are likely to spread due to the expansion of the range of disease carrying organisms. By 2100, there could be an additional 50-80 million cases of malaria each year.

- Agriculture, forests, and natural ecosystems are also likely to be affected. The poorest countries, already subject to food production and distribution problems, will likely suffer the greatest agricultural impacts. Doubling current carbon dioxide concentrations could lead to a dramatic change in the geographic distribution of one-third of the Earth's forests. (For example, the ideal range of some North American forest species would shift by as much as 300 miles to the north in the next 100 years -- far faster than their ability to migrate on their own.) Such changes could have profound effects on parks and wildlife refuges, and lead to a reduction in species diversity.

What Changes Have We Seen to Date?

The earth's temperature is increasing: Scientists from our National Oceanic and Atmospheric Administration (NOAA), the U.K. Meteorological Office and the National Aeronautics and Space Administration (NASA) all recently announced that 1997 was the warmest year on record. In fact, nine of the last 11 years are among the warmest ever recorded.

The water cycle of the planet may be speeding up: Since the beginning of the century, NOAA estimates that precipitation in the United States has increased by about 5 - 10 percent, while the frequency of heavy downpours (where more than 2 inches fall in a day) has increased by about 20 percent. The United States has had many recent reminders of how costly extreme events can be: the Mississippi flooding of 1993 led to damages of between \$10 and \$20 billion; the Southern Plains drought of 1996 was estimated to cost \$4 billion; and the Northwest floods of 1996-97 about \$3 billion. We have yet to learn what the current floods in California will cost. While no single event can be attributed to global warming, increases in floods and droughts are expected as global warming occurs.

Let me now turn to the recent Kyoto Conference.

Kyoto Protocol

Last December in Kyoto, Japan, the nations of the world reached agreement on an historic step to control greenhouse gas emissions which cause global warming. No sooner had the negotiating session ended, however, than some critics on both ends of the political spectrum, without a full examination of the results achieved, denounced the agreement as either too little too late or too much too soon. In fact, the Kyoto Protocol, reached only through the exercise of vigorous American leadership, represents an important achievement in the best interests of the United States. But it is a framework for action, a work in progress, not a finished product ready for Senate consideration.

U.S. Negotiating Objectives

In order to secure an effective agreement that is environmentally strong and economically sound, while protecting the unique worldwide interests of the U.S. military, President Clinton and Vice President Gore established three major objectives. As a result of the Kyoto negotiations, we achieved the first two – realistic targets and timetables for reducing greenhouse gas emissions among the world's major industrial nations, which fully protect the unique role of our military in its global reach; and flexible market-based mechanisms for achieving those targets cost-effectively. The third, meaningful participation of developing countries, will be the focus of our work in the coming months and years, but with the Kyoto Protocol we have made an important down payment.

Elements of the Kyoto Protocol and Related Decisions

Our first objective – realistic targets and timetables among developed countries – had to be a credible step in reducing the dangerous buildup of greenhouse gases, yet measured enough to safeguard U.S. prosperity at home and competitiveness abroad. In the end, we secured the key elements of the President's proposal on targets and timetables, often over the initial objections of the European Union and other developed countries. The agreement and related decisions include:

- The U.S. concept of a multi-year time frame for emissions reductions rather than a fixed, single-year target. The multi-year time frame will allow the United States, other nations and our industries greater flexibility in meeting

Flexible Market Mechanisms

Our second broad Presidential objective was to make sure that countries can use flexible market mechanisms to reach their targets rather than the mandatory “policies and measures,” such as carbon taxes, favored by the E.U. and many other developed countries.

The Kyoto Protocol enshrines a centerpiece of this U.S. market-based approach – the opportunity for companies and countries to trade emissions permits. In this way, companies or countries can purchase less expensive emissions permits from companies or countries that have more permits than they need (because they have met their targets with room to spare). This is not only economically sensible, but environmentally sound. By finding the least expensive way to reduce emissions, we will be providing a strong incentive for achieving the maximum level of emissions reductions at the least cost. The United States has had a very positive experience with permit trading in the acid rain program, reducing costs by 50 percent from what was expected, yet fully serving our environmental goals.

This was a new concept for developed and developing countries alike – some of whom fought it vigorously. But we have it firmly enshrined in the Kyoto Protocol and it is a critical way of ensuring cost-effective solutions. Its inclusion was a major victory for us.

We went even further by achieving a conceptual understanding with several countries, including Australia, Canada, Japan, New Zealand, Russia and Ukraine, to trade emissions rights with each other. This ‘umbrella group’ could further reduce compliance costs.

Ensuring that we can meet our target reductions cost-effectively will depend significantly on access to the flexibility mechanisms we fought hard to include in the Kyoto Protocol. Let me be very clear: The commitment we made in Kyoto would not have been made -- could not have been made -- were it not for the flexibility mechanisms that were also agreed there. Until we are satisfied with the rules and procedures yet to be established, the promise of Kyoto will never be realized. The importance of emissions trading is emphasized by CEA Chairman Yellen’s economic analysis and testimony.

The Kyoto agreement does not meet our requirements for developing country participation. Nevertheless, a significant down payment was made in the form of a provision advanced by Brazil and backed by the United States and the Alliance of Small Island States. This provision defines a “Clean Development Mechanism,” which embraces the U.S.-backed concept of “joint implementation with credit.” The goal is to build a bridge – with incentives – between developed, industrialized countries, and developing nations. This new mechanism will allow companies in the developed world to invest in projects in countries in the developing world – such as the construction of high-tech, environmentally sound power plants – for the benefit of the parties in both worlds. The companies in the developed world will get emissions credits at lower costs than they could achieve at home, while countries in the developing world will share in those credits, and receive the kind of technology that can allow them to grow without ruining their environment.

The Clean Development Mechanism has great potential, but developing countries will need to do more in order to participate meaningfully in the effort to combat global warming. In determining what developing countries ought to do, we should be aware that the circumstances of developing countries vary widely, along a kind of continuum. Some today are very poor; their greenhouse gas emissions are negligible and are likely to remain so for the foreseeable future. Others, whose greenhouse gas emissions are not substantial, are relatively well off. Some are poor on a per capita basis, but their greenhouse gas emissions today rival or surpass those of the most advanced industrialized nations. Still others have already joined ranks with the industrialized world in the OECD but have not yet fully accepted the added responsibility for protection of the global environment that comes with their new status.

Any ‘one-size-fits-all’ approach to the ‘meaningful participation of developing countries’ and to satisfy the Byrd-Hagel Resolution is thus unlikely to prevail. We found in Kyoto that even among the industrialized countries it was necessary to recognize the individual national circumstances faced by those differently situated in order to reach agreement, notwithstanding our common purpose. Similarly, any uniform, inflexible approach to the ‘meaningful participation of developing countries’ is unlikely to prevail.

In the end, the Parties took a decision to exempt key overseas military activities from emissions targets, including exemptions for "bunker fuels" (those used in international aviation and maritime transport) and for emissions resulting from a wide range of multilateral operations, such as peacekeeping and humanitarian relief. This exempts from our national targets not only multilateral operations expressly authorized by the U.N. Security Council (such as Desert Storm or Bosnia), but also multilateral operations that the United States initiates pursuant to the U.N. Charter without express authorization (such as Grenada). Countries may also decide among themselves how to account for emissions relating to multilateral operations (e.g., U.S. training in another NATO country) without going through emissions trading. If any other measures to preserve our national security interests are required, and there do not appear to be any, they can be addressed through future implementing legislation. As Secretary of Defense Cohen wrote in a letter of February 24, 1998, to Congressperson Bachus, "Based on achieving our international objectives, the Department is fully satisfied with the Kyoto results."

