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

CHIEF OF STAFF

September 15, 1998

Dear Mr. Brechtel:

In a letter dated June 30, 1998, Chairman Talent posed several questions as follow-up to the June 4 testimony given by Dr. Janet Yellen before the Committee on Small Business. I am pleased to enclose herein the responses to those questions.

If you or Chairman Talent have any questions, please contact us at 202-395-5084.

Sincerely,

Michele Jolin

Michele Jolin

Mr. Peter Brechtel
Legislative Assistant
Committee on Small Business
U.S. House of Representatives
Room 2361 Rayburn House Office Building
Washington, D.C. 20515-6315

Enclosure

Answers to Questions From Chairman Talent to Dr. Yellen, Chair of the CEA

1) In your written testimony, you referenced the increase in an average household's energy bill. What is your estimate of the impact of the Kyoto Protocol for the following cases:

a) Energy costs for an average household assuming that emissions trading is not allowed (approximately $200/metric ton based on the SGM model). This data should include the components from oil (heating and gasoline), natural gas, and electricity.

> This question does not apply to the Kyoto Protocol because Article 17 of the Protocol establishes the right to trade emissions among parties with emissions targets. However, our informal analyses of such a policy suggest that the effects on energy prices would be nearly 10 times greater than under the policy conditions that were identified in Dr. Yellen's testimony. The testimony indicated that effective international trading and meaningful developing country participation could result in permit prices of about $14 to $23/ton. We believe that this difference of nearly a factor of 10 underscores the importance of international permit trading and developing country participation, two cornerstones of the Administration's climate change policies.

This data should include a typical household in the following regions: Northeast, Southeast, South, Mid-West, Northwest and Southwest.

> We have no data on spending by region and have not undertaken such analysis.

b) Direct energy costs for an average small business of 50 employees under the same conditions as listed in Item a above.

> We have no data on spending on energy by small businesses and have not undertaken such analysis.

2) In addition to the direct energy costs, what is your estimate of the indirect costs of the policy for the cases described above?

> We do not have quantitative estimates of indirect compliance costs.

[3)] Please provide the following:

1) At the time of the President's policy statement in October the reduction target for carbon stabilization at 1990 levels was approximately 375 million metric tons (Mmt). Since this announcement the EIA outlook has added another 80 Mmt to the target and the Kyoto reduction of 7 percent has added another 95 Mmt. The total reduction for energy alone is now 550 Mmt.

If you add the other gases the Kyoto target for reduction is 650 Mmt. Since the total amount of emissions is critical to any economic analysis, please provide the assumptions used in your analysis for the amount of emissions to be traded. Also confirm which of the analyses you used were performed after Kyoto.

As with any conventional economic model, our model assumed simply that the amount of emissions permits to be traded would be determined by the supply and demand for emissions permits among the trading countries. All of the quantitative analyses underlying Dr. Yellen's testimony were developed after Kyoto.

2) What are the Clinton Administration's assumed further emission reduction targets for the period 2013-2020?

We have made no assumptions about the emissions targets for the periods beyond 2012. The Administration has not proposed emissions targets for the second or subsequent commitment periods. We acknowledge that Kyoto is a first step, and the President in October said that we must work toward further reductions in the years beyond 2012. The Administration, however, is not prepared at this time to propose an emissions target for these years.

3) What analysis of the total impact on the economy (both direct and indirect costs) of the U.S. has been performed using these assumptions?

The analysis that we have performed is summarized in Dr. Yellen's testimony to Congress and in the July 1998 report titled "The Kyoto Protocol and the President's Policies to Address Climate Change: Administration Economic Analysis."

How are total costs reflected in your analysis since the SGM analysis you referenced in your testimony only treats direct costs, which is recognized to underestimate total costs by a factor of 2-4?

Our approach follows the practice of the researchers who have developed the SGM model and is consistent with other uses of this model. It reports costs as the sum of 1) the cost of emissions reductions achieved in the United States, calculated to reflect only the incremental cost of each reduction, i.e., the minimum compensation that a profit-oriented firm would need as compensation for such reductions, and 2) the total value of payments to firms outside of the United States for emission permits acquired through international trading.

Although we have followed a practice accepted by many modelers the measurement of total costs in the computable general equilibrium models used to assess the economic impacts of mitigating climate change is an area of ongoing study. For example, researchers within the Energy Modeling Forum recognize that modelers need a better understanding of why the costs are so different across models and some way to decompose the many components contributing to the overall cost of mitigation.

Differences in cost have not yet been decomposed into distinct components in a manner that lets independent researchers evaluate the validity of such claims.

4) Estimates of the U.S. demand for emissions credits by year for the period 2008-2012 and the potential supply from Russia and the Ukraine based on

A) Projected demand relative to the Kyoto target.
B) Projected demand relative to the assumed additional reductions targets.

The Administration has no estimates of the demand for emission credits by year for the period 2008-2012. Demand will be sensitive to a variety of factors that are quite difficult to forecast 10 to 14 years in advance, especially the rate of technological innovation and the diffusion and adoption of current innovations and those placed on the market over the next ten years. For the same reason we have no estimates of the supply of emission credits.

In addition, as mentioned above, the Administration has not proposed additional reductions targets for periods beyond 2012.

[4)] Given this strong opposition by developing nations to even consider voluntary commitments and given the lack of progress on fleshing out the skeletal flexibility provisions (such as trading) in the protocol, isn't it unrealistic to expect savings from these areas and isn't the Kyoto Protocol likely to cost America substantially more? Please elaborate in your answer and supply details of your calculations.

The President will not submit the Kyoto Protocol to the Senate for its advice and consent to ratification without the meaningful participation of developing countries. Some forms of developing country participation, together with emissions trading among Annex I countries, can produce significant cost-savings in meeting the Protocol's targets. For details, see the discussion surrounding Table 4 (p. 52) in "The Kyoto Protocol and the President's Policies to Address Climate Change: Administration Economic Analysis."

JAMES M. TALENT, MISSOURI
CHAIRMAN

NYDIA M. VELÁZQUEZ, NEW YORK

JLY, JA,
cc. RL, JA,
MJ
Rec'd 7-6-98

Congress of the United States
House of Representatives
105th Congress
Committee on Small Business
2361 Rayburn House Office Building
Washington, DC 20515–0515

June 30, 1998

Honorable Janet L. Yellen
Chair
Council of Economic Advisors
OEOB
17th & Pennsylvania Ave., N.W.
Washington, DC 20500

Dear Dr. Yellen:

Thank you for testifying at the Committee's hearing on the Kyoto Protocol. The hearing was held to give you and others the opportunity to provide Members of the Committee with a report on the potential economic impact of the Protocol on small businesses.

As mentioned at the hearing, the hearing record has been kept open for Members of the Committee for follow-up questions. In light of this, please provide the Committee with answers to the enclosed follow-up questions for the hearing record. Please send your response to the Committee office at 2361 Rayburn House Office Building by July 24, 1998. If you have any questions concerning this request, please direct them to Peter Brechtel of the Committee staff at 225-5821.

Sincerely,

Jim Talent

James M. Talent
Chairman

Enclosure

Questions for the record by Chairman James M. Talent for Dr. Janet L. Yellen, Chair, Council of Economic Advisors

1) In your written testimony, you referenced the increase in an average household's energy bill. What is your estimate of the impact of the Kyoto Protocol for the following cases:

   a) Energy costs for an average household assuming that emissions trading is not allowed (approximately $200/metric ton based on the SGM model). This data should include the components from oil (heating oil and gasoline), natural gas, and electricity. This data should include a typical household in the following regions: Northeast, Southeast, South, Mid-West, Northwest, and Southwest.

   b) Direct energy costs for an average small business of 50 employees under the same conditions as listed in Item a above.

2) In addition to the direct energy costs, what is your estimate of the indirect costs of the policy for the cases described above?

On page 10 of your written testimony, you said "the emission cuts agreed upon in Kyoto are only a first step in a long journey." Since the implications of these further reductions contemplated by President Clinton are substantial in terms of the impact on the U.S. economy and the availability of emissions credits, please provide the following:

1) At the time of the President's policy statement in October the reduction target for carbon stabilization at 1990 levels was approximately 375 million metric tons (Mmt). Since this announcement the EIA outlook has added another 80 Mmt to the target and the Kyoto reduction of 7% has added another 95 Mmt. The total reduction for energy alone is now 550 Mmt. If you add the other gases the Kyoto target for reduction is 650 Mmt. Since the total amount of emissions is critical to any economic analysis, please provide the assumptions used in your analysis for the amount of emissions to be traded. Also, confirm which of the analyses you used were performed after Kyoto.

2) What are the Clinton Administration's assumed further emission reduction targets for the period of 2013-2020?

3) What analysis of the total impact on the economy (both direct and indirect costs) of the U.S. has been performed using these assumptions? How are total costs reflected in your analysis since the SGM analysis you referenced in your testimony only treats direct costs, which is recognized to underestimate total costs by a factor of 2-4?

4) Estimates of the U.S. demand for emissions credits by year for the period 2008-2020 and the potential supply from Russia and the Ukraine based on:

   a) Projected demand relative to the Kyoto target.
   b) Projected demand relative to the assumed additional reduction targets.

Dr. Yellen, your testimony before the Committee on June 4 was that the Kyoto Protocol would have a modest economic impact on the United States and that the cost per ton of greenhouse gas reductions would be in the range of $14 to $23 per ton. You also testified that this cost estimate was predicated on achieving developing country participation and other flexibility mechanisms in future international negotiations. However, during the recent UN FCCC Subsidiary Bodies meeting in Bonn, Germany, the Group of 77 (G-77) and China voiced strong opposition to even placing voluntary responses for developing nations on the agenda for the fourth Conference of Parties (COP-4). On June 12, the closing statement by the Ambassador of Indonesia on behalf of G-77 and China stated:

"The Group reiterates that there must be no new commitments, voluntary or otherwise, introduced for all developing countries, under any guise, in such reviews."

Given this strong opposition by developing nations to even consider voluntary commitments and given the lack of progress on fleshing out the skeletal flexibility provisions (such as trading) in the protocol, isn't it unrealistic to expect savings from these areas and isn't the Kyoto Protocol likely to cost America substantially more. Please elaborate in your answer and supply details of your calculations.

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Department of Energy
Washington, DC 20585

TELEFAX COVER SHEET

DATE:________________

FROM: Matt Greenwald

Deputy Assistant Secretary for Senate Liaison
Office of Congressional and Intergovernmental Affairs
U.S. Department of Energy
Washington, D.C. 20585

Telephone: 202-586-~~5468~~ 4068

Telefax: 202-586-4891

TO: Michelle Jolin

Telefax No.________________ Confirmation No.________________

This document contains____ pages, (not including the cover sheet).

MESSAGE

EIA testimony for Thursday
Good to talk to you!
Matt

If there is a problem with the clarity or transmission of this document, please call our office at the number listed above. Thank You.

STATEMENT OF

JAY HAKES

ADMINISTRATOR, ENERGY INFORMATION ADMINISTRATION

DEPARTMENT OF ENERGY

before the

ENERGY and NATURAL RESOURCES COMMITTEE

UNITED STATES SENATE

MARCH 25, 1999

- - - DRAFT - - -

Mr. Chairman and Members of the Committee:

I appreciate the opportunity to appear before you today to discuss the Energy Information Administration's (EIA) analysis of carbon emissions from energy and the potential impacts of the Kyoto Protocol.

EIA is an autonomous statistical and analytical agency within the Department of Energy. We are charged with providing objective, timely, and relevant data, analysis, and projections for the use of the Department, the Congress, and the public. We do not take positions on policy issues, but we do produce data and analysis reports that are meant to help policy makers decide energy policy. Because we have an element of statutory independence with respect to the analyses that we publish, our views are strictly those of EIA. We do not speak for the Department, nor for any particular point of view with respect to energy policy, and our views should not be construed as representing those of the Secretary of Energy or the Department's policy position. EIA's baseline projections on energy trends, however, are widely used by government agencies, the private sector, and academia for their own energy analyses.

Each year EIA publishes the *Annual Energy Outlook*, which provides projections and analysis of domestic energy consumption, supply, prices, and carbon emissions. These projections are not meant to be exact predictions of the future but represent a likely future, assuming known trends in demographics and technology improvements and also assuming current laws, regulations, and policies. In October 1998, EIA published the report *Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity*,[1] which is the focus of my testimony today. The report was done at the request of the House Committee on Science.

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[1]Energy Information Administration, *Impacts of the Kyoto Protocol on U.S. Energy Markets and Economic Activity*, SR/OIAF-3 (Washington, DC, October 1998).

Carbon Emissions and the Kyoto Protocol

Carbon abatement is a highly complex issue, far more complicated than most other emissions reduction programs. Although comparisons are drawn between the sulfur dioxide (SO_2) reduction program for electricity generators and carbon reduction, there are several key differences. First, carbon emissions are an international issue. Assuming that climate change is a reality, the U.S. climate is equally affected by carbon emissions around the globe as by emissions in the United States. Also, there are a vast number of entities that emit carbon—homes, factories, vehicles, commercial facilities, and agricultural sources—unlike the relatively few electricity generators covered by the SO_2 reduction program in the first phase. Finally, unlike SO_2, there are not cost-effective means to remove and sequester carbon other than by natural processes at this time.