Second, it has been suggested that the Protocol will create a super U.N. Secretariat that will threaten U.S. sovereignty and national decision-making through alleged intrusive verification procedures and prior approval of individual emissions trades. That is not so. The review process contained in the Protocol largely codifies the existing practice under the 1992 Framework Convention, to which the United States is a Party. Under the Protocol, small expert review teams will continue to visit Annex I countries for brief periods to review implementation of the Convention and of the Protocol. The review process is intergovernmental, in that experts are nominated by governments. The review teams meet with government officials, and with others by invitation. In reviews under the Convention, the teams have met with Congressional staff, representatives of the private sector and representatives of environmental organizations – but only with their concurrence. Any other visits, such as site visits, would take place only if approved by the host country and, if the private sector is involved, the relevant interested persons. It is important to emphasize that no one can come onto the private property of a U.S. citizen without that individual's express approval and consent. To date under the Convention, no site visits have taken place.

Indeed, the private purchase of emissions credits is one of the crucial ways to achieve cost-effective emissions reductions for U.S. firms.

As with any market transaction, purchases of these credits will have to comply with all U.S. legal and regulatory requirements. In addition, U.S. firms interested in international investment will have an incentive to ensure that other countries meet the international standards for adequate monitoring and reporting of their emissions of greenhouse gases. At the same time, Russia will have significant incentives to use the revenue generated to invest in the most modern, climate-friendly plants and equipment so that, as its economy recovers, it continues to produce emissions credits that it can sell on international markets.

Framework for Action

Where do we go from here? While historic, the Kyoto Protocol is only one step in a long process. It is, in essence, a framework for action, a work in progress, and a number of challenges still lie ahead. We anticipate signing the Protocol within the one-year period provided for in the agreement, which runs from March 1998 to March 1999. We have not, as yet, determined the precise timing due to tactical considerations. We will sign at a time that makes the most sense in terms of the overall diplomatic situation.

In that diplomatic context, rules and procedures must be adopted to ensure that emissions trading rights, joint implementation and the Clean Development Mechanism operate efficiently and smoothly. The Kyoto Protocol establishes emissions trading, but leaves open the specifics of operations. We will work hard to ensure that the rules and procedures adopted enable emissions trading, joint implementation and the Clean Development Mechanism to work smoothly and efficiently, thereby encouraging the private sector to engage.

We will also work closely with our industries to be sure they are satisfied that the emissions trading system which is developed is as efficient and effective as possible to meet their needs.

Most significant, we must work to secure the meaningful participation of key developing countries. We must be creative in initiating bilateral agreements. We have made a promising start with an agreement we reached with China during last fall's

carry out work under the U.N. Framework Convention on Climate Change and in the Intergovernmental Panel on Climate Change (IPCC), as well as the contributions that we make to the Global Environment Facility (GEF). For FY 1999, the President has requested \$314 million for the International Organizations and Programs Account, a level that represents a 6.6 percent increase over FY 1998. This amount includes \$8 million for the Climate Stabilization Fund which supports the Framework Convention and the IPCC. Parties to the Convention have much work ahead of them, as I have already noted. In addition, the IPCC has now embarked on its Third Assessment Report of Climate Change, scheduled for completion in late 2000 or early 2001. These funds are vital to ensuring U.S. leadership in both of these organizations and to ensuring that our views and the work of our scientists are taken fully into account.

In addition, the President has requested \$300 million to meet our past and current pledges to help fund the Global Environment Facility (GEF). The GEF helps developing countries act to protect the global environment in several key focal areas including international waters, biodiversity, climate change and depletion of the stratospheric ozone layer. If we want to bring developing countries on board with real commitments to limit greenhouse gas emissions, we need to demonstrate that we are a reliable partner by supporting their concrete efforts with reliable resources. At this point, our GEF shortfall damages U.S. credibility in promising to help developing countries meet the climate change obligations we are urging that they undertake. I would therefore urge the Congress to fund fully our \$300 million request, to meet our current pledge and also clear our substantial shortfall of nearly \$200 million.

President's Climate Change Technology Initiative

In his State of the Union address, President Clinton said that global warming is "the gathering crisis that requires worldwide action." We need to begin now to launch the sensible, cost-effective efforts that will help us avoid the high future cost of inaction.

The President last October outlined a three-stage approach to addressing climate change at home. The first stage consists of immediate actions to stimulate development and use of technologies that can minimize the cost of meeting U.S. goals in reducing greenhouse gas emissions. Stage two will review options created through ongoing

supported under PNGB. It is exciting to see our U.S. automakers already planning for the cars of the future, not as pipe dreams but as achievable greenhouse gas friendly products.

As General Motors Chair and CEO John F. Smith said recently in announcing GM's plans to step up research spending and focus on bringing new products to market, "No car company will be able to thrive in the 21st century if it relies solely on internal combustion engines." And as William C. Ford, Jr., Chair of Ford's Finance Committee, also said in announcing that Ford will join with Daimler-Benz of Germany in developing cars with fuel-cell engines, "There's a compelling business case to be made."

Similar government-industry efforts are proposed to develop cleaner, more efficient diesel engines for both light trucks and heavy trucks. The R&D effort also includes expanded research partnerships for key renewable technologies such as wind, photovoltaics, geothermal, biomass, and hydropower to accelerate price reductions and improve performance. The President's 1999 budget proposes a \$100 million increase in appropriations for solar and renewable energy R&D – a 37 percent increase over 1998.

We hope that the Congress will view the President's initiative favorably and appropriate the funds and enact the tax incentives that he has requested. We look forward to working with you to put the President's proposals into action.

The President and his Administration are committed to working with you in the Congress, both to realize the potential of the Climate Change Technology Initiative and to craft the ongoing U.S. approach to climate change. The United States has the power to lead the global effort, and Congress holds the key. What is done or not done today will determine the kind of world we will leave to future generations and the conditions of life they will face.

Sustained Effort Required

Mr. Chairman, I have mentioned that Kyoto produced a framework for future action, and I have listed a number of the steps that await us.

Coming to grips with the threat of global warming is no small task. We must tackle it in a vigorous, sober and determined manner, understanding that it represents a challenge but also an opportunity. And as we have always done in the face of global challenge, we must assume the responsibilities of American leadership. Thank you.



THE CHAIRMAN

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

Statement before the House Commerce Subcommittee on Energy and Power

Dr. Janet Yellen

Chair, Council of Economic Advisers

Tuesday, July 15, 1997

Good afternoon, Mr. Chairman and members of the Subcommittee. I appreciate the opportunity to discuss with you today the economics of global climate change.

Introduction

In his speech to the United Nations Special Session on Environment and Development in June, President Clinton emphasized that the risks posed by global climate change are real and that sensible preventive steps are justified. This assessment accords with the views of the more than 2300 economists, including 8 Nobel laureates, who signed a statement supporting measures to reduce the threat of climate change. The economists endorsed the conclusions from last year's report by the Intergovernmental Panel on Climate Change (IPCC), which said that governments should take steps to reduce the threat of damage from global warming, and went on to argue that market-based policies can slow climate change without harming the American economy.

At this time the Administration has not settled on a particular set of new policies to reduce greenhouse gas emissions. Instead, the President indicated in his U.N. speech that he intends to engage in a discussion with all interested parties about the problems posed by

greenhouse gas accumulations and the costs and benefits of corrective action. To this end, the President will hold a White House conference on climate change later this year, and Members of his Cabinet and other senior Administration officials will meet with Members of Congress, scientific and economic experts, environmentalists, local government officials, and business and labor leaders on a regular basis over the next several months to discuss issues related to climate change. This process is intended to inform the Administration's decision-making process, which will culminate in a U.S. policy position in the international negotiations in Kyoto in December of this year.