The Kyoto Protocol calls for the United States to reduce its total net emissions of six greenhouse gases, weighted for their global warming potential, by 7 percent relative to 1990 emissions levels. This reduction is to be achieved on average during the years 2008 to 2012. Much of the focus on emissions reduction is on the energy sector because energy use is the primary source of greenhouse gas emissions. In 1997, carbon emissions from the combustion of energy totaled 83 percent of all U.S. greenhouse gas emissions.[2] Reducing carbon emissions below 1990 levels would be a challenging task, as they had already increased 10 percent by 1997 and are projected with current policies to rise by 2010 to 33 percent over 1990.

Carbon emissions from energy can be reduced in several ways. First, there can be a shift from fossil to nonfossil fuels, such as nuclear power or renewable sources of energy. Second, energy use can shift from highly carbon-intensive fossil fuels to those with lower carbon intensity. For example, natural gas produces only about half the carbon emissions per unit of thermal output as coal. Also, energy consumers can use more energy-efficient technologies, thereby using less

[2]Energy Information Administration, *Emissions of Greenhouse Gases in the United States 1997*, DOE/EIA-0573(97)(Washington, DC, October 1998).

energy to achieve the same level of energy service. Finally, consumers can reduce the level of energy services, for example, by traveling less or lowering their demand for heating and cooling.

EIA's analysis assumed that a price mechanism would be used to encourage more rapid development and adoption of energy-efficient technologies, the use of less carbon-intensive fuels, and a reduction in energy demand. The price mechanism is applied to fossil fuels relative to their level of carbon content. Although electricity itself emits no carbon, the carbon price is applied to the fuels used to generate electricity and is passed to consumers through the price of electricity. This price mechanism may take the form of a carbon tax, a carbon permit trading system, or a carbon permit auction. In addition to price incentives, reductions in carbon emissions could be achieved by regulatory or voluntary programs.

Within the Kyoto Protocol, there are a number of ways for the United States to achieve the overall target apart from energy-related carbon reductions. The Protocol recognizes that different countries may have different levels of opportunity for emissions reductions and allows emissions trading among the Annex I countries. Joint implementation projects are also allowed among the Annex I countries, whereby a nation can earn emissions credits by investing in projects that reduce emissions or enhance emissions-absorbing sinks, such as forests, in other Annex I countries. The Protocol also establishes a Clean Development Mechanism, under which Annex I countries can earn credits for projects that reduce net emissions in non-Annex I countries. Apart from these international activities, domestic investment in carbon absorption activities, such as reforestation, or in reducing the emissions of the other greenhouse gases covered by the Protocol may also lower the required reduction in carbon emissions.

These flexibility measures in the Protocol offer opportunities to reduce the cost of complying with the Protocol, but complicate the analysis. Rules and guidelines for the international trading, joint implementation, and the Clean Development Mechanism are not specified in the Protocol and will be finalized at some future international meeting. Also, the actual opportunities for low-cost investment in emissions abatement in other countries cannot be known with certainty or whether other Annex I countries would be willing to sell emissions permits or would hold them for credit against future reductions. Finally, the role of sinks and other greenhouse gases in offsetting carbon reductions remains uncertain.

In addition to these difficulties, there are a number of other uncertainties in analyzing the Protocol. Different energy analysts have different opinions about the price elasticity of energy—how quickly energy consumers will react to changes in energy prices by changing their patterns of energy use or by purchasing different energy-using equipment and also whether consumers change their behavior in anticipation of future price increases. Unknown future policies may raise or lower the costs of the impacts. It is also not possible to foresee with certainty how energy-using technologies will develop in the future. Finally, the entire issue of climate change and greenhouse emissions reductions is relatively new, and measurement systems and methods of gauging how individual consumers or countries will respond to an international effort of this scope and magnitude will need to be further developed..

Analysis of the Kyoto Protocol

At the request of the Congressional committee, the EIA analysis is based upon the methodologies and assumptions in the *Annual Energy Outlook 1998* (*AEO98*),[3] with no changes in policy, regulatory actions, or funding for energy and environmental programs, since no specific policies had been advanced. The analysis was conducted using the National Energy Modeling System (NEMS), EIA's energy-economic model of domestic energy markets, which underlies the *AEO98* projections.

In most of the energy-producing and consuming sectors, NEMS includes explicit treatment of individual technologies and their characteristics, such as capital and operating costs, date of commercial availability, efficiency, and other relevant characteristics. Because of this detailed

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[3]Energy Information Administration, *Annual Energy Outlook 1998*, DOE/EIA-0383(98)(Washington, DC, December 1998).

representation of technology, NEMS captures the most significant factors that influence the turnover of energy-using equipment and the choice of new technologies and is appropriate for the analysis of the transitional impacts of policies designed to influence the choice of new technologies. NEMS also represents consumer choice through empirically-derived price elasticities and behavioral characteristics.

Because more energy-efficient and less-carbon intensive technologies can significantly reduce energy consumption and carbon emissions, the rate of technological progress and its penetration is one of the major factors and key uncertainties in determining the cost of carbon reductions. In its analysis, EIA incorporates ongoing trends of technological progress for both energy consumption and production, taking into account the characteristics of current technologies and those technologies assumed to be available and cost effective within the forecast horizon. In general, higher energy prices do not alter the characteristics or availability of energy-using technologies but encourage more rapid adoption of more efficient or advanced technologies because consumers would have more incentive to purchase them. However, the turnover rate of the capital stock—homes, appliances, and automobiles—can be slow, limiting the speed with which new, more-efficient technologies can capture a significant share of the market.

Because of the uncertainties concerning the final implementation of the Protocol, EIA's analysis included the reference case of what is expected with current policies and six additional cases with a range of reductions for energy-related carbon emissions in the United States. In each case, the United States achieves its target of reducing net greenhouse gas emissions by 7 percent; however, different means are used to reach the target. The cases in the analysis implicitly assume different levels of international trading, other international activities, forestry and agricultural sinks, and offsets from other greenhouse gases, with the remaining reduction taken in energy-related carbon reductions. Each of these cases is compared to a reference case that assumes no enforced carbon reductions in order to analyze the energy and economic impacts of achieving the reductions.

The reference case of the analysis is based upon the reference case from the *Annual Energy Outlook 1998*, in accordance with the Congressional request. By 2010, energy-related carbon emissions are projected to increase from 1,346 million metric tons in 1990 to 1,791 million metric tons, 33 percent above 1990 levels. The six carbon reduction cases range from reducing emissions to an average of 24 percent above 1990 levels (1990+24%) between 2008 and 2010 to reducing emissions to an average of 7 percent below 1990 levels (1990-7%) over the same period (Figure 1). The 1990+24% case assumes that international trading and other activities offset most (77 percent) of the required reductions in carbon emissions from energy; however, the 1990-7% case essentially assumes that the 7-percent target in the Kyoto Protocol must be met by energy-related carbon emissions with no net offsets from sinks, other greenhouse gases, or international activities. In this case, carbon emissions from energy are reduced approximately 30 percent from reference case levels in 2010.

In each of the cases, the target is achieved on average for the years in the first commitment period, 2008 through 2012. Although the rationale for the averaging is not explicitly stated in the Protocol, the fact sheet issued by the Department of State on January 15, 1998, indicates that this flexibility smooths short-term fluctuations in economic performance or weather. Because the Protocol does not specify targets beyond the first commitment period, the target is assumed to hold constant through 2020, the end of the forecast horizon. The target is assumed to be phased in over a three-year period, beginning in 2005 since the Protocol indicates that demonstrable progress toward reducing emissions must be shown by 2005. This allows energy markets to begin adjustments to meet the reduction targets.

In 2010, the carbon prices necessary to achieve the carbon emissions reduction targets range from $67 per metric ton (1996 dollars) in the 1990+24% case to $348 per metric ton in the 1990-7% case (Figure 2). In the three cases with the more severe reductions, the carbon price escalates more rapidly through 2010 in order to achieve the reductions in the commitment period then declines by 2020 as cumulative investments in more energy-efficient and lower-carbon equipment, particularly in the electricity generation sector, reduce the marginal cost of compliance in the later years of the forecast. The carbon prices represent the marginal cost of reducing carbon emissions to the specified level, reflecting the price the United States would be willing to pay in order to purchase carbon permits from other countries or to induce carbon reductions in other countries. In the absence of a complete analysis of international carbon markets, these carbon prices do not represent the international market-clearing price of carbon permits or the price at which other countries would be willing to offer permits.

Carbon fees raise the delivered prices of energy and lead to a decline in the overall intensity of energy use. Energy intensity, measured as primary energy consumed per dollar of gross domestic product (GDP), declines at an average annual rate of 1 percent between 2005 and 2010 in the reference case. In the carbon reduction cases, the rate of intensity improvement improves in the same period to between 1.6 percent a year in the 1990+24% case to 3.0 percent a year in the 1990-7% case (Figure 3).

In 2010, carbon reductions from electricity generation account for between 68 and 75 percent of the total carbon reductions due to lower electricity demand than in the reference case and the penetration of more efficient, less carbon-intensive generation technologies. Electricity generators are expected to respond more strongly to higher prices than end-use consumers because the industry has traditionally been cost-minimizing and factors future energy price increases into their investment decisions. In contrast, the end-use consumers are assumed to consider only current prices in making their investment decisions and consider factors other than price. Also, a number of more-efficient and lower-carbon technologies for electricity generation become economically available due to the carbon price.

In the electricity generation sector, fuel switching accounts for most of the carbon reductions. Relative to the reference case, the delivered price of coal to generators in 2010 is higher by between 153 and nearly 800 percent in the carbon reduction cases. Coal-fired generation accounts for more than half of all generation in 2010 in the reference case, but its share drops to between 42 percent and 12 percent in the carbon reduction cases. To replace coal plants, generators build more natural gas plants, extend the life of existing nuclear plants, and, particularly in the more stringent reduction cases, dramatically increase the use of renewables as costs per megawatt decline with more penetration, especially biomass and wind energy systems. Improved generation efficiency and lower electricity sales also contribute to lower carbon emissions from generation. Across the carbon reduction cases, electricity sales in 2010 are reduced from between 4 and 17 percent relative to the reference case, as electricity prices increase between 20 and 86 percent above those in the reference case.

The slate of energy fuels used in the United States is projected to change from that in the reference case (Figure 4). The use of both coal and petroleum is reduced, and there is a greater reliance on natural gas, renewable energy, and nuclear power. Although the consumption of petroleum declines relative to the reference case, it increases slightly as a share because most petroleum is used in the transportation sector in which there are fewer fuel substitutes available.

Because of the high carbon content of coal, total domestic coal consumption is significantly reduced in the carbon reduction cases, mostly for electricity generation but also in the industrial sector. Coal exports are also lower in the carbon reduction cases due to lower demand for coal in the Annex I nations, further reducing domestic coal production.

Natural gas consumption for electricity generation is higher than in the reference case in 2010 by a range of 2 to 12 percent across the carbon reduction cases. Although the use of natural gas is lower in the end-use sectors due to demand reductions and efficiency improvements, this is more than offset by the increase in consumption for generation. Although meeting the levels of production that may be required will be a challenge for the industry, sufficient natural gas resources are available, and the potential increases in both drilling and pipeline capacity are within levels achieved historically.

Consumption of renewable energy, which results in no net carbon emissions, is projected to increase by between 2 and 16 percent in 2010 and by between 9 and 70 percent in 2020. Most of this increase occurs in electricity generation, primarily with additions to wind energy systems and an increase in the use of biomass (wood, switch grass, and refuse), both of which significantly increase their share of total fuel consumption for electricity generation with higher carbon prices (Figure 5). Because additional renewable technologies become available and economic later in the forecast period, the share of renewable generation continues to increase through 2020, reaching as high as 22 percent in 2020, compared to 9 percent in the reference case.

In the reference case about half of the current nuclear plants are projected to retire by 2020. In accordance with the request, no new nuclear plants are allowed to be built in the carbon reduction cases, but extending the lifetimes of existing plants becomes more economical with higher carbon prices. In more stringent reduction cases, most existing nuclear plants are life-extended through 2020.

In 2010, the average price of gasoline increases by between 11 and 53 percent across the carbon reduction cases, compared to the reference case (Figure 6). Although carbon emissions from transportation are reduced due to lower travel and the purchase of more efficient vehicles, the transportation sector accounts for the lowest reductions of all the end-use demand sectors. This is a result of the continued dominance of petroleum although alternative-fuel vehicles increase their market share. New car efficiency improves with higher carbon prices, but vehicle turnover rates slow the improvement of the fleet. Total light-duty fleet efficiency rises from 20.5 miles per gallon in 2010 to only between 20.7 and 21.7 miles per gallon. The impact of carbon prices on the economy also lowers light-duty vehicle and airline travel and freight requirements and induces some efficiency improvements in the airline and freight sectors. Primarily due to lower demand in the transportation sector, petroleum consumption is reduced in all of the carbon reduction cases by between 2 and 13 percent in 2010 compared to the reference case. Because crude oil and petroleum product imports are reduced relative to the reference case, the dependency of the United States on imported petroleum is reduced from the reference case level of 59 percent to as little as 53 percent in 2010.

In both the residential and commercial sectors, higher energy prices encourage investments in more efficient equipment and building shells and reduce the demand for energy services. As a result, energy use per household and per square foot of commercial floorspace declines with higher carbon prices. Space heating, cooling, and ventilation account for the largest share of the demand reductions. More efficient lighting and office equipment and lower electricity demand for a variety of miscellaneous appliances, such as computers, televisions, VCRs, and telecommunications equipment also contribute to lower energy consumption. In the industrial sector, consumers replace productive capacity faster, invest in more efficient technology, and switch to less carbon-intensive fuels; however, total industrial output is also lower due to the impact of higher energy prices on the economy.

Apart from the impacts of the higher prices on energy markets, there are likely to be significant impacts on the macroeconomy. As energy costs rise due to the carbon prices, the rate of decline in energy consumption per dollar of GDP will accelerate. Other factors of production in the economy, including labor and capital, become relatively less expensive, and there will be some adjustments to substitute labor and capital for more expensive energy. Some economic potential is lost in that process. This will reduce the potential GDP for the United States, which is the long-run equilibrium path of the economy when all resources—labor, capital, and energy—are fully employed.

There are additional transitional costs that are likely to arise as energy price increases disrupt capital or employment markets. These short-run costs would impact the actual GDP but could be moderated by adjustments to Federal monetary and fiscal policies. The analysis assumes that a carbon permit trading system functions as an auction run by the Federal Government and that the revenues raised through the auction would be recycled back into the economy. Recycling of the funds would increase disposable income and encourage both consumption and investment, offsetting some adverse short-term effects on the economy. Two alternative fiscal policies were analyzed: one recycling the revenues through a lump sum rebate in the personal income tax and the other through the social security tax rates.

It is estimated that the loss in potential GDP will range from $13 billion to $72 billion (1992 dollars) in 2010. In an economy today of more than $7 trillion, which is expected to grow to more than $9.4 trillion in 2010, the percentage loss in output ranges from 0.1 percent to 0.8 percent in 2010. The loss in actual GDP is projected to range between $61 billion and $183 billion in 2010 if revenues are returned through a social security tax rebate and between $96 billion and $397 billion if they are recycled through personal income taxes. When viewed from the perspective of growth rates, the economy continues to grow, but at a slower rate between 2005 and 2010 (Figure 7). Although there is a slowing of economic growth initially, actual GDP returns to the potential path later in the forecast period, muting the economic impacts through 2020 (Figure 8).

The finding that economic growth slows only moderately in the transition period and slows only slightly when averaged to 2020 results from two factors. First, energy costs have become a smaller part of the overall economy than in the past, muting broader impacts of energy price increases. Second, revenues from the higher costs of energy can be recycled back into the American economy, as opposed to, for instance, going to foreign oil producers. The continued growth of the economy and of personal disposable income during the period of carbon reductions is one of the reasons that energy prices reach the high levels in our projections. With growing personal income, energy consumers will be more willing to pay higher energy costs to maintain desired life styles.