An important step in this -- and any -- policy process is determining the impact it will have on the American economy. President Clinton's top priority, since his first days in office, has been revitalizing the U.S. economy, creating jobs and investing in people and technology to enhance long-term growth. And, we have made tremendous progress. The President is not going to jeopardize that progress. Any policy he ultimately endorses on climate change will be informed by his commitment to sustaining a healthy and robust economy.

In my testimony today, I would like to describe some of the principal lessons that emerge from the voluminous literature, much of it relatively recent, on the economic impacts of policies to address global climate change.

Underlying Uncertainties

Before I begin my discussion of the economic literature, I would like first to acknowledge the uncertainties associated with estimating both the costs and benefits of reducing greenhouse gas emissions. To provide some perspective: as you all know, it is difficult to gauge exactly what impact the balanced budget agreement will have on the U.S. economy's growth rate, levels of employment, interest rates and consumption over the next five years. But with global climate change, it is orders of magnitude more difficult to gauge the effects on the economy: we are concerned with not just the next five years and not just the American economy, but, rather, we are dealing with economic and physical processes that operate globally and over decades, if not centuries.

Although a great many scientists believe that global climate change is already underway, the more serious potential damages associated with increasing concentrations of greenhouse gases are not predicted to occur for decades. This means that the benefits of climate protection are very difficult to quantify. And, while the potential costs of reducing greenhouse gas emissions may be more immediate, they too, as I will discuss below, are difficult to predict with any certainty. Many unanswered questions exist about the biophysical systems, potential thresholds, and economic impacts. In short, if anybody tells you that he or she has the definitive answer as to the costs and benefits of particular climate change policies, I would suggest that you raise your collective eyebrows.

Lessons from the Economic Literature

Let me now turn to the economic literature and try to summarize what I think we know so far about this difficult topic. Most economists have not addressed the benefits of climate protection, but rather have focused on the costs associated with alternative paths for reducing greenhouse gas emissions. The economic literature includes estimates using many different models to evaluate numerous alternative emission reduction strategies. In fact, because there are so many different models, economists initially faced difficulties in comparing results: they could not sort out the extent to which differences in results stemmed from differences in models and assumptions versus differences in baseline emission paths and policies. To solve this problem, thereby enabling meaningful comparisons, many economists have calibrated the various models by performing a standardized simulation. Specifically, they have assessed the consequences of stabilizing greenhouse gas emissions at 1990 levels by 2010 or 2020.

Within the Administration, a staff level working group -- the Interagency Analysis Team (IAT) -- has attempted to estimate some of the economic implications of climate change policies. They took the emissions scenario most often used in academic literature -- that is, stabilizing emissions at 1990 levels by 2010 -- as the starting point for their own analysis. I would emphasize that this scenario is not Administration policy; instead, it was picked to make comparisons with other models easier. The staff group employed 3 different models -- the DRI model, the Second Generation Model (SGM) and Markal-Macro model, all commonly available in the public sphere. In running these models, the staff adopted a common baseline and, to the maximum extent possible, similar economic assumptions. This modeling effort produced some

useful lessons, but as we found from the peer reviewers' comments, it also suffered from some serious shortcomings. Both the lessons and the shortcomings point to one clear conclusion: the effort to develop a model or set of models that can give us a definitive answer as to the economic impacts of a given climate change policy is futile. Rather, we are left with a set of parameters and relationships that influence estimates of the impacts. In my view, it is more productive to employ a broad set of economic tools to analyze policy options than to seek to develop a single definitive model.

I understand that a draft of the staff analysis was given to the Subcommittee this morning, along with the reviewers' comments. I would be happy to answer any questions you may have about this modeling effort.

The Lessons. Modeling efforts both inside and outside the Administration clearly indicate that economic analysis can do no more than estimate a range of potential impacts from particular policies and highlight how outcomes depend on underlying assumptions about how the economy works and the ways in which policy is implemented. However, the economics literature on climate change does point to several important lessons:

How the economy works. First, the magnitude of the costs of reducing greenhouse gas emissions in the various models depends crucially on a number of key assumptions about how the economy works. For instance:

- If firms in the economy can shift from high-carbon to low-carbon energy sources quickly, the costs of climate protection will be lower.
- If the economy has significant opportunities, even now, to employ energy-saving technology at low costs, the costs of climate protection will be lower.
- If technological change occurs at a rapid rate, or is highly responsive to increases in the price of carbon emissions, the costs of climate protection will be reduced.
- If the Federal Reserve pursues a monetary policy oriented toward keeping the economy at full employment, transitional output costs will be lower.

In short, the greater the substitution possibilities and the faster the economy can adapt, the lower the costs.

How the plan is implemented. Second, costs depend critically on how emission reduction policies are implemented. It boils down to this: if we do it dumb, it could cost a lot, but if we do it smart, it will cost much less and indeed could produce net benefits in the long run. The over 2300 signatories of the economists' statement argued that any global climate change policy should be rely on market-based mechanisms. Such mechanisms allow for flexibility in both the timing and location of emission reductions, thereby minimizing the costs to the U.S. economy. The economists concluded that "there are policy options that would slow climate change without harming American living standards, and these measures may in fact improve U.S. productivity in the longer run."

- The speed at which emissions reductions are required can have large effects on the estimated costs. It is important to allow sufficient lead-time for orderly investment in new equipment and technology. Alternatively, if emission reduction requirements are too far off in the future, the incentives to adopt energy efficient technologies are weakened because people may not view the policy as credible.
- A “cap and trade” system in which emission permits are issued and then traded among firms can substantially reduce the cost of meeting an emissions target by creating incentives for emissions to be reduced by those firms and in those activities where costs are lowest.
- International emission permit trading substantially lowers costs by applying the same cost-minimizing principle globally.
- So-called “banking” and “borrowing” of permits increases flexibility and lowers costs by allowing firms to change the timing of their emission reductions.
- Joint implementation, whereby US firms would receive credit for undertaking emission reductions in countries with low abatement costs, would also lower the domestic burden.

An additional aspect of implementation that profoundly affects the costs of reducing emissions concerns “revenue recycling.” In many model simulations, emissions are reduced by using various market mechanisms. For many of these scenarios, the Federal government realizes an increase in revenues. Economic growth can receive a

long-term boost if these revenues are used to reduce distortionary taxes that diminish the incentives to invest, save or work, or if the revenues are channeled into deficit reduction, thereby lowering interest rates and boosting investment. In fact, in some models and scenarios, emissions reduction generates a net economic benefit when the revenues are recycled in a growth-promoting fashion.

Which countries participate. The third lesson that emerges from a study of the economics of climate protection is that developing, as well as developed, countries must be part of the process. While developed countries are responsible for most of the greenhouse gas currently in the atmosphere, developing countries are starting to catch up. By 2040, the largest fraction of emissions is estimated to come from developing countries. Thus, any comprehensive plan to deal with this global problem must include a mechanism to bring developing countries into the process.

The timetable for the inclusion of developing countries is also important. The sooner that developing countries face incentives to move away from carbon intensive energy sources, the less likely it is that they will become dependent on those types of fuels to spur their economic growth. In short, global problems require global solutions. We must find the technologies and solutions to lead the way.

but as

Conclusion

Let me conclude. Policies to promote economic growth, create jobs, and improve the living standards and opportunities of all Americans have been and always will remain the top priority of the President and his Administration. In his remarks to the Business Roundtable on global climate change, the President said “[l]et’s find a way to preserve the environment, to meet our international responsibilities, to meet our responsibilities to our children, and grow the economy at the same time.”

Some of the key economic lessons we have learned that will help us achieve the President’s goal include:

- Inherent uncertainty dictates that models should be expected to generate only a range of economic impacts, not definitive answers.
- Key assumptions about how the economy works directly influence the estimated costs of climate protection.
- Implementation of any policy needs to be market-based and flexible over time and space to achieve the lowest cost reductions.
- All nations, both developed and developing, need to participate.

Thank you. I would be happy to answer any questions you may have.

**ORAL TESTIMONY OF DR. JANET YELLEN
CHAIR, COUNCIL OF ECONOMIC ADVISERS
BEFORE THE HOUSE INTERNATIONAL RELATIONS COMMITTEE
ON THE ECONOMICS OF THE KYOTO PROTOCOL
MAY 13, 1998**

Thank you, Mr. Chairman. The President has said that we can work to avert the grave dangers of climate change, while at the same time maintaining the strength of our economy. I agree and am pleased to have this opportunity to appear before the Committee to elaborate on the Administration's views on these issues.

The international agreement that was reached in Kyoto this past December is a crucial step forward in addressing global climate change. But it is only one step in a long journey. Since the international effort to reduce greenhouse gas emissions is still in some respects a work-in-progress, it is not yet possible to provide a full authoritative analysis of it. In my testimony today, I will attempt to identify key elements of the agreement and the Administration's policy, such as international emissions permit trading, meaningful developing country participation, the inclusion of land-use activities that absorb carbon ("sinks") and six categories of gases, as well as domestic initiatives, that can ensure that reductions in global greenhouse gas emissions are consistent with continued strong economic growth.

Effects of Climate Change

The Intergovernmental Panel on Climate Change (IPCC), jointly established by the World Meteorological Organization and the United Nations Environment Programme, concluded in 1995 that "the balance of evidence suggests that there is a discernible human influence on global climate." Current concentrations of carbon dioxide, methane, nitrous oxide, and the other so-called greenhouse gases have reached levels well above those of preindustrial times. As a result of the increased concentration of greenhouse gases, the IPCC estimates that global temperatures will increase by between 2 to 6 degrees Fahrenheit in the next 100 years, with a best guess of about 3.5 degrees Fahrenheit. The IPCC reports that a doubling of carbon dioxide

greenhouse gas emissions have the same effect on the climate regardless of how, where, and, within limits, when they occur--suggests three basic approaches to lower the cost of achieving given levels of environmental protection. We term these "when", "what", and "where" flexibility.

As a result of U.S. diplomatic efforts, all three forms of flexibility are broadly reflected in the Kyoto Protocol. The choice of a multi-year budget period, ending later than many countries proposed, with allowance for "banking" of emissions reductions, constitute key elements of "when flexibility." These provisions mitigate costs by permitting reductions at times when they are less rather than more costly. The inclusion of all six greenhouse gases and certain sink activities that promote removal of carbon from the atmosphere provide substantial "what flexibility". The U.S. succeeded in having the Kyoto Protocol stipulate that countries with binding targets are to reduce total greenhouse gas emissions by certain percentages, but the Protocol does not require specific reductions for specific gases. Moreover, sinks can be used to offset emissions targets. The inclusion of international emissions trading among countries that take on binding targets, coupled with an agreement allowing industrial countries to receive emissions reduction credit for certified investments in "clean development" projects in the developing world, are the critical forms of "where" flexibility incorporated in the Kyoto Protocol. Although details of these provisions need to be finalized in negotiations in Buenos Aires later this year, we believe that these mechanisms can produce substantial reductions in the costs of attaining our environmental objectives.

The problem of climate change is global and so requires a global solution. Around 2030, under a continuation of business as usual, a majority of world emissions are projected to come from developing countries. Without developing country participation we cannot achieve adequate climate protection. In addition, developing country participation would permit relatively low-cost emissions reductions to be internationally recognized as a substitute for more expensive reductions in many industrial countries. The President has made clear that he will not submit the Kyoto Protocol to the Senate without meaningful participation from key developing countries

industry-by-industry consultations to prepare emission reduction plans in key industrial sectors. A final component of the President's climate change policy is his support for electricity restructuring in a manner that will offer approximately \$20 billion in cost savings to electricity consumers, while offering modest reductions in greenhouse gas emissions.

I look forward to continuing to work with members of this Committee, as well as other interested parties, in further analyzing the Kyoto Protocol and evaluating the effects of reducing greenhouse gas emissions.

I welcome your questions.

pollution emissions by 90 percent. These technological advances have been made possible through the efforts of the Partnership for a New Generation of Vehicles between the Administration and the U.S. auto companies and their suppliers.

Such progress may be replicated in other sectors. VCRs and TVs, even when off, consume about \$1 billion worth of electricity annually. EPA has established a partnership with major manufacturers that has a goal of achieving a 70% reduction in energy use, without sacrificing product quality, usefulness, or increasing costs. This partnership offers promise of substantial improvements in energy efficiency.

Non-Climate Benefits

A final factor that should be included in any comprehensive assessment of the economic implications of the Kyoto protocol are the benefits of the agreement. The literature has emphasized that any relative price shifts that prove necessary to reduce emissions should produce non-climate benefits in three areas: air pollution unrelated to climate change, traffic congestion, and highway accidents. These benefits are hard to quantify precisely but are potentially significant. ~~our rough estimates suggest that these three benefits could offset 15-25% of any resource cost of the climate change policy.~~ *Suggest deleting unless it*

Synthesis

can be verified by specific modeling results as described in other parts of

A comprehensive evaluation of the economic impact of the Kyoto Protocol must integrate all of the factors described above: reliance on flexible market-based mechanisms domestically; international trading and joint implementation among Annex I countries; the Clean Development Mechanism; meaningful developing country participation; the potential cost-mitigating role of including six gases and carbon sinks; the benefits of electricity restructuring; and emissions reductions achieved as a consequence of other proposed Administration climate change initiatives. Assuming that effective mechanisms for international trading, joint implementation and the Clean Development Mechanism are established, and assuming also that the U.S. achieves meaningful developing country participation, our overall assessment is that the economic cost to the United States in aggregate and to typical households of attaining the targets and timetables specified in the Kyoto Protocol, will be modest.

Keep

The Testimony

no

This conclusion that the impact will be modest is not entirely dependent upon, but is fully consistent with, formal model results. I have previously emphasized the limitations of relying on any single model in assessing the economic impact of the Kyoto Protocol, and continue to view any such results as just one input into an overall analysis. But it is worth emphasizing that model results reflecting the details of the Kyoto Protocol are consistent with our conclusion. For



EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF MANAGEMENT AND BUDGET
WASHINGTON D.C. 20503

TRANSMISSION NUMBER: 202/395-5836
VERIFICATION NUMBER: 202/395-6827

ENVIRONMENT BRANCH
ROOM 8026
NEW EXECUTIVE OFFICE BLDG.

Name _____ Fax # 56870

To: Joe Aldy

From: Bob Tuccillo

Message: Comments on testimony

Number of Pages to Follow: 18

Date: 3/2/98

Time: 5:40 pm

LRM ID: EHF385
Climate Treaty

SUBJECT: Council of Economic Advisers Oversight Testimony on Kyoto

**RESPONSE TO
LEGISLATIVE REFERRAL
MEMORANDUM**

If your response to this request for views is short (e.g., concur/no comment), we prefer that you respond by e-mail or by faxing us this response sheet. If the response is short and you prefer to call, please call the branch-wide line shown below (NOT the analyst's line) to leave a message with a legislative assistant.

You may also respond by:

(1) calling the analyst/attorney's direct line (you will be connected to voice mail if the analyst does not answer); or

(2) sending us a memo or letter

Please include the LRM number shown above, and the subject shown below.