Figure 1

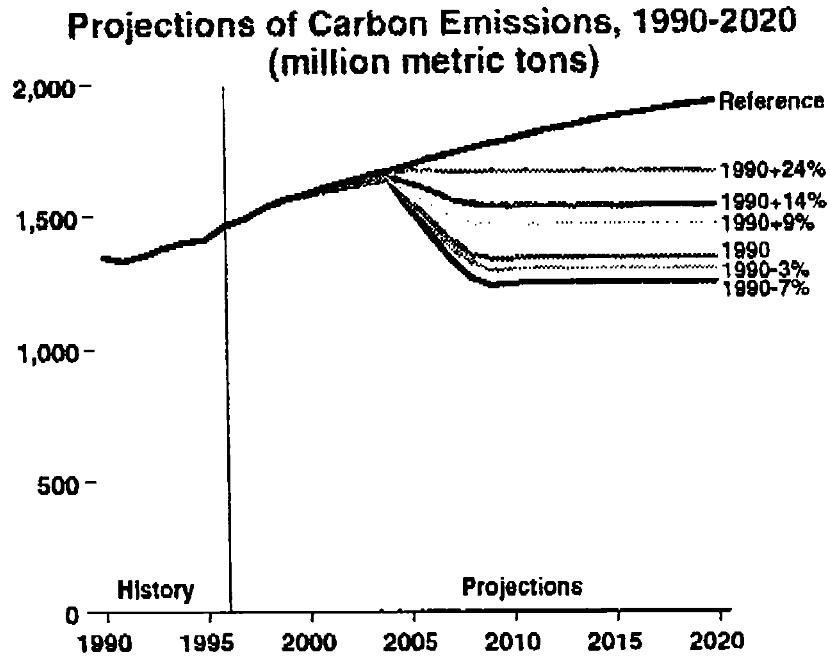


Figure 2

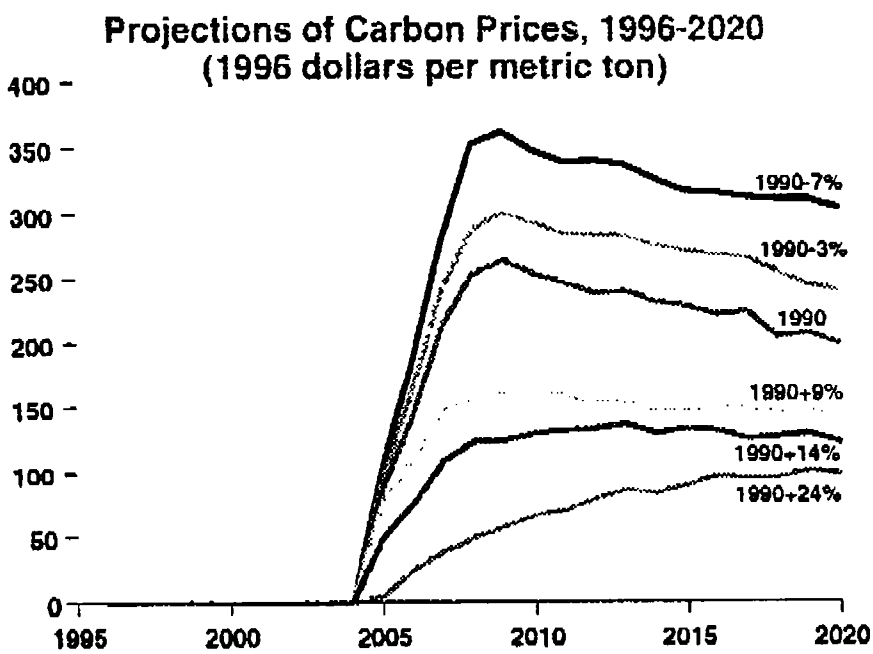


Figure 3

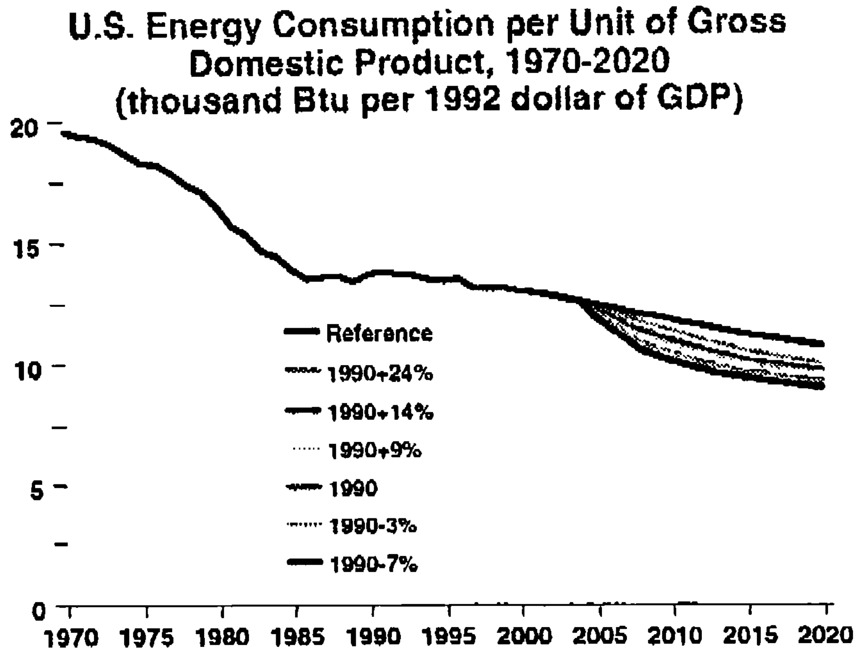


Figure 4

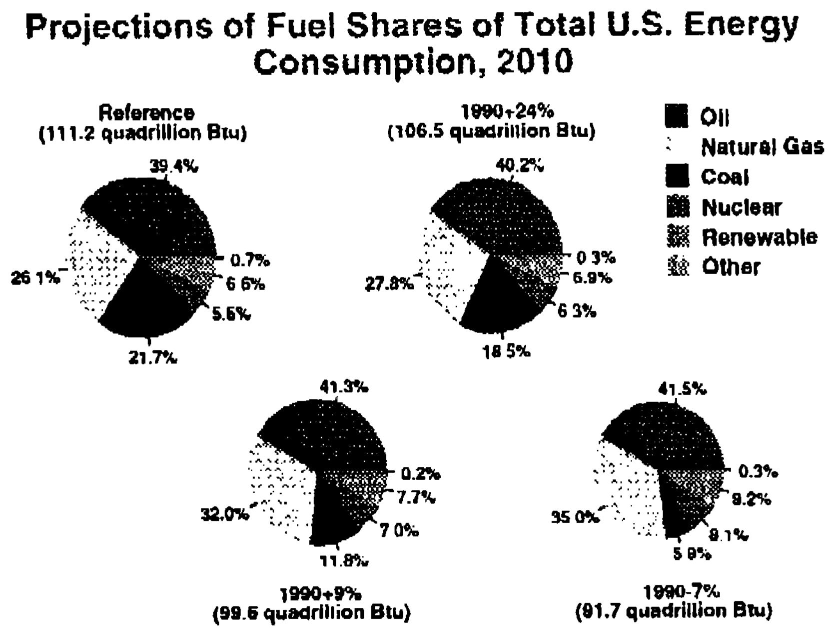


Figure 5

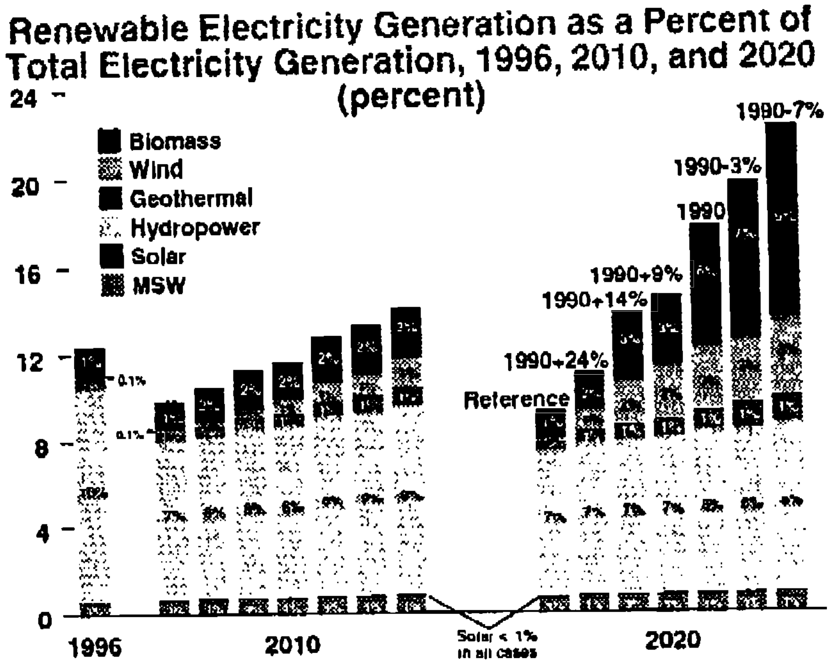


Figure 6

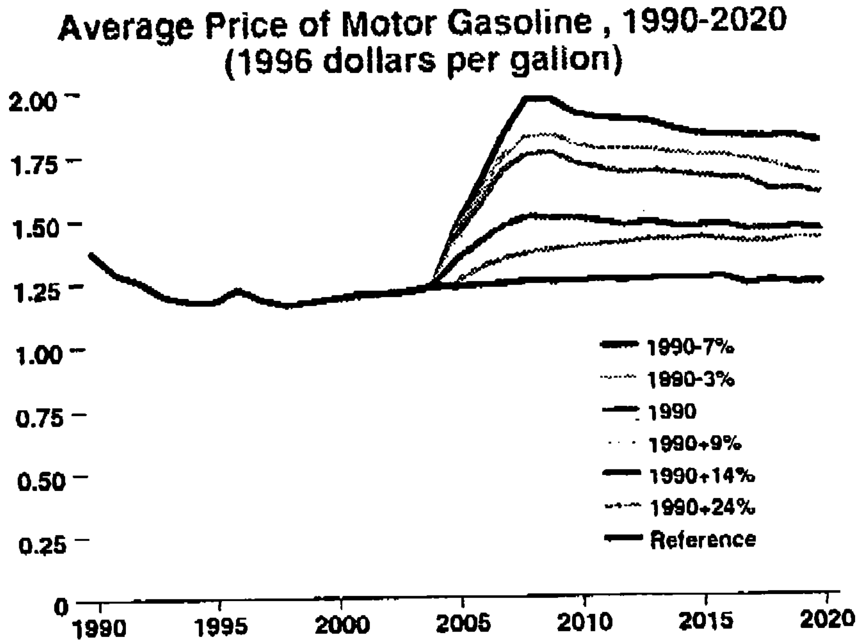


Figure 7

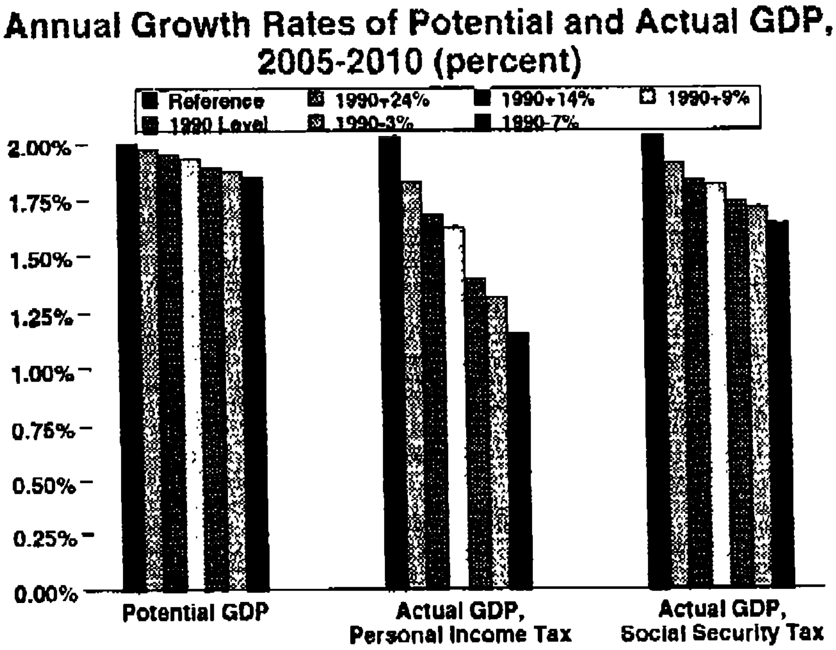
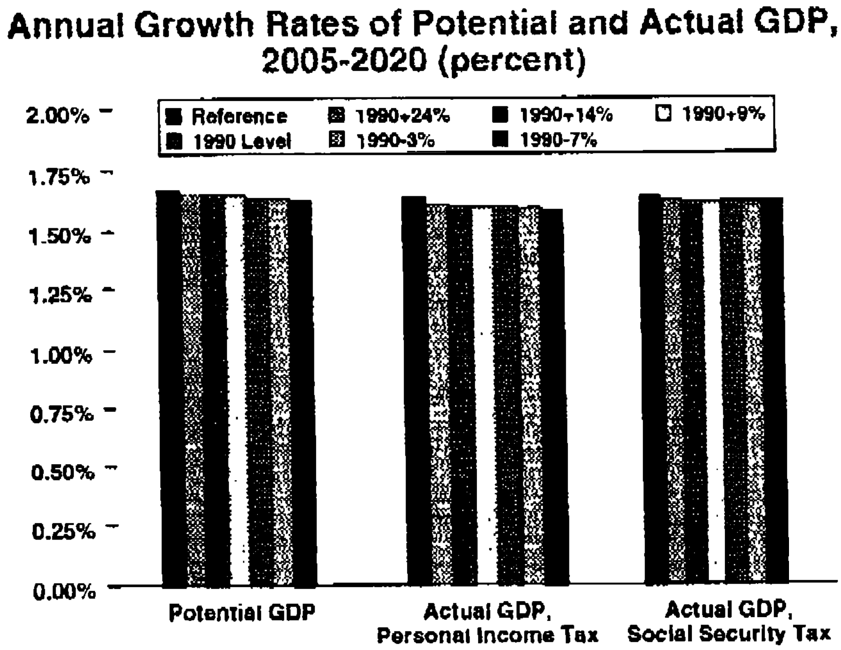


Figure 8



JLY
JAF
SP
JA
QF

U.S. House of Representatives
Committee on Commerce
Room 2125, Rayburn House Office Building
Washington, DC 20515-6115

December 10, 1998

Rec'd 12-17-98

→ Joe will draft + get cleared As by Jan 11.

→ Left message for Cathy saying that wouldn't get As until Jan 11

The Honorable Janet Yellen
Chair
Council of Economic Advisors
Old Executive Office Building
Washington, D.C. 20502

The Honorable Melinda Kimble
Acting Assistant Secretary of State
Oceans and International Environmental and Scientific Affairs
U.S. Department of State
2201 C Street, N.W.
Washington, D.C. 20520

Dear Dr. Yellen and Ms. Kimble:

I appreciated your testimony at the hearing held by the Subcommittee on Energy and Power on October 6, 1998 regarding the Kyoto Protocol: The Outlook for Buenos Aires and Beyond. Since that hearing, the Administration participated in the Fourth Conference of the Parties to the Framework Convention on Climate Change (COP4) which reached decisions on a number of issues related to the Kyoto Protocol. I am writing to relay a number of follow-up questions from the hearing and COP 4, and would appreciate your reply by December 31, 1998. If you have any questions in this regard, please contact Cathy Van Way of the Commerce Committee staff at (202) 225-2927.

Thank you for your prompt attention to this matter.

Sincerely,

Dan Schaefer

Dan Schaefer
Chairman
Subcommittee on Energy and Power

DS/cvw
Enclosure

Follow-up Questions
Energy and Power Subcommittee

1. What is the status of negotiations to obtain the participation of developing countries?
   - Which countries have expressed a willingness to participate?
   - What will be the nature of their participation (i.e., will they agree to binding emission reductions by the same commitment period as is facing developed countries)?
   - Could a developing country "volunteer" to take on binding emissions limitations that involve significant growth in their emissions (like Australia's 8%) so that they could trade emissions credits?

2. The Kyoto Protocol set a "binding" target of reducing U.S. emissions of greenhouse gases to a level seven percent less than what we emitted in 1990.
   - Who determines whether a particular emissions target has or has not been met?
   - What are the consequences, legal or otherwise, if the United States fails to attain this "binding" target?
   - What are the consequences if other countries fail to meet their targets?
   - What are the mechanisms to enforce compliance, both ours and that of other countries, with these binding targets?

3. The Administration has characterized the Kyoto Protocol as a "work in progress." Can the Protocol be amended before it enters into force?

4. Under the terms of the Kyoto Protocol what issues are still to be negotiated? What issues cannot be reopened in the Kyoto Protocol?

5. If the Protocol cannot be amended prior to ratification, how do you propose to secure their meaningful participation prior to the U.S. ratifying the Kyoto Protocol?

6. Does the Administration consider participation in the Clean Development Mechanism to be "meaningful participation" as promised by the President?

7. One of the stated advantages of the Kyoto Protocol is the amount of lead time it gives industry to prepare; binding commitments don't begin until 2008. However, the Administration has said it won't send the Treaty up for ratification until it has meaningful commitments by developing countries. The Administration has also indicated that it won't seek to implement the Protocol until it is ratified. How long will it take the Administration to secure meaningful participation by developing countries? If it is likely to take years, what will happen to the lead time built into the Protocol? Will the first budget period be extended?

8. In testimony before the Subcommittee it was noted that the Administration is developing a domestic emissions trading system to be in place by 2008. Can you please explain under what authority that program is being developed?

9. The Administration's forecast of "modest" costs of the Kyoto Protocol on the U.S. economy is predicated on the assumption of developing country participation and full use of flexible implementation mechanisms. What would be the total costs to the U.S. economy if those two assumptions are not correct - that is, if the major developing countries do not participate, and if the use of flexible implementation mechanisms is capped at no more than 50% of our 7% reduction target?

10. What U.S. industries and sectors of our economy would be hardest hit by the Kyoto Protocol?

11. Will the combination of tax credits, research and development, and emissions trading be sufficient to meet all of the U.S. target of a 7% reduction, or will additional measures be necessary? If additional measures are likely to be needed, what specifically is the Administration proposing?

12. The Administration is currently undertaking efforts to obtain voluntary commitments from U.S. companies to reduce their emissions of greenhouse gases. What sort of credits are being promised to these companies in exchange for early action?

13. The Administration has been working on a "conceptual agreement" with some countries to pursue "an umbrella group to trade emissions permits." There are no details about the nature of the agreement or what is contemplated. Would this be a part of the Protocol or a separate agreement outside the Protocol? How would it be recognized by the Protocol Parties?

14. Has the Administration offered its economic analysis for peer review?

15. One of the assumptions upon which the Administration's economic analysis is based is "meaningful participation by key developing countries". Could you please explain what that meant for purposes of the economic analysis? For example what was the nature of the commitment that was assumed for countries like China, India, etc.... How are cost estimates impacted if countries like Argentina or South Korea take on commitments but countries like China and India do not?

16. (From Mr. Markey) Dr. Yellen: Most of your testimony was about the costs of reducing greenhouse gas emissions. But you also mentioned that the same measures reduce pollution, thus bringing economic benefits. How can one compare the costs against the benefits of reduced pollution and reduced global warming?

17. (From Mr. Markey) Dr. Yellen: Do you account in your economic analysis for the number of lives saved due to reduced pollution? If not, why not?

18. (From Mr. Markey) Dr. Yellen: In your testimony you project that the cost per household of implementing the Kyoto Accord will be "nearly fully offset" by price declines from electricity restructuring. You also comment that the electricity restructuring is likely to cause a significant reduction of greenhouse gas emissions. Why is that – where would the reduced emissions come from? How are we going to get lower electricity prices, greater efficiencies, and technological innovations all at the same time?

19. (From Mr. Markey) Dr. Yellen: The breakup of AT&T was followed by rapid technological innovation and adoption in the telecommunications industry. If the breakup of electricity monopolies also spurs rapid changes in electricity generation, transmission, and distribution technologies, how would that affect the cost predictions of current economic models?

20. (From Mr. Markey) Dr. Yellen: The second panel presented economic analyses that project higher costs to reduce emissions than the ones you presented. Why do their results differ from the Administration's forecasts?

21. (From Ms. Furse) Many countries wanted the Protocol to address only the three major greenhouse gases, carbon dioxide, methane, and nitrous oxide. The Administration advocated, and won, inclusion of all 6 categories of greenhouse gases. What are the economic benefits of including 6 kinds of gases, instead of 3?

22. (From Ms. Furse) You discuss in your testimony the cost-savings possible with effective international trading. Since the rules of international trading have not been agreed to, could you describe what you mean by an effective international emissions market?

23. (From Ms. Furse) You state in your testimony that the Kyoto Protocol will not affect aggregate employment. However, we have heard from other economists that this agreement could cost the U.S. millions of jobs. Why is the range of estimates so large?

24. (From Ms. Furse) The Kyoto Protocol does not require countries to meet binding targets until 2008. However, there are certain aspects of the Protocol, such as the Clean Development Mechanism, that allow for emissions reductions to occur as early as the year 2000. Further, the Administration is pushing for tax incentives and Research and Development now. Dr. Yellen, why is it so important to do these things now?

25. (From Ms. McCarthy) Ms. Kimble: Could you please review the business opportunities that this treaty creates for U.S. firms, both at home and abroad?

26. (From Ms. McCarthy) In Kyoto, many countries pushed for an early commitment period. The Administration pushed for a later commitment period of 2008-2012, which ultimately was included in the Protocol. What was the economic rationale behind pushing for this later commitment period?

27. (From Ms. McCarthy) How do we encourage countries, such as Russia, to invest money from emissions credits in clean energy developments?