TO: Robert J. Tuscullo Phone: 305-5809 Fax: 305-5838
Office of Management and Budget
Branch-Wide Line (to reach legislative assistant): 305-4586

FROM: 3/2/98 (Date)
REYNOLD MENI (Name)
EPA (Agency)
260-5428 (Telephone)

The following is the response of our agency to your request for views on the above-captioned subject:

☐ Concur☐ No Objection☐ No Comment☐ See proposed edits on pages _____☒ Other: see attached☐ FAX RETURN of _____ pages, attached to this response sheet

EPA comments on Janet Yellen's draft testimony
March 2, 1998

The testimony is generally excellent. Here are several specific comments and proposed changes. Most have these have been reviewed already with Randy Lutter, who found them acceptable. (We were interrupted in discussing the last point, and need to talk again about that one.)

P.15: In the paragraph on restructuring, change the fourth sentence to read: "In addition, stronger incentives for improved generation efficiency, in conjunction with ~~provisions to conserve energy and promote use and development of renewable energy sources~~ appropriate market based provisions, ~~will~~ could achieve modest reductions in emissions."

ok
• The change from "will" to "could" is needed to reflect the uncertainty regarding the emissions consequences of retail legislation -- NEC and CEQ project a small (1-3%) decline (relative to approximately 40% baseline growth 1990-2010), and also acknowledge substantial uncertainty and that actual emissions could increase.

• The phrase "appropriate market based provisions" was used in the October 22 fact sheet on restructuring to accompany the President's climate speech in order to bridge the gap between the DOE and EPA views on whether the renewables portfolio, etc. was sufficient to address emissions, or whether market based emissions provisions are needed as well.

fu
P. 17: In the first paragraph on sinks, change the second to last sentence to read: "Very preliminary estimates ... indicate that carbon sinks could comprise up to nearly 10% ..."
• We have not reached a definitive policy decision on interpretation of the Protocol's sinks language and are not yet in a position to imply a "nearly 10%" bonus from sinks. The addition qualifies the point.

jh
P.18: There is a typo in the first full para: "25 percentage points" should read "0.25 percentage points," or "one quarter of one percent". More important, the current formulation does not track the Interagency agreement reached last week on language going something like this:

"For example, results based on SGM and other model simulations with different assumed rates of AEEI suggest that permit prices could be reduced by as much as 40 percent for each quarter percent by which the AEEI can be successfully increased."

may
In addition, we suggest switching the order of the first and second full paragraphs on that page, and moving the first sentence of the last paragraph forward, as follows:

no
"Our justification for incorporating ... In this instance, we prudently and have made conservatively assumptions as to the rate of new that there will be substantial delays between investments ...

~~"There are reasons, however, for faith in the ability of American ingenuity to offer solutions to the challenge of climate change. The President's FY 1999 budget ... For example, published results based on SGM model simulations with different assumed rates of AEEI suggest that an increase in the AEEI of 25 percentage points could lead to~~

~~declines in the permit price of approximately 40 percent.~~ For example, results based on SGM and other model simulations with different assumed rates of AEEI suggest that permit prices could be reduced by as much as 40 percent for each quarter percent by which the AEEI can be successfully increased.

~~"There are many other reasons for faith in the ability of American ingenuity to offer solutions to the challenge of climate change."~~ Moreover, at the recent automobile show ...

P.19: In the first full para:

no "Such progress ~~may be~~ is being replicated in other sectors. To give but one recent example, VCRs and TVs ..."

du P.20: Last para: Please try to find another term besides "fraught with uncertainty." "Fraught" is generally a perjorative. How about: "As highlighted earlier, there are substantial, but unavoidable uncertainties surrounding estimates like these."

You may want to include here some words emphasizing once again that there really is no responsible alternative to acting under uncertainty, given the long-term nature of this problem, and the fact that greater certainty cannot be had in time to be useful.

To discuss these comments, please call David Doniger, 280-2865.

LRM ID: EHF385
Climate Treaty

SUBJECT: Council of Economic Advisors Oversight Testimony on Kyoto

**RESPONSE TO
LEGISLATIVE REFERRAL
MEMORANDUM**

If your response to this request for views is short (e.g., concur/no comment), we prefer that you respond by e-mail or by faxing us this response sheet. If the response is short and you prefer to call, please call the branch-wide line shown below (NOT the analyst's line) to leave a message with a legislative assistant.

You may also respond by:

(1) calling the analyst/attorney's direct line (you will be connected to voice mail if the analyst does not answer); or

(2) sending us a memo or letter

Please include the LRM number shown above, and the subject shown below,

TO:

Robert J. Tunello Phone: 305-5500 Fax: 305-5530
Office of Management and Budget
Branch-Wide Line (to reach legislative assistant): 305-4586**URGENT**

FROM:

3/2/98 (Date)
Velma Taylor (Name)
DJS (Agency)
514-7279 (Telephone)

The following is the response of our agency to your request for views on the above-captioned subject:

☐ Concur☐ No Objection☐ No Comment☒ See proposed edits on pages 7 and 9.☐ Other: _____☐ FAX RETURN of _____ pages, attached to this response sheet

energy prices, which we will shortly address. In general it is difficult to undergo a structural change in the economy without having the effect of expanding some sectors and contracting others. But to provide some perspective on this issue, consider the following facts. First, on average, energy constitutes only 2.2 percent of total costs to U.S. industry. Second, energy prices already vary significantly across countries. According to the 1997 Statistical Abstract, for example, in 1996 premium gasoline cost \$1.28 per gallon in the United States -- but only 8 cents per gallon in Venezuela. Similarly, gas prices were \$3.71 per gallon in Switzerland and \$4.41 per gallon in France. Electricity prices also vary significantly: in the U.S. they were 5 cents per kilowatt hour, a fraction of prices in Switzerland of 13 cents per kilowatt hour. Yet U.S. industry is not moving en masse to Venezuela, nor is Swiss industry moving to the United States. Third, roughly two-thirds of all emissions are not in manufacturing at all, but in transportation and buildings. We therefore believe we need developing country participation because the problem is global and cost-effective solutions are essential, than to avoid adverse effects on competitiveness.

oh
Flexibility and Market Mechanisms

industries which by their nature would not locate to other countries.

A global solution is thus critical to the global problem of climate change. Globalizing the solution is not, however, enough by itself. We must also ensure that our efforts to reduce global greenhouse gas emissions reductions in the most efficient manner possible. The nature of the climate change problem suggests three basic methods to lower costs of achieving given levels of environmental protection. They can be characterized in terms of three categories of flexibility: (1) "when" flexibility; (2) "what" flexibility; and (3) "where" flexibility, which may be the most important of all. Such methods have long been championed by economists interested in increasing the efficiency of protection. Indeed, 2,600 economists from academia, industry, and government alike urged such approaches in a letter they signed last year advocating action on climate change:

"Economic studies have found that there are many potential policies to reduce greenhouse gas emissions for which the total benefits outweigh the total costs...The most efficient approach to slowing climate change is through market-based policies."

1. "When flexibility" (timing)

First is "when flexibility" or timing. Since climate change is a long-term problem, the exact timing of emissions reductions is, within some range, not of primary importance. Thus the freedom to delay or accelerate reductions within an agreed upon time frame -- while ensuring credibility of emissions reductions -- lowers costs.

As a result of U.S. leadership, the Kyoto Protocol incorporates this

greenhouse gases by a greater percent than reductions of CO₂ could reduce prices by as much as 10 percent. Thus allowing countries flexibility in what gases they reduce -- essentially trading emissions reductions across gases -- can help lower significantly the costs of meeting their targets.

The second source of "what flexibility" is the treatment of sinks, i.e., land use activities that promote the removal of carbon from the atmosphere through the growth of plants. At the urging of the U.S. delegation, sinks can be used to offset emissions targets. Promoting such sinks through afforestation and reforestation may reduce atmospheric concentrations of CO₂ at much lower costs than reducing emissions of greenhouse gases.