CEA Climate Change Documents-- Members Only Review

Joint Implementation (JI)

11-14-97	e-mail from Frankel to Yellen w/ attached discussion paper on JI

Emissions Trading

1-15-98	fax memo from Saile to interagency distribution re third draft emissions trading paper
1-20-98	fax memo from Reifsnyder to interagency distribution re discussion paper on rules for emissions trading
1-20-98	fax memo from Reifsnyder (same as above) w/handwritten comment
1-20-98	fax memo from Reifsnyder (same as above) w/different handwritten comments
3-25-98	draft position paper re emissions trading
3-25-98	draft paper re "Could we use Article 4 (the 'Bubble')?"
4-3-98	fax memo from Pershing to interagency distribution re meeting to continue discussion of issues related to emissions trading
7-17-98	fax from Saile to Lutter re draft list of questions for liability and tradking system topics
7-20-98	paper re allocation of risk under international emissions trading
7-22-98	draft questions re emissions trading and risk allocation (seller/buyer beware)
7-28-98	e-mail from Polasky to Saile re summary of findings at Friday's Experts Meeting on liability and reporting
8-4-98	e-mail from Frankel to Aldy, Polasky reliability & trading limitations
8-5-98	e-mail from Frankel to Squitieri, Cumby re rewrite of bs liability
8-5-98	fax memo from State attaching EPA liability paper
8-6-98	e-mail from Karpoff (DoE) to Frankel re liability memo
8-6-98	e-mail from Polasky to Frankel re feasibility of limits on trading
8-6-98	e-mail from Polasky to Frankel re feasibility of limits on trading (as above) w/handwritten comments.
8-6-98	e-mail from Frankel to Karpoff (DoE) re liability memo
8-6-98	paper titled, "Are limitations on trading institutionally workable?"
8-7-98	paper titled, "Allocation of risk under international emissions trading"
8-8-98	e-mail from Aldy to Egner re emissions and marginal abatement cost curves
8-8-98	e-mail from Aldy to Egner (same as above) w/handwritten comments
8-10-98	e-mail from Polasky to Frankel re language on alternative version of seller plus
8-10-98	e-mail from Frankel to Polasky re alternative language of seller plus
8-10-98	e-mail from Polasky to Franco re current version of Frankel proposed rule
8-10-98	e-mail from Polasky to Frankel re seller plus
8-10-98	e-mail from Frankel to Polasky re seller plus
8-10-98	e-mail from Polasky to Frankel re seller plus
8-10-98	e-mail from Frankel to Polasky re seller plus

8-11-98	handwritten notes re meeting on emission trading
8-11-98	e-mail from Polasky to Frankel re outside proposals re liability
8-12-98	e-mail from Polasky to Sirrie re risk allocation between buyer/seller
8-12-98	draft paper titled, "Limits to Trade: Workable but Distortionary"
8-19-98	draft paper titled "Limits to Trade can be Workable"
8-19-98	draft paper titled "Limits to Trade are Highly Distortionary"
8-20-98	E-mail from Squitieri to Forrister, Frankel, Glauthier, Rubin re paper on emissions trading rules
8-21-98	e-mail from Frankel to Polasky, Aldy, Franco re paper on emissions trading rules
8-21-98	e-mail from Polasky to Frankel re paper on emissions trading rules
8-21-98	e-mail from Frankel to Squitieiri re paper on emissions trading rules
8-21-98	e-mail from Frankel to Squitieri re further reaction re paper on emissions trading rules
8-21-98	draft paper, "Limits to Trade can be Workable, even though Undesirable"
8-24-98	e-mail from Rubin to Frankel, Polasky re seller cap proposal
8-24-98	e-mail from Polasky to Frankel re seller cap proposal
8-24-98	e-mail from Polasky to Frankel re seller cap proposal
8-25-98	draft paper, "Limits to Trade can be Workable, even though Undesirable"
8-25-98	memo from Frankel to Stern re Unworkability and Inefficiency of Limits on Trading
8-26-98	fax memo from Kimble to interagency distribution re Meeting on Emissions Trading/Liability 8-28
8-26-98	fax memo from Kimble to interagency distribution (same as above) w/handwritten comments
8-26-98	paper "Addressing the risk of overselling in international emissions trading"
8-26-98	fax from WHCCTF to interagency distribution w/draft revised options memo on allocation of risk and cover memo on strategy
9-16-98	fax version of 8-17 paper, "International Emissions Trading: Market Power Issues"
9-27-98	draft paper on "Seller Plus" proposal (Revised)
9-29-98	draft paper on Allocation of Risk (Liability)
9-29-98	e-mail to Polasky from Frankel re seller-plus-plus
9-29-98	e-mail from Frankel to Polasky re seller-plus-plus
10-1-98	paper titled "Durable Goods Monopoly"
undated	Allocation of Risk (Liability)
undated	FSU paper w/handwritten comments
undated	Spreadsheet on permit market, FSU Monopoly w/chart attached
undated	Addressing the risk of overselling in international emissions trading
undated	Table re Maximum Abuse
undated	Table on Sample Calculations for Seller-Plus Options
undated	Spreadsheet on Annex 1 + Key LDC
undated	paper on Registries w/handwritten comments

undated	Example: Seller Plus Plus
undated	Draft memo to Stern from Frankel re Unworkability and Inefficienty of Limits on Trading
undated	Buyer Versus Seller Liability and Transactions Costs
undated	Addressing the risk of overselling in international emissions trading
undated	Restrictions on International Trading Would be Potentially Unworkable, Inefficient, and Counterproductive
undated	Monopoly with multiple transactions dates within a single budget period: Illustrative example"
undated	handwritten notes w/graph
undated	Memo from Polasky to Doniger re "Seller Plus" Option
undated	Memo from Biniaz to Doniger re Allocation of Risk (aka "liability") paper

Umbrella Group

1-27-98	fax memo from Reifsnyder to interagency distribution re discussion paper on the "Umbrella Group"
5-14-98	cable (cc'd to Frankel and CEA staff) re Umbrella Group progress at Reykjavik
7-22-98	draft paper re formalizing the Umbrella Arrangement
9-2-98	fax memo from Rubin to interagency distribution re Umbrella Group Talking Points
undated	Formalizing the Umbrella Arrangement
undated	Technical Aspects of Using Article 4 (the "Bubble")

Developing Countries

1-28-98	fax from Hales to interagency distribution re discussion paper on defining "Meaningful Participation" for developing countries
3-14-98	e-mail from P Orszag to Aldy re developing countries paper
3-20-98	handwritten notes re global climate change developing country meeting
3-25-98	draft paper re developing countries
3-25-98	draft paper re developing countries w/handwritten comments
3-26-98	draft proposal for developing countries: participation in a "Target and Trade" system
3-30-98	draft proposal for developing countries: participation in a "Target and Trade" system
5-13-98	e-mail from Frankel to Yellen re Stern request re case for int'l emissions trading
6-9-98	memo from Bhagat to U/S Eizenstat re Follow-up to conversation on "Target and Trade"/Meaningful Participation
8-14-98	fax memo from Reifsnyder to interagency distribution re revised responses to G-77/China Qs on Flex Mechs
8-14-98	fax memo from Reifsnyder (same as above) w/handwritten comments
undated	Draft #5 "Developing Country Options"
undated	Draft "Engagement with the European Union prior to Buenos Aires:

Approaches on Developing Country Issues and Forestalling Caps"

Sinks

2-13-98	fax memo from Reifsnyder to interagency distribution re paper on Sink Options
2-18-98	draft chart on carbon sinks / analysis of Kyoto Protocol w/attached discussions of alternatives
3-25-98	draft position paper re sinks
8-21-98	e-mail from Frankel to Polasky re sinks
9-17-98	e-mail from Aldy to Frankel, Polasky, Franco re sinks update
undated	paper on Sinks w/handwritten comments
undated	sinks paper

Compliance

3-3-98	fax memo from Reifsnyder to interagency distribution re discussion paper on compliance
3-25-98	draft position paper re compliance
8-17-98	draft paper on Russian Market Power and Compliance
10-1-98	draft paper, "Russian Market Power and Compliance"
undated	Market Power: Will FSU Comply?
Undated	Handwritten notes

Clean Development Mechanism (CDM)

3-25-98	draft position paper re clean development mechanism
3-25-98	draft position paper re clean development mechanism w/handwritten comments
8-19-98	fax from Seabright to interagency contacts re clean development mechanism
8-19-98	fax from Seabright (same as above) w/handwritten comments
9-25-98	draft paper on clean development mechanism
9-28-98	fax from Greenfield to Cumby, Aldy re clean development mechanism--summary of position
9-28-98	e-mail from Colby (Treas.) To Squitieri, Cumby, Wilcox, Aldy, Franco re CDM Paper addendum

Climate Change Process/Decision Points Memos

3-26-98	fax memo from Nigel Purvis to interagency distribution re Sherman/Eizenstat climate change meeting
3-31-98	fax from Nigel Purvis to interagency distribution re Sherman/Eizenstat Climate Change meeting
4-23-98	fax memo from Kimble to Assistant Secretary Group re Draft summary policy papers: climate change

7-24-98	fax from Nigel Purvis to interagency distribution re Sherman/Eizenstat climate change meeting
7-27-98	draft outline of decisions required by principals for the FCCC 4th Conference of the parties at Buenos Aires (Nov 2-13)
7-31-98	fax memo from Kimble,Sandalow to interagency distribution re Monday Climate Change Oversight Meeting
Undated	Interagency Processes: Climate Change Policy and Diplomatic Development
Undated	Interagency Processes: Climate Change Policy and Diplomatic Development"

Micellaneous

4-4-98	memo from Breidenich to interagency distribution re technical analysis of Brazilian protocol proposal
7-14-98	fax from Anne Pence to Greenfield attaching revised Doniger paper plus Canada paper
1-31-98	e-mail from Stern to P. Orszag re Byrd statement
6-25-98	fax memo from Wirth to interagency distribution re conversation with Senator Byrd
9-15-98	e-mail from Stern to Jolin re validators
9-18-98	e-mail from Aldy to Yellen, Frankel, Stern re new and improved table of EMF modeling results of Kyoto
9-24-98	fax memo from Cumby to Early Action Group re latest draft of early action memo
10-1-98	draft paper, "Climate Change and the Agricultural and Forestry Sectors"
undated	Yellen Q&As for Climate Change Testimony
1-21-98	e-mail from Frankel to Yellen re Eiszenstat meeting
3-13-98	e-mail from Orszag to Stern re economic validators
3-15-98	e-mail from Frankel to Orszag re economic validators

To: Michelle / Joe

Committee on Energy and Natural Resources

UNITED STATES SENATE

312 Dirksen Senate Office Building
Washington, D.C. 20515
(202) 224-4103
FAX (202) 228-0391

TO: Roger Ballantine

FAX#: 456-6468

FROM: Shirley Neff

DATE: 3.23.99

RE:

You should receive 9 pages, including this cover sheet.
If you do not receive all of the pages, please call (202) 224-6836.

NOTES:

WITNESS LIST

COMMITTEE ON ENERGY AND NAUTRAL RESOURCES

OVERSIGHT HEARING TO RECEIVE TESTIMONY ON THE ECONOMIC IMPACTS OF THE KYOTO PROTOCOL TO THE FRAMEWORK CONVENTION ON CLIMATE CHANGE

THURSDAY, MARCH 27, 1999
9:30 A.M. — SENATE DIRKSEN OFFICE BUILDING, ROOM 366
WASHINGTON, DC

The Hon. Chuck Hagel
U.S. Senate

Dr. Janet Yellen
Chair, Council of Economic Advisers
Washington, DC

<u>Panel One</u>

The Hon. Jay Hakes
Administrator
Energy Information Administration
U.S. Department of Energy
Washington, DC

Ms. Mary Novak
Senior Vice President, Energy Service
WEFA
Burlington, Massachusetts

Dr. Margo Thorning
Senior Vice President & Chief Economist
American Council for Capital Formation
Washington, DC

Mr. Cecil Roberts
President
United Mine Workers of America
Washington, DC

United States Senate

COMMITTEE ON
ENERGY AND NATURAL RESOURCES
WASHINGTON, DC 20510-6150

WWW.SENATE.GOV/~ENERGY

March 23, 1999

MEMORANDUM

To: Chairman Murkowski, and Members, Committee on Energy and Natural Resources

From: Colleen Deegan, Counsel, 4-8115

Re: March 25, 1999 Hearing on Economic Effects of Kyoto Protocol

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An oversight hearing has been scheduled before the Senate Energy and Natural Resources Committee for March 25, 1999 on the economic effects of the Kyoto Protocol to the Framework Convention on Climate Change.

The hearing will commence at 9:30 am in room SD-366. Attached to this memorandum are a draft witness list, some state specific information, and an executive summary of the Energy Information Administration (EIA) October 1998 study done for the House Committee on Science. Jay Hakes, Administrator of the EIA, will be discussing this study in his testimony.

The Kyoto Protocol

On December 11, 1997, the Parties to the United Nations Framework Convention on Climate Change (FCCC) concluded the negotiation of what is commonly called the Kyoto Protocol. The Protocol imposes legally binding emissions limits for greenhouse gasses on the industrialized nations. Reductions average 6%-8% below 1990 levels between the years 2008-2012. The United States' Kyoto target is 7% below 1990 levels. Under the terms of the Berlin Mandate, governing Protocol negotiations, Developing Countries, including China, India, Brazil, and approximately 130 others, are not subject to the new emissions controls, nor are they obligated to accept any new commitments.

Critics of this approach argue that emissions controls will increase energy prices in the United States and other nations subject to controls, resulting in a massive shift of industrial production and jobs from the industrial nations to the developing nations. Moreover, actual global emissions would not decrease — only their points of origin would change. Indeed, because industrial processes in industrialized nations are generally more energy efficient than those found in most developing nations, global carbon emissions per unit of production might actually increase. In other words, the United States and the leading industrial nations might suffer domestic economic pain, without realizing global environmental gains.

Some of the questions that have been raised include: How much economic pain would the United States face? How high could energy prices rise? What will happen to US employment and international economic competitiveness in energy-intensive industries such as chemical production, petroleum refining, steel, paper and cement production? What impacts could the Kyoto Protocol have on domestic coal production? Since coal produces approximately 57% of the nation's electricity, what impacts would the Protocol have on electricity supply and prices, not to mention our domestic coal industry?

In deliberations over US policy on global climate change, trade groups and labor unions representing America's heavy industry, utility, and agricultural sectors have been some of the strongest vocal opponents of regulation on CO2 emissions, claiming their members would bear the greatest economic burden of reducing fossil fuel emissions. These organizations have commissioned studies that show the loss of many American jobs to countries which would not be required to impose any strong environmental regulations, and have routinely expressed opposition against any effort by the Administration to commit to greenhouse gas reductions that are not supported by sound scientific and economic analysis. Lately, these groups, and many Members of Congress, have challenged greenhouse gas control proposals under the 1997 Kyoto Protocol that would not apply to developing countries in kind, and consequently, many have opposed US ratification of the Protocol.

Byrd-Hagel

In July of 1997, the United States Senate adopted, by a vote of 95-0, Senate Resolution 98, commonly known as the Byrd-Hagel resolution. The resolution was to provide guidance to the Administration and its global climate negotiating team as they entered negotiations in Kyoto. The resolution stipulates two conditions that must be met before the United States can become a signatory to any international agreement on climate change: (1) the agreement must include developing countries; and (2) cannot result in serious harm to US economy. It is clear that the Kyoto Protocol does not meet the first Byrd-Hagel test. Whether the Protocol also fails to meet the second part of the test on serious harm to the US economy is where economists differ and is the focus of the March 25th hearing.

Economic Impact

The Administration's economic analysis, prepared by the Council of Economic Advisors (CEA) and released in July, 1998, predicts a "modest" impact as a result of the emissions limitations imposed by the Kyoto Protocol. CEA anticipates costs of $7 - $12 billion a year in 2008-2012. Translated to energy costs, that is about $14 - $23 per ton of carbon. Put another way, CEA calculates that the average household's energy bill will increase $70 - $110 per year. As the attached charts illustrate, CEA's analysis is at the extreme low end of the spectrum when compared to other studies. Some have criticized the CEA analysis for adopting overly optimistic assumptions. Those assumptions are: (1) reductions are undertaken in an efficient manner; (2) meaningful developing country participation; (3) effective international trading; and (3) an efficiently functioning Clean Development Mechanism. In other words, many believe the Administration used what is a best case scenario.

Other groups have done studies on the economic impacts of the Kyoto Protocol. Not surprisingly, predictions vary widely. For instance, some economic models predict a sharp fall in GDP, while others find little or no impact. It is important to remember that model outputs vary depending on the assumptions used (the old adage "garbage in, garbage out"), and it is possible to make assumptions that will predict a GDP increase as a result of new emissions controls. For instance, if you assume that there will be economically detrimental climate change if we do nothing, and that action on our part will prevent climate change and avert resulting damages, then one can coax a positive result out of an economic model. However, if emissions merely shift from industrial nations to developing nations with no global decrease in emissions, there are no "benefits" from averted climate damages to be tallied against emission control "costs," and the result will be negative. Therefore, the realism of the assumptions made in initializing an economic model are the key to getting meaningful results.

The Energy Information Administration, the independent statistical and analytical agency created within the Department of Energy, prepared a report for the US House of Representatives Committee on Science in October 1998. EIA will present findings from this report at the March 25th hearing. EIA did six different case studies, ranging from the least stringent scenario — emissions levels 24% above 1990 levels — to the most stringent — 7% below 1990 (the US Kyoto target). The assumptions are not nearly as optimistic as the Administration's best-case scenario and the evaluation of the Kyoto target was done assuming no policy changes. The EIA analysis places a great deal of emphasis on fuel switching and projects dramatic increases in the use of natural gas and non-hydro renewables.

The following is a range of impacts projected for 2010 by the EIA models:

— Average household energy costs up to $335 to $1,740 annually
— Electricity prices up 20-86%
— Gasoline prices up 11-53%
— Fuel oil prices up 14-76%
— GDP declines between $60-$397 billion per year
— Decline in coal use of 20-80%
— 10,400 - 42,000 coal mining jobs lost

Another economic impact study, done by WEFA (formerly the Wharton Econometric Forecasting Associates) found that implementing the Kyoto Protocol would mean sharply higher prices for energy and electricity. WEFA believes that these higher prices would reduce the US standard of living and give developing countries a competitive advantage. The group also found that the GDP wold fall 3.2% below baseline projections — an annual loss of $300 billion. At the same time, the US would lose 2.4 million jobs and the average income loss would be $2,700 per family. The WEFA analysis does not include international trading of carbon permits because details of how the system would work have not been addressed. WEFA also noted that the strong and diverse views expressed during and after the Kyoto negotiations make it unclear when and if such a trading program could ever be implemented. Many groups, not just WEFA, believe such a program would only be effective if all emitting countries were included.

The United Mine Workers of America (UMWA) will present testimony based on a study done by DRI. This study, done before the Kyoto Protocol was signed, was based on two case studies. The first scenario was based on a reduction to 1990 levels and the second was based on 10% below 1990. Some of the findings:

— Cumulative GDP losses could exceed $1 trillion by 2008
— $19,00-$27,000 in losses per household
— 2.3 million jobs lost by 2005, with a high of 2.6 million in 2007
— every region of US is adversely affected through 2015
— every industrial sector is hit — coal is devastated
    — 110,00 jobs in transportation and public utilities
    — 199,00 jobs in manufacturing
    — 426,000 jobs in services
— wages will fall
— energy prices will rise
— for average Americans, energy price increases will add:
    — nearly $900 to energy bills by 2005
    — up to $2,200 by 2020

Understandably, the UMWA is concerned with the future of the domestic coal industry. The United States has recoverable coal reserves of 250+ years. Coal currently provides 57% of our electricity generation. If drastic cuts are made in coal use, a concern arises over what fuel can realistically make up the loss in generation.

One group, the American Council for Capital Formation (ACCF) did a review of numerous studies on the economic impacts of the Kyoto Protocol. ACCF's projections of costs, job loss, and overall impact on GDP stand in sharp contrast to the Administration's analysis prepared by CEA. ACCF found that the Administration's reliance on full global trading (including India and China) was extremely unrealistic since Kyoto does not require developing nations to reduce emissions and many have said they will not. ACCF is particularly critical of the Administration's assumption that relies on "cost-less" and instantaneous adjustments in all markets.

The Science of Climate Change

Underlying the debate is a continuing discussion over Climate Change. A recent CRS Report on Climate Change (January 11, 1999) made the following observation:

"Natural variability of climate is large enough that even the record-setting warmth and severe weather events in the 1980's and 1990's does not allow a vast majority of knowledgeable scientists to state beyond a reasonable doubt that weather extremes experienced over the past two decades are attributable to "global warming," at least at the present time. In some cases, causal relationships between seasonal climate changes and present-day severe weather events can be established, because of an improved ability to observe the El Nino phenomenon. This notwithstanding, singular extreme weather events have focused public attention on possible outcomes of potential long-term climate change and the need for a better understanding of global and regional climates.

National Oceanic and Atmospheric Administration's (NOAA) researchers reported that the 12 warmest years since historical records have been kept occurred in the past two decades, with 1990 and now 1998 shaping up to be among the warmest. At least some of this warming, they concluded, is human-induced. On the other hand, satellite instruments — which measure temperatures of the atmosphere in a deep column above the surface — over the past 15 years are hard pressed to demonstrate any positive trends."

Some Helpful Definitions

The debate over the Kyoto Protocol and Climate Change is developing its own peculiar lexicon. A glossary of some of the more common terms follows:

- **Berlin Mandate** - The mandate for the negotiations leading to Kyoto. In April, 1995, at the first Conference of the Parties (COP-1) of the Framework Convention on Climate Change (FCCC) in Berlin, delegates agreed to proceed with a new round of negotiations leading to a new treaty or other legal instrument for adoption at the third Conference of the Parties (COP-3) — the Kyoto Protocol. The mandate for those negotiations stipulated that there would be no new commitments for developing nations. Senate opposition to this stipulation was expressed in a 95-0 vote on the Byrd-Hagel Resolution — Senate Resolution 98 — during the 105th Congress.

- **Emissions banking and borrowing** - A flexibility-enhancing measure that would allow nations to bank unused emissions credits for use in a future measurement period, or to borrow emissions credits from a future measurement period for use in a current measurement period.

- **Emissions trading** - Emissions trading, in theory, would allow nations to purchase emissions credits from other nations who had earned credits as a consequence of reductions they had made or credits they had accumulated. Although emission trading is used in the United States for Sulphur Oxides, it remains to be seen whether such a system could work with respect to the variety of greenhouse gases in an international setting.

- **Framework Convention on Climate Change (FCCC)** - The climate treaty agreed to at the Rio Earth Summit and ratified by the Senate on October 7, 1992. The goal of the FCCC is to achieve the "stabilization of greenhouse gas concentrations at a level that would prevent *dangerous* anthropogenic [human-induced] interference with the climate system." To achieve that goal, the FCCC committed the industrialized nations to the non-binding aim of reducing greenhouse gas emissions in the year 2000 to 1990 levels. Both the Bush and Clinton administrations adopted strategies that relied upon voluntary measures to meet this aim. However, the Kyoto Protocol includes mandatory, legally-binding emissions controls.

- **Greenhouse effect** — This is the natural, beneficial "greenhouse effect" that warms the Earth and makes it habitable by trapping reflected and scattered solar radiation that would otherwise be lost from the atmosphere. The current debate is whether or not human enhancement of existing atmospheric greenhouse gasses will enhance the natural greenhouse effect to the point where additional warming could result in adverse effects.

- **Greenhouse gasses** - Water vapor, carbon dioxide, methane, and chlorofluorocarbon are some of the heat-trapping greenhouse gasses.

- **Joint Implementation (JI)** - JI would allow an emitter to gain credits or achieve reductions by paying for emissions reductions or carbon sequestration in another location. For example, rather than spending more for ever diminishing emissions reductions at an existing fuel-efficient plant, a utility in Ohio might achieve reductions or credits more cost-effectively by purchasing fuel efficient boilers for a utility in Poland, or by planting forests in Costa Rica.

- **Kyoto Protocol** - Shorthand for the new climate treaty signed in agreed to in Kyoto, Japan in December 1997. Both conventions and protocols are called treaties. Both require Senate ratification. In the environmental context, initiatives generally begin with a framework convention (in this case, the Framework Convention on Climate Change or FCCC) which contains agreements to cooperate, conduct research, share information, etc. Most of the time, the real commitments to specific, legally-binding actions are left to protocols that follow the framework conventions. For example, in the case of CFCs, the Vienna Convention on Protection of the Stratospheric Ozone Layer was followed by the Montreal Protocol on Ozone-depleting Substances. The Montreal Protocol contains the phase-outs of CFCs. The FCCC, signed in Rio, contains more than is generally contained in most framework conventions, since it contains an "aim" or "goal" that industrialized nations reduce emissions to 1990 levels by 2000. This goal was voluntary. The Kyoto Protocol changes the goals and makes them legally binding.

- **No regrets** - A "no regrets" approach refers to those steps that are desirable in their own right for domestic economic reasons that would simultaneously reduce carbon emissions and other environmental pollutants. Examples might include energy conservation and efficiency improvements or elimination of uneconomical tax and budget subsidies for certain fuels.

- **Senate Climate Change Observer Group** - This group was established by the Senate leadership after the Senate's consideration of S. Res. 98 on July 25, 1997. Members include Senators Hagel, Byrd, Kerry, Lieberman, Murkowski, Chafee, Baucus, Levin, Abraham, Craig, Roberts, and Kerrey.

United States Senate

COMMITTEE ON
ENERGY AND NATURAL RESOURCES
WASHINGTON, DC 20510-6150

WWW.SENATE.GOV/~ENERGY

March 22, 1999

Dr. Janet L. Yellen
Chair
Council of Economic Advisers
Old Executive Office Building, Suite #314
Washington, DC 20502

Dear Dr. Yellen:

On behalf of the Committee on Energy and Natural Resources, I would like to invite you to testify at the Committee's Thursday, March 25, 1999, oversight hearing on the economic impacts of the Kyoto Protocol to the Framework Convention on Climate Change.

This hearing will take place at 9:30 a.m. in room SD-366 of the Dirksen Senate Office Building in Washington, D.C. In order to maximize the time available for Members to ask questions, please limit oral testimony to five minutes. Written testimony will be included in full in the Committee's printed hearing record.

Please provide the Committee with 100 copies of your testimony by close of business Tuesday, March 23, 1999. Additionally, you will need to provide a copy of your testimony on a 3 ½ inch disk or e-mail it to admin@energy.senate.gov. It is not necessary that you convert the file to any particular format. The Committee intends to post your testimony on its web site, www.senate.gov/~energy, in order to make it widely available to the public.