3. "Where flexibility" (International)

The third type of flexibility, and perhaps the most important, is "where flexibility" (International). As I have already emphasized, emissions have the same environmental consequences regardless of where in the world they occur. Therefore, the least-cost approach to controlling climate change is to reduce emissions wherever such reductions are cheapest. The Kyoto Protocol, because of U.S. insistence and persistence, includes three important cost-saving provisions of this nature.

First, it provides for countries that take on binding targets, at present the industrial countries, to trade rights to emit greenhouse gases with each other. This market in emissions permits could ensure that emissions reductions occur where they are least expensive within the industrial countries. In particular, U.S. companies could purchase emissions reductions in other participating countries when doing so would reduce their costs -- thus lowering costs without affecting the level of environmental protection.

Second, the agreement provides for joint implementation by Annex I countries. Thus if some industrial countries do not develop programs to trade permits internationally, U.S. firms could nonetheless implement projects in those countries for which they could receive emissions reductions credits in the U.S.

Third, the agreement allows industrial countries to invest in "clean development" projects in the developing world and use these projects' certified emissions reductions toward meeting their targets. Many such clean development projects may be quite cheap in terms of the cost per ton of emissions avoided, as has been illustrated by the joint implementation pilot program that is already in place in the U.S.

no
Rational for edit
We have not yet
secured agreement
that domestic
companies can trade
All we have is an
agreement that
COUNTRIES
can trade.

LRM ID: EHF385
Climate Treaty

SUBJECT: Council of Economic Advisors Oversight Testimony on Kyoto

**RESPONSE TO
LEGISLATIVE REFERRAL
MEMORANDUM**

If your response to this request for views is short (e.g., concur/no comment), we prefer that you respond by e-mail or by faxing us this response sheet. If the response is short and you prefer to call, please call the branch-wide line shown below (NOT the analyst's line) to leave a message with a legislative assistant.

You may also respond by:

(1) calling the analyst/attorney's direct line (you will be connected to voice mail if the analyst does not answer); or

(2) sending us a memo or letter

Please include the LRM number shown above, and the subject shown below.

TO: Robert J. Tuccillo Phone: 395-5809 Fax: 395-5838
Office of Management and Budget
Branch-Wide Line (to reach legislative assistant): 395-4586

FROM: 3/2/98 (Date)
Vanessa Harrison (Name)
State (Agency)
647-4463 (Telephone)

The following is the response of our agency to your request for views on the above-captioned subject:

☐ Concur☐ No Objection☐ No Comment☐ See proposed edits on pages _____☐ Other: _____☒ FAX RETURN of 3 pages, attached to this response sheet



United States Department of State

*Bureau of Oceans and International
Environmental and Scientific Affairs*

Washington, D.C. 20320

March 2, 1998

TO:

FROM:

SUBJECT: LRM EHF 385 -- Comments on Draft CEA Climate testimony

Overall, the draft testimony provides a useful summary of our economic understanding of the costs of the climate agreement. It also appropriately provides caveats on what we do and do not know. However, the testimony as drafted overemphasizes the issue of developing countries and the umbrella -- and in neither case fully reflects current policy on these items. While additional comments are provided to correct errors in the draft, these two items are of the greatest importance and must be fixed prior to submitting the testimony. Thus, comments on pages 16, 17, 19 and 20 are critical.

Specific Comments

NO Page 2. Top paragraph: It is not just "commerce" that will be affected, but also quality of life, and in some cases life itself -- e.g., deaths from spread of disease, and from damage to human infrastructure are not only commercial issues. In addition, the end of the paragraph suggests that the only issue is lack of incentives for unilateral action -- while omitting the fact that unilateral action is inadequate for solving the problem. Propose a rewrite to the last sentence to read: "The fundamental logic of the Kyoto Protocol is that without such an international agreement, we cannot solve the global problem: individual nations cannot individually reduce emissions sufficiently to constrain global concentrations, and absent a global accord, will not have the incentives to address this threat."

modified Page 2, Climatic impact. Should add a short sentence after the second sentence to read: "Few modellers expect that we will be able to constrain global concentrations to only twice pre-industrial levels -- and therefore, increases in both temperature and sea level are likely to exceed amounts suggested here." way

ok Page 3. Economic and Monetary damages; second paragraph. Need a cite/affiliation for Cline

ok Page 4, first full paragraph, last sentence. The possibility of non-linear events is not known; to say they are small presumes knowledge. Delete words: "small and unknown" from sentence.

no Page 5. Need for Global Action, first paragraph. Second sentence, add words "can or" before "has an incentive..." Also, at the beginning of the fourth sentence, insert new text to read: "Few other countries are likely to act unless the US acts, and conversely, even if ..."

no
oh Page 5, third paragraph of section. Rewrite first sentence to read: "Both to address the lack of progress among many industrialized countries toward meeting the Rio objective and to set a post-2000 goal for action to mitigate climate change (neither of which were included in the original Convention text), the United States and 160 other nations agreed in negotiations held in Kyoto, Japan last December to take additional steps to reduce emissions of greenhouse gases." In addition, it would be appropriate to either spell out all gases, or provide formulas for all gases; current text mixes both.

Page 6, 2nd full paragraph. Add text to end of second sentence to read: "... under a continuation of business as usual --- although even then, developing country per capita emissions will remain only about one quarter of our own." reject

Page 7, Flexibility and Market Mechanisms. Add a new second sentence to first paragraph of this section: "Here too, we must take the lead -- both as the world's largest emitter, and as a key player in and developer of the concept of greenhouse gas emissions markets." reject

oh Page 8, first bullet: delete phrase: "such as those from prematurely scrapping coal fired electricity plants" -- we do not want to send the signal that we intend to permanently exempt these plants from any obligation. reject

Page 8, propose a fifth bullet: "Fifth, joint implementation credits are not time limited by the agreement -- Parties may arrange for project credits and banking as soon as the agreement enters into force." reject

oh? Page 8, 2. What flexibility. Referring to carbon dioxide as a pollutant is inappropriate. Strike this word in the third sentence and replace with "...one gas can be used..."

oh Page 9, Where flexibility. First bullet. Rewrite first sentence to read: "First, it provides the opportunity for countries that take on binding targets to trade rights to emit greenhouse gases with each other." Add new final sentence to end of bullet: "While currently only developed countries have emissions caps, this mechanism also offers an incentive for developing countries to take on emissions targets."

oh Page 9, second bullet. Delete word: "industrial" in second sentence.

no Page 10, top two paragraphs are repetitive. Also, in second paragraph, may wish to note the initial fine imposed by EPA was over \$1000/ton not the \$250 stated.

no Page 12, Assessing the Kyoto Protocol, first para of section. Rewrite last two sentences to read: "...in an efficient manner and we are successful in securing an effective international trading regime and an operable clean development mechanism in future negotiations. This small net premium, even...."

no Page 15, Estimate costs section, top paragraph. Delete first half of second sentence, begin sentence with "Costs could be reduced substantially...." It is unnecessary to highlight developing countries so much. Also, in this section, it is unclear why so much is underlined -- underlines should be deleted.

no Page 16. Delete entire section on umbrella – we do not have a policy on this issue yet, and this prematurely exposes us to obtaining a specific set of commitments – which may never happen. J

ch Page 16, Estimate reduction in costs section. Second paragraph of section Rewrite first sentence to read: “...that will likely accrue from the limited role to which developing countries have already agreed:.....”. Also, rewrite second sentence to read: “The CDM might shave costs by roughly another 20 to 25 percent from the reduce costs that result from trading among Annex I countries. Additional developing country action could be expected to yield additional cost reductions.” ? no

no Page 16, last paragraph on page. Strike this entire paragraph including that on top of page 17. It implies a specific obligation to which we expect developing countries to agree – and we have not set this policy yet. J

Page 17. First full para. Rewrite second sentence to end as follows: “... emissions trading, and ultimately, meaningful participation by key developing countries.” Delete remainder of paragraph. J

Page 17, Accounting for Carbon sinks. Rewrite second to sixth sentence as follows: “...role of carbon sinks in which carbon absorbing activities can be used to offset emissions. The Kyoto protocol specifies that removals of CO2 by sinks count toward meeting the target, and counts the net emissions effects...” no

Page 19, Synthesis. Second sentence, delete words: “an assuming also that the US achieves meaningful developing country participation,” – the costs savings are not only predicated on this – and it assumes a very specific level of commitment from developing countries that may not be achievable.