Should you have any questions, please contact Colleen Deegan or Julia McCaul of the Committee staff at (202) 224-8115.

Sincerely,

Frank H. Murkowski

Frank H. Murkowski
Chairman

FHM:CD:jm

SENATE COMMITTEE ON ENERGY AND NATURAL RESOURCES

WASHINGTON, DC 20510
VOICE: 202-224-~~6170~~ 0115
Fax: 202-228-~~0530~~ 0302

To: Dr. Janet L. Yellen
F# 395-6958

Date: 3.22.99

From: Colleen Deegan

Time: 11:25 am

SUBJECT: 3.25.99 Hearing

COMMENTS: See attached letter.

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, 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 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

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 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.

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-CO_2 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 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.

EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL ON ENVIRONMENTAL QUALITY
WASHINGTON, D.C. 20503

April 8, 1998

The Honorable James M. Talent
Chairman
Committee on Small Business
United States House of Representatives
2361 Rayburn House Office Building
Washington, DC 20515-6315

Dear Chairman Talent:

Thank you for your letter requesting information from the Council on Environmental Quality about the Kyoto Protocol. Given the press of business before the House, I appreciate your courtesy and attention as well as that of the other members of the Committee.

Enclosed you will find the answers I have prepared in response to your questions as well as those of other members of the Committee for the record. I have attempted to answer each question -- even those within the purview of other agencies -- with information that I hope will be helpful. If you have any questions or require clarification, please let me know.

Again, thank you.

Sincerely,

Kathleen A. McGinty
Chairman

KAM/rsk
cc: The Honorable John LaFalce
Ranking Member
Enclosures

QUESTIONS FOR THE RECORD FROM CHAIRMAN KATHLEEN A. McGINTY FOR CHAIRMAN TALENT

QUESTION 1: Please provide any and all regulatory impact or economic analyses performed by federal agencies, contractors or grantees regarding the implementation of the Kyoto Protocol in the United States;

ANSWER 1: The Council on Environmental Quality is not the lead White House office on economic issues, and would not be the appropriate respondent to questions regarding economic impacts or analyses of the Kyoto Protocol. Dr. Janet Yellen, Chair of the Council of Economic Advisers, provided congressional testimony recently on this issue, and I have enclosed a copy of her testimony for your information.

QUESTION 2: Please provide any and all activities and/or plans for federal agency implementation of the Kyoto Protocol;

ANSWER 2: As Undersecretary of State Stuart Eizenstat testified before Congress recently, the President will not seek to implement the Kyoto Protocol without the advice and consent of the U.S. Senate. The President has made clear that the Protocol does not yet include the meaningful participation of key developing countries. Until it does, he will not submit it for Senate approval. The President indicated in the October 22, 1997 announcement of his policy (see enclosures), however, that he believes it is in the best interest of the U.S. to begin taking long-term steps to reduce domestic emissions without regard to the achievement of a climate change agreement. Towards that end, he proposed a five year, $6.3 billion climate technology initiative in the FY 1999 budget to enhance U.S. R&D and technology development and deployment for a variety of energy intensive sectors. This initiative has the benefits of improving basic economic productivity, reducing dependence on foreign energy, and reducing greenhouse gas emissions.

QUESTION 3: Please provide any and all evidence, documentation, or scientific bases for the existence of the phenomenon described as Global Warming;

ANSWER 3: It would not be practicable to identify or reproduce all scientific evidence regarding global warming, however, accompanying this letter are several documents providing a broad scientific background on global warming. I draw your attention particularly to the Intergovernmental Panel on Climate Change (IPCC) documents that summarize the state of science on the issues.

During the 1980s, scientific evidence about global climate change and its consequences led to growing concern among scientists, policy makers, and the public. In 1988, the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) jointly established the IPCC. Through the IPCC process, scientists representing more than 150 countries have assessed the available information on climate change and its environmental and economic effects and have provided the scientific understanding needed to help formulate appropriate responses.

A series of IPCC reports, incorporating extensive peer review and a commitment to scientific excellence, have provided the most authoritative and comprehensive information available on the science of climate change. In 1996, the IPCC published its Second Assessment Report, which summarizes the most recent information on climate change science and the vulnerability of natural and socioeconomic systems. (IPCC Website: http://www.ipcc.ch/). The chapters within these documents also refer to thousands of peer-reviewed articles that further detail the science and earlier compendia of information.

The documents accompanying this letter include:

- 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.

- Remarks by the President on Global Climate Change. National Geographic Society. October 22, 1997.

- Climate Change 1995. The Science of Climate Change. Contribution of Working Group I to the Second Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.

- Climate Change 1995. Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses. Contribution of Working Group II to the Second Assessment Report of the Intergovernmental Panel on Climate Change. Cambridge University Press.

- Climate Change 1995. The Science of Climate Change. Summary for Policymakers and Technical Summary of the Working Group I Report. Cambridge University Press.

- Climate Change 1995. IPCC Second Assessment. A Report of the Intergovernmental Panel on Climate Change. Summaries for Policymakers for IPCC Working Group I, II, and III. (enclosed are several copies of this document for distribution)

- Climate Change 1994. Radiative Forcing of Climate Change and an Evaluation of the IPCC IS92 Emission Scenarios. Cambridge University Press.

- The Regional Impacts of Climate Change: An Assessment of Vulnerability. 1997. Intergovernmental Panel on Climate Change. Cambridge University Press.

- The Regional Impacts of Climate Change: An Assessment of Vulnerability. Summary for Policymakers. 1997. Intergovernmental Panel on Climate Change. Cambridge University Press.

- Technologies, Policies and Measures for Mitigating Climate Change. IPCC Technical Paper I. 1996. Intergovernmental Panel on Climate Change. Cambridge University Press.

- An Introduction to Simple Climate Models Used in the IPCC Second Assessment Report. IPCC Technical Paper II. 1997. Intergovernmental Panel on Climate Change. Cambridge University Press.

- Stabilization of Atmospheric Greenhouse Gases: Physical, Biological and Socio-economic Implications. IPCC Technical Paper III. 1997. Intergovernmental Panel on Climate Change. Cambridge University Press.

- Implications of Proposed CO_2 emissions limitations. IPCC Technical Paper IV. 1997. Intergovernmental Panel on Climate Change. Cambridge University Press.

- Policy Implication of Greenhouse Warming: Mitigation, Adaptation, and the Science Base. 1992. Panel on Policy Implications of Greenhouse Warming, Committee on Science, Engineering, and Public Policy, National Academy of Sciences, National Academy of Engineering, Institute of Medicine. National Academy Press, Washington, DC.

- Our Changing Planet: The FY 1993-1998 US Global Change Research Program. A Report by Subcommittee on Global Change Research of the Committee on Environment and Natural Resources (formerly Committee on Earth and Environmental Sciences.)

- Our Changing Climate. Reports to the Nation on our Changing Planet. 1997. Publication of the UCAR Joint Office for Science Support and the NOAA Office of Global Programs.

- Common Questions About Climate Change. 1997. United Nations Environment Programme and World Meteorological Organization.

- Climate Change: State of Knowledge. 1997. A publication by the Office of Science and Technology Policy.

QUESTION 4: Please provide any known or perceived specific time frame for signing of the Kyoto Protocol by the President of the United States;

ANSWER 4: As Undersecretary of State Stuart Eizenstat testified recently before a number of Congressional committees, the Kyoto Protocol is open for signature from March 15, 1998 through March 15, 1999. The President expects to sign the agreement sometime during this period. However, the President will not seek the advice and consent of the U.S. Senate on the Kyoto Protocol until there is meaningful participation from key developing countries.

QUESTION 5: Please provide copies of any side agreements, memoranda, protocols or other documents concerning the Kyoto Protocol entered into or contemplated between the Executive Branch and other nations, parties or non-governmental entities;

ANSWER 5: I am not aware of and CEQ does not have any such agreements, memoranda, protocols or other similar documents.

<u>CEA Climate Change Documents -- For Members Only</u>

<u>1996</u>

1	10-29	Copy of 10-8 fax from Squitieri (Treas) to Munnell of draft memo to Shafer from Gotbaum re Climate Change Deputies Meeting of 10-24
2	10-29	Copy of 10-8 draft of memo to Summers from Gotbaum re Climate Change Meeting with Tim Wirth

<u>1997</u>

3	1-3	Draft memo from R. Prince to Yellen re Administration Position on Climate Change
4	1-6	Memo from R. Prince to Yellen re Administration Position on Climate Change
5	1-13	Memo from K. Panerali (NEC) to inter-agency contacts re Climate Change Deputies Meeting 1-14: attached agenda and documents
6	2-26	Memo from R. Kapla (CEQ) to interagency contacts re Climate Change Deputies Meeting of 2-27: attached agenda and documents
7	3-14	Frankel talking points on coal subsidies for Deputies mtg
8	3-15	e-mail copy of draft memo from Frankel to McGinty, Tarullo, et.al. re: G-7 summit proposal: on coal subsidies
9	3-17	e-mail copy of 3-15 memo above re-sent to Jolin
10	3-19	unsigned memo from Frankel to Tarullo re coal subsidies
11	3-19	memo from Frankel to Tarullo (as above but w/attachment)
12	3-19	unsigned memo from Frankel (as above but w/different attachments)
13	4-3	memo from Mazur to Tarullo re coal subsidies
14	4-17	buckslip from Frankel to Tarullo w/ memo re coal subsidies (w/attachments)
15	4-17	buckslip from Frankel to Tarullo w/ memo re coal subsidies (w/different attachments)

16	4-23	draft memorandum for the Deputies re climate change
17	4-25	memo from Munnell to Seidel, Sandalow & Mazur re comments on draft memo for the Deputies re climate change (above)
18	4-30	hand-written notes by Yellen
19	5-2	hand-written notes by Frankel from GCC Principals mtg
20	5-7	unsigned memo from Mazur/Sandalow to inter-agency contacts re 5-8 meeting on climate change: draft deputies decision memo attached
21	5-19	hand-written notes by Frankel re Deputies meeting
22	5-30	draft memo from Shogren to Yellen re Principals Meeting on global climate change policy
23	6-1	talking points on CEA position on global climate change w/ Yellen notes
24	6-17	fax memo from Forrister to Stern, McGinty, Sandalow, Tarullo, Mazur w/paper on climate change
25	6-17	fax memo from Forrister to McGinty, Sandalow, Tarullo, Mazur w/revised version of paper on climate change (above)
26	6-17	draft talking points on global climate change for Yellen
27	7-1	memo from Mazur to Yellen re: climate change economic analysis reports
28	7-1	hand-written notes by Frankel from NEC Principals' mtg
29	7-3	unsigned memo from Frankel to Yellen/Munnell re: climate change, "technology" and prices w/attachments
30	7-3	unsigned memo from Frankel to Yellen/Munnell re: climate change, "technology" and prices w/o attachments
31	7-11	NEC/CEQ Principals Meeting: agenda and discussion paper
32	7-18	draft memo from McGinty to Heads of Federal Agencies re guidance on consideration of global climatic change in environmental documents prepared pursuant to the National Environmental Policy Act
33	7-22	paper from Frankel to Yellen re impact of climate change policies on U.S. industry

34	7-22	paper from Frankel to Yellen (same as above) w/different hand-written notes
35	7-22	paper from Frankel to Yellen (same as above) w/different hand-written notes
36	7-22	paper to Yellen re impact of global climate change on US industry--key points
37	7-22	revised paper to Yellen (re same as above) w/ hand-written notes
38	7-22	hand-written notes by Frankel from GCC Principals mtg
39	7-22	e-mail from Yellen to Frankel, Munnell, Shogren, Orszag re Janet's presentation today; e-mail from McGinty to Tarullo, Sperling, Yellen re same
40	7-23	fax from Sylvia Liu (Justice) to inter-agency contacts re Principals meeting: draft paper on relationship between domestic and international emissions trading
41	8-7	unsigned memo from Bierbaum/Shogren to Stern re voluntary programs for climate change
42	8-7	signed memo (above)
43	9-2	hand-written notes by Frankel from mtg w/ Principals
44	9-9	memo from Daley to Sperling/McGinty re climate change
45	9-9	notes on Tim Wirth's Proposal
46	9-11	climate change scenarios presentation to NEC Principals 9-11
47	9-14	fax memo from Glauthier to Sperling/Stern/McGinty re technology strategy for climate change mitigation
48	9-16	hand-written notes by Frankel from GCC Principals mtg
49	9-17	buckslip from Stern to Steinberg/McGinty/Sperling/Yellen/Tarullo w/Layla Boulton newspaper article attached
50	9-24	hand-written notes by Frankel from mtg w/ GCC Principals
51	9-26	buckslip from Frankel to Yellen w/attached paper from Dept of Energy
52	9-26	hand-written notes by Frankel from GCC Principals mtg
53	9-29	hand-written notes by Frankel from NEC Principals mtg

54	10-1	hand-written notes by Yellen from GCC NEC Principals mtg
55	10-8	Memo from Aldy/Lutter to Yellen re sensitivity of permit prices
56	10-8	Memo from Aldy/Lutter to Yellen (same subject as above) different version/attachments
57	10-8	e-mail from P Orszag to Sperling, McGinty, Stern, et.al. re EDF/early action
58	10-9	hand-written notes by Yellen
59	10-9	draft memo for Yellen re effects of safety valve
60	10-14	e-mail forwarded by Frankel to Yellen re EDF early action
61	10-15	draft memo for Yellen re effects of safety valve
2	10-16	memo to NEC Principals from Sperling/Wallman re electricity industry restructuring
63	10-22	fax from Gruber to Aldy w/10-22 memo from Gruber to Summers re responses to your questions on climate change
64	11-2	memo from Orszag to Sperling/Tarullo/Stern/Yellen/Sandalow/Gruber re institution building and climate change
65	11-2	draft discussion paper re climate negotiations for GCC Deputies
66	11-7	fax from Kratz (Defense) to Frankel/Stern/Orszag w/attached letter from Goodman to Sandalow
67	11-18	memo from Lutter/Aldy to Yellen re forecasts of carbon emissions and electricity restructuring
68	11-24	letter from U/S of Defense to Steinberg
69	11-26	draft discussion paper for Deputies re climate change treaty national security package
70	12-23	hand-written notes by Frankel from mtg w/ GCC Principals

1998

71	1-12	memo from Saile/Doniger (EPA) to Wilcox/Frankel/ et al re draft emissions strategy paper
72	1-12	e-mail from Aldy to Frankel/Gruber/et al re comments on EPA memo on international trading
73	1-15	e-mail from Frankel to Lutter/Morris re meeting on LDCs w/attachments
74	1-15	memo from Hunker (DOC) to inter-agency contacts re developing country participation paper
75	1-15	memo from Hunker (same as above w/hand-written comments)
76	1-15	memo from Saile (EPA) to Karpoff/Haspell/ et. al. re third draft of emissions trading paper
77	1-15	fax from Saile to emissions trading strategy inter-agency group (same as above w/cover sheet)
78	1-15	fax from Saile to emissions trading strategy inter-agency group (same as above w/hand-written comments)
79	1-15	discussion paper re clean development mechanism: answers
80	1-16	e-mail from Morris to Frankel re meeting on LDCs
81	1-20	memo to Saile from Morris re comments on emissions trading strategy paper
82	1-21	fax from Saile to inter-agency contacts w/paper from EPA/Treasury on emissions trading analysis
83	1-21	e-mail from Frankel to Yellen re report on Eizenstat Mtg on GCC
84	1-21	Draft points of consensus paper for assistant secretaries meeting of 1-16
85	1-21	fax of paper on international emissions trading analysis
86	1-23	hand-written notes by Frankel
87	1-28	fax from White (EPA) to inter-agency contacts re growth targets paper
88	1-28	EPA discussion draft paper on developing country growth targets
89	1-30	outcomes and follow up / climate team meeting (w/ attachments)

90	1-30	memo to Aldy from Hohenstein (EPA) re options for addressing hot and super heated air in a post-2000 Kyoto Agreement
91	2-11	e-mail from Yellen to Williams/Branch/Daigle re response to outside calls concerning climate change testimony
92	2-11	memo to Yellen from Lutter re electricity restructuring update
93	2-12	memo to Kimble/Sandalow from Hales/Seabright re USAID's programs and activities that support the USG developing country strategy
94	2-12	e-mail from Frankel to Aldy/Morris re response to Hales on LDC participation
95	2-13	memo to Hales from Frankel re definition of meaningful participation
96	2-13	memo to Hales from Frankel (same as above w/hand-written comments)
97	2-13	another version of above memo to Hales
98	2-13	another version of above memo to Hales
99	2-13	signed version of above memo to Hales
1 0	2-18	predecisional draft on climate change diplomatic policy status report
1 1	2-18	same as above w/distribution notation
1 2	3-3	paper to Morris re getting India to undertake meaningful commitments to limit greenhouse gases
103	3-3	memo to Yellen from Fuglie re Q&As on agriculture and climate change
04	3-4	predecisional draft for discussion re market-based international trading regime
05	3-6	talking points for emissions trading
1 6	3-6	paper on issues regarding trading
107	3-6	draft proposal for CEA position on targets for developing countries
08	3-9	fax to Greenfield from Morris re Plan for emissions paper
109	3-11	fax from Saile to interagency working group for international emissions trading re meeting

110	3-12	fax from Saile to Greenfield re how international emissions trading would work
111	3-12	fax from Saile to Morris re same subject as above
12	3-13	draft proposal for developing countries: to cap and trade emissions permits w/handwritten comments
13	3-13	draft proposal as above w/o handwritten comments
114	3-13	draft proposal as above (different version)
115	3-16	fax from Saile to CEA re latest version of comments for New Zealanders
116	3-16	draft proposal for developing countries: to cap and trade emissions permits
117	3-16	fax from Saile to working group re paper to Sandalow (same subject as above)
118	3-19	draft proposal for developing countries: participation in a "target and trade" system
19	3-19	climate change meeting agenda w/hand-written notes by Frankel attached
20	3-23	fax from Steinberg/Antholis/Boone/Odlum to inter-agency contacts re UK climate change draft for Leeds Castle Environmental Ministerial
21	3-25	draft addendum to 3-25 1998 emissions trading paper
122	3-25	paper re ancillary environmental benefits of cap and trade for developing countries
23	3-25	draft US position paper re clean development mechanism
24	3-25	draft US position paper re compliance
25	3-25	draft US position paper re emissions trading
126	3-30	comments from Frankel to Aldy/Lutter/Morris re paper on LDC commitments
27	3-31	fax from Saile to State re DOE draft paper on emissions trading: buyer seller liability
28	4-8	fax memo to inter-agency contacts from Breidenich re technical analysis of Brazilian protocol proposal
29	4-9	paper re emissions trading goals, issues, and roadmap

130 4-9 same as above w/handwritten notes

31 4-12 draft paper re targets for developing countries

132 4-12 another version of above

133 4-13 e-mail from Aldy to inter-agency contacts re meeting on international trading

134 4-14 fax from Saile to CEA re paper on comments on New Zealand non-paper on GHG emissions trading

35 4-15 draft CDM structure chart

136 4-24 draft paper re CDM vs target and trade

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37 Talking Points: NEC Principals Meeting on Climate Change

38 Treasury's Agenda for Climate Change (quotes from Summers)

139 different version of above document

40 Memo from Gruber to Summers re effect of stabilizing US carbon emissions

41 Note to Stern w/ EPI Study attached

142 Chart re liability options in trading regime

143 Paper on developing countries

144 handwritten note by Frankel re Summers position

145 hand-written notes by Yellen

146 memo on impact of climate change policies on US "competitiveness" for Yellen

147 Yellen notes

148 Schedule of Climate Change activities (describes memo to President) w/ Yellen notes

CEA Climate Change Documents -- For Members Only

1996

1	10-29	Copy of 10-8 fax from Squitieri (Treas) to Munnell of draft memo to Shafer from Gotbaum re Climate Change Deputies Meeting of 10-24
2	10-29	Copy of 10-8 draft of memo to Summers from Gotbaum re Climate Change Meeting with Tim Wirth

1997

3	1-3	Draft memo from R. Prince to Yellen re Administration Position on Climate Change
4	1-6	Memo from R. Prince to Yellen re Administration Position on Climate Change
5	1-13	Memo from K. Panerali (NEC) to inter-agency contacts re Climate Change Deputies Meeting 1-14: attached agenda and documents
6	2-26	Memo from R. Kapla (CEQ) to interagency contacts re Climate Change Deputies Meeting of 2-27: attached agenda and documents
7	3-14	Frankel talking points on coal subsidies for Deputies mtg
8	3-15	e-mail copy of draft memo from Frankel to McGinty, Tarullo, et.al. re: G-7 summit proposal: on coal subsidies
9	3-17	e-mail copy of 3-15 memo above re-sent to Jolin
10	3-19	unsigned memo from Frankel to Tarullo re coal subsidies
11	3-19	memo from Frankel to Tarullo (as above but w/attachment)
12	3-19	unsigned memo from Frankel (as above but w/different attachments)
13	4-3	memo from Mazur to Tarullo re coal subsidies
14	4-17	buckslip from Frankel to Tarullo w/ memo re coal subsidies (w/attachments)
15	4-17	buckslip from Frankel to Tarullo w/ memo re coal subsidies (w/different attachments)

16	4-23	draft memorandum for the Deputies re climate change
17	4-25	memo from Munnell to Seidel, Sandalow & Mazur re comments on draft memo for the Deputies re climate change (above)
18	4-30	hand-written notes by Yellen
19	5-2	hand-written notes by Frankel from GCC Principals mtg
20	5-7	unsigned memo from Mazur/Sandalow to inter-agency contacts re 5-8 meeting on climate change: draft deputies decision memo attached
21	5-19	hand-written notes by Frankel re Deputies meeting
22	5-30	draft memo from Shogren to Yellen re Principals Meeting on global climate change policy
23	6-1	talking points on CEA position on global climate change w/ Yellen notes
24	6-17	fax memo from Forrister to Stern, McGinty, Sandalow, Tarullo, Mazur w/paper on climate change
25	6-17	fax memo from Forrister to McGinty, Sandalow, Tarullo, Mazur w/revised version of paper on climate change (above)
26	6-17	draft talking points on global climate change for Yellen
27	7-1	memo from Mazur to Yellen re: climate change economic analysis reports
28	7-1	hand-written notes by Frankel from NEC Principals' mtg
29	7-3	unsigned memo from Frankel to Yellen/Munnell re: climate change, "technology" and prices w/attachments
30	7-3	unsigned memo from Frankel to Yellen/Munnell re: climate change, "technology" and prices w/o attachments
31	7-11	NEC/CEQ Principals Meeting: agenda and discussion paper
32	7-18	draft memo from McGinty to Heads of Federal Agencies re guidance on consideration of global climatic change in environmental documents prepared pursuant to the National Environmental Policy Act
33	7-22	paper from Frankel to Yellen re impact of climate change policies on U.S. industry

34	7-22	paper from Frankel to Yellen (same as above) w/different hand-written notes
35	7-22	paper from Frankel to Yellen (same as above) w/different hand-written notes
36	7-22	paper to Yellen re impact of global climate change on US industry--key points
37	7-22	revised paper to Yellen (re same as above) w/ hand-written notes
38	7-22	hand-written notes by Frankel from GCC Principals mtg
39	7-22	e-mail from Yellen to Frankel, Munnell, Shogren, Orszag re Janet's presentation today; e-mail from McGinty to Tarullo, Sperling, Yellen re same
40	7-23	fax from Sylvia Liu (Justice) to inter-agency contacts re Principals meeting: draft paper on relationship between domestic and international emissions trading
41	8-7	unsigned memo from Bierbaum/Shogren to Stern re voluntary programs for climate change
42	8-7	signed memo (above)
43	9-2	hand-written notes by Frankel from mtg w/ Principals
44	9-9	memo from Daley to Sperling/McGinty re climate change
45	9-9	notes on Tim Wirth's Proposal
46	9-11	climate change scenarios presentation to NEC Principals 9-11
47	9-14	fax memo from Glauthier to Sperling/Stern/McGinty re technology strategy for climate change mitigation
48	9-16	hand-written notes by Frankel from GCC Principals mtg
49	9-17	buckslip from Stern to Steinberg/McGinty/Sperling/Yellen/Tarullo w/Layla Boulton newspaper article attached
50	9-24	hand-written notes by Frankel from mtg w/ GCC Principals
51	9-26	buckslip from Frankel to Yellen w/attached paper from Dept of Energy
52	9-26	hand-written notes by Frankel from GCC Principals mtg
53	9-29	hand-written notes by Frankel from NEC Principals mtg

54	10-1	hand-written notes by Yellen from GCC NEC Principals mtg
55	10-8	Memo from Aldy/Lutter to Yellen re sensitivity of permit prices
56	10-8	Memo from Aldy/Lutter to Yellen (same subject as above) different version/attachments
57	10-8	e-mail from P Orszag to Sperling, McGinty, Stern, et.al. re EDF/early action
58	10-9	hand-written notes by Yellen
59	10-9	draft memo for Yellen re effects of safety valve
60	10-14	e-mail forwarded by Frankel to Yellen re EDF early action
61	10-15	draft memo for Yellen re effects of safety valve
62	10-16	memo to NEC Principals from Sperling/Wallman re electricity industry restructuring
63	10-22	fax from Gruber to Aldy w/10-22 memo from Gruber to Summers re responses to your questions on climate change
64	11-2	memo from Orszag to Sperling/Tarullo/Stern/Yellen/Sandalow/Gruber re institution building and climate change
65	11-2	draft discussion paper re climate negotiations for GCC Deputies
66	11-7	fax from Kratz (Defense) to Frankel/Stern/Orszag w/attached letter from Goodman to Sandalow
67	11-18	memo from Lutter/Aldy to Yellen re forecasts of carbon emissions and electricity restructuring
68	11-24	letter from U/S of Defense to Steinberg
69	11-26	draft discussion paper for Deputies re climate change treaty national security package
70	12-23	hand-written notes by Frankel from mtg w/ GCC