Page 20. Last paragraph on page. Delete clause in second sentence: “the developing country participation that we are insisting upon as a condition for our ratifying the Kyoto protocol but which is not yet part of the protocol and on” -- it prejudices the outcome of internal deliberations on developing countries. J

Drafted: OES/EGC - Jonathan Pershing
3/1/98

Cleared: OES/E - RPomerance (subs)

LRM ID: EHF385
Climate Treaty

SUBJECT: Council of Economic Advisors Oversight Testimony on Kyoto

RESPONSE TO
LEGISLATIVE REFERRAL
MEMORANDUM

If your response to this request for views is short (e.g., concur/no comment), we prefer that you respond by e-mail or by faxing us this response sheet. If the response is short and you prefer to call, please call the branch-wide line shown below (NOT the analyst's line) to leave a message with a legislative assistant.

You may also respond by:

(1) calling the analyst/attorney's direct line (you will be connected to voice mail if the analyst does not answer); or

(2) sending us a memo or letter

Please include the LRM number shown above, and the subject shown below.

TO: Robert J. Tuccillo Phone: 385-6808 Fax: 385-6898
Office of Management and Budget
Branch-Wide Line (to reach legislative assistant): 385-4588

FROM: 3/2/98 (Date)
TEA Pullman (Name)
DOE (Agency)
586-3397 (Telephone)

The following is the response of our agency to your request for views on the above-captioned subject:

☐ Concur

☐ No Objection

☐ No Comment

☒ See proposed edits on pages 3, 10, 11, 12, 14, 16, 19

☐ Other: _____

☐ FAX RETURN of _____ pages, attached to this response sheet

growing conditions from changing weather patterns, threats to human health from increased range and incidence of diseases, changes in availability of freshwater supplies, and damage to ecosystems and biodiversity.

Economic and Monetary Damages

The derivation of quantitative or monetary estimates of the damages from such a change in the climate is extremely difficult given the capacity of today's models. Estimates of the economic damages from climate change fall into the following broad areas: agriculture, sea-level rise, air conditioning and heating, water supply, human life and health, air pollution, and other costs (hurricanes, relocation costs, human amenity, construction, leisure activities, urban infrastructure, and ecological damages such as forest loss and species loss). Although the quantification of these effects is quite demanding, researchers have developed estimates that prompt substantial concern. The IPCC reports that a doubling of carbon dioxide levels would lead to about 6,000 to 10,000 additional deaths per year from higher summer temperatures, even after netting out the effects of warmer winters and assuming acclimatization. Other researchers have predicted sea level increases of about 20 inches by 2100, with substantially greater increases in subsequent years.

Despite the difficulties, respected researchers have developed estimates of the monetary damages expected from an average worldwide temperature increase. For example, Cline estimated that a temperature change of 4.5 degrees Fahrenheit would impose annual damages of more than \$70 billion per year on the U.S. economy in today's terms. These damages include \$22 billion in lost agricultural production, \$13 billion in additional electricity costs, and \$8 billion in new costs to maintain the existing supply of fresh water. (Cline's original estimates are quoted in 1990 dollars. The figures given above translated those numbers into 1997 dollars using the annual GDP price index.) William Nordhaus of Yale University has likewise computed estimates of the dollar loss attributable to a doubling of greenhouse gas concentrations. Although he uses methods that differ from Cline's in several respects, he finds that the Cline estimate is in the center of three estimates for the U.S., and that the high estimate is only 30 percent greater than the low estimate. It must be noted, however, that this similarity among aggregate estimates masks the true uncertainty associated with forecasts of the damages from given increases in global warming — the estimates are all fundamentally based on extrapolations from current and past experience, and may not fully incorporate effects that will unfortunately become apparent only with future experience.

One key difficulty in interpreting and monetizing these estimates of damages is uncertainty over the extent that they should be discounted because they occur in the distant future. Since the benefits of stemming future climate

NO New scientific information noted in various scientific journals in 1997 indicates that temperature increases from a doubling of CO₂ may be below the low end of the 1995 IPCC range, e.g. below 1.5 degrees C. If this is so, the health effects and the economic impacts are likely to be overstated.

Details of how these provisions will operate will be discussed in future negotiations such as the one in Buenos Aires later this year. Nonetheless, effective international trading of emission credits, joint implementation, and the Clean Development Mechanism can lead to substantial reductions in costs relative to alternative policies that do not exploit the power of market incentives. To illustrate briefly the ability of U.S. industry to perform beyond expectations when given appropriate economic incentives, consider further EPA's highly acclaimed sulfur dioxide (SO₂) program, which relies, among other things, on a system of tradeable permits to reduce emissions of SO₂ from electric utilities. The SO₂ program has been successful in several ways: a large number of utilities participate, SO₂ emissions and ambient concentrations have fallen and the costs of reducing emissions are considerably lower than originally forecast.

As has been frequently noted, the average cost of SO₂ emissions reductions has recently been significantly lower than was originally forecast, in part due to the role of incentives in fostering innovation. Emission permit prices, currently at approximately \$100 per ton of SO₂, are well below earlier estimates of around \$250 to \$350 per ton.

Trading programs may not always bring cost savings as large as those achieved by the SO₂ program; trading programs will not always be accompanied by the discovery of much cheaper control strategies. However, the SO₂ experience demonstrates clearly how programs like international permit trading, joint implementation, and the Clean Development Mechanism will lead firms to find cheaper ways of reducing emissions that can lead to unexpectedly low costs.

IV. Difficulties of Economic Analysis of the Kyoto Protocol

Now that we have a Protocol -- even if it is not yet fully complete nor ready for the President's submission to the Senate -- it is possible to examine it in somewhat more detail from an economic perspective. But, once again the inherent limitations of any such estimates deserve emphasis. Such limitations should not be surprising to you; economists have a difficult enough time projecting the behavior of the economy over the next quarter or year, let alone over the next two decades. The scale of the forecasting exercise is therefore daunting, and any specific results should be treated with substantial caution.

The difficulties associated with economic analysis of climate change fall into three broad categories. First are the uncertainties that still remain over the terms of the ultimate treaty, necessitating assumptions on which the analysis is predicated. Second are the inherent limitations of available models to analyze even short-term costs and benefits. And finally is a topic discussed earlier: the impossibility of putting a single monetary number on the long-term benefits of climate change mitigation, although there will clearly be economic benefits of

20 It also should be noted that a worldwide program of greenhouse gas emissions trading is substantially more complex than the trading of one pollutant in one country. Furthermore, monitoring and verification are important elements to be addressed before successful adoption of this program.

emission reductions.

Uncertainties in the International Effort to Combat Climate Change

The Kyoto Protocol was an historic accomplishment, delineating the broad terms of the international effort to address climate change. But although we know a lot more than we did before Kyoto about how that international system will work, and that informs our analysis, there is still much that we do not know.

First, some provisions raise complex implementation issues. At issue here is the treatment of so-called sinks -- activities that affect the rate at which carbon is removed from the atmosphere and "sequestered," e.g., by the planting of trees.

Second, the details of a number of items -- primarily concerning international trading and developing countries -- are the subject of further discussions including future negotiations in Buenos Aires next fall, because they had not been definitively settled by the end of the last all-night session of the Kyoto talks.

Finally, and most importantly, we have not yet negotiated international agreements to limit emissions beyond the 2012 window. The emission cuts agreed upon at Kyoto are only a first step on a long journey. The first step that we propose to take over the next 15 years is critical. But the reason it is critical is *not* that, by itself, it will solve the climate change problem -- emissions during any given decade are small compared to the cumulative concentrations in the atmosphere. Rather, the first step is critical because we can not take the second and third steps until we have taken the first. At the same time, any analysis is complicated by the lack of knowledge over what the subsequent steps will be.

Inherent Limitations of Models

In addition to these uncertainties about the details of the international effort to address climate change, are the inherent limitations of the models used to evaluate that effort. Even within a given model, answers depend critically on the precise nature of the question asked. For example, the costs of emissions reductions depend critically on the extent of global participation and international trading that a treaty is assumed to feature. But in addition to the dependence of the results from a given model on the precise assumptions, different models can give different answers even when all the assumptions are specified to be the same -- a concrete illustration of the range of uncertainty to which we must assign the predictions of any one individual model.

One area in which the uncertainty is particularly large is the pace of technological progress -- especially the diffusion of existing energy-efficient

technologies, but also the development of new technologies -- and the extent to which the pace will accelerate in response to government programs. Models and experts on climate change policy tend to have a wider range of disagreement on the scope for speeding the diffusion of existing energy-efficient technologies than on any other single issue.

Furthermore, each model has strengths and weaknesses; each has questions to which it is better or worse suited to answer. Some, for example, model the energy sector in detail. Some allow for the fact that a coal-fired power plant cannot costlessly be converted to one that runs on natural gas. Some show the effects of hypothetical tax cuts made possible by the new revenues earned through the auction of emissions permits. Some are capable of showing recessions and booms. Others include a long-term "carbon cycle" model that can keep track of the accumulation of greenhouse gas concentrations in the atmosphere and their climatological effects. Some break down the rest of the world into regions and so can model international trade. No one model does everything, and therefore we must not rely blindly on the results of any one model or set of models. Professional judgement and economic intuition, along with diplomatic assessments, are also crucial.

Benefits of Averting Climate Change

As discussed above, it is evident that the benefits of averting climate change are potentially immense. But we have chosen not to try to quantify them in monetary terms, in light of the difficulties we have enumerated. These include the uncertainty of these benefits, their timing and therefore the extreme sensitivity of the results to the chosen discount rate, and the dependence of benefits on emissions paths after the 2008 to 2012 budget period specified in Kyoto.

V. Assessing the Kyoto Protocol

In order to evaluate the likely net economic impact of the Kyoto Protocol, *excluding the benefits of mitigating climate change itself*, we have drawn upon a variety of tools to assess the various possible costs and non-climate benefits of the Administration's emissions reduction policy. To give away the punch line, our conclusion is as follows: the net costs of our policies to reduce emissions are likely to be small, assuming those reductions are undertaken in an efficient manner and we are successful in securing meaningful developing country participation as well as effective international trading and clean development mechanisms in future negotiations. That potential small net premium, even excluding the benefits of mitigating climate change, in effect, purchases a partial insurance policy against a serious environmental threat.

Because the results from any model must be treated with caution, the

assumptions that will require much effort to realize.

20

I said in Congressional testimony last July that we can do this smart or we can do this dumb. I was referring to the point that the costs of cutting emissions can be much reduced if flexible, market-based mechanisms are used. Our economic analysis highlighted the importance of such flexible, market-based mechanisms -- which are therefore reflected, at the President's insistence, in the Kyoto Protocol and our ongoing diplomatic strategy.

gh clean development mechanism
Within the Kyoto Protocol, this means an insistence on international trading, joint implementation, and, ultimately, on meaningful developing country participation. Domestically, this means that we implement any emissions reductions through a market-based system of tradeable emissions permits, which ensures that we achieve reductions wherever they are least expensive. But this also means taking serious and responsible steps in the short run to prepare us to meet our obligations in the longer term.

The first such step is the inclusion in this year's budget of an aggressive, \$5.3 billion program of tax cuts and R&D investments -- \$1.3 billion more than the \$5 billion package the President promised in his October 22 speech on this issue. The goal is both to stimulate the development of new energy-saving and carbon-saving technologies and to encourage the dissemination of those that exist already. The proposed package contains \$3.6 billion over the next 5 years in tax cuts for energy efficient purchases and renewable energy, including tax credits of \$3,000 to \$4,000 for consumers who purchase highly fuel efficient vehicles, a 15 percent credit (up to \$2,000) for purchases of rooftop solar equipment, a 20 percent credit (subject to a cap) for purchasing energy-efficient building equipment, a credit up to \$2,000 for purchasing energy-efficient new homes, an extension of the wind and biomass tax credit, and a 10 percent investment credit for the purchase of combined heat and power systems. The package also contains \$2.7 billion over the next 5 years in additional research and development investments -- covering the four major carbon-emitting sectors of the economy (buildings, industry, transportation, and electricity), plus carbon removal and sequestration, Federal facilities, and cross-cutting analyses and research. One example of the R&D effort is the Partnership for a New Generation of Vehicles (PNGV). PNGV is a government-industry effort to develop attractive, affordable cars that meet all applicable safety and environmental standards and get up to three times the fuel efficiency of today's cars. In FY99, the combined proposal for PNGV is \$277 million, up from \$227 million appropriated in FY98. Similar government-industry efforts are proposed to develop more efficient diesel engines for both light trucks and heavy trucks.

A second responsible step entails industry-by-industry consultations to prepare emission reduction plans in key industrial sectors. The Administration will work in partnership with industry to identify ways in which the Federal government

Estimated reduction in costs from umbrella trading

One possibility that emerged in Kyoto, which none of us foresaw, was the idea developed there by the U.S. delegation, that the United States might undertake trading with a subset of Annex I countries, dubbed the "umbrella". Countries that have expressed interest in the umbrella include the United States, Australia, Canada, Japan, New Zealand and Russia, with strong indications of interest from some others. This subset of Annex I countries shares a common interest in promoting market-based mechanisms, most specifically, fully flexible rules for international trading of emissions permits.

It is too early to state the precise form the umbrella will take. But we can envision a number of potential benefits. The umbrella could, for example greatly reduce costs to the U.S. Results that we have derived from various BGM simulations of efficient international trading suggest that, relative to the situation in which there is no trading at all, the umbrella can reduce costs by an estimated 60-75 percent, depending on whether the former Warsaw Pact countries fall within the umbrella. The Kyoto Protocol classifies these countries outside of the EU bubble for the first budget period 2008-2012.

Estimated reduction in costs from developing country participation

The next consideration is participation by developing countries. The President has said that he will not submit the treaty for ratification without meaningful participation by key developing countries. Such participation would further reduce the costs involved.

The substantial potential gains from meaningful developing country participation are highlighted by the significant benefits that will likely accrue even from the limited role that the developing countries have already agreed to: the Clean Development Mechanism (CDM), ~~modeled after the U.S. joint implementation concept.~~ The CDM cannot realistically be expected to yield all the gains of binding targets for developing countries, but it might shave costs by roughly another 20 to 25 percent from the reduced costs that result from trading among Annex I countries. keep
no

~~Another possibility is that we persuade some of the key developing countries that are the largest emitters to commit to targets, and allow us to buy emission reductions from these paths.~~ Simulations with the BGM model suggest that full participation by non Annex I countries could cut roughly 55 percent off the reduced costs that result from Annex I trading. The actual cost reduction would depend on the extent of developing country participation that is ultimately obtained, as well as the effectiveness of international trading arrangements. The more developing countries that take on modest binding targets and trade in international keep
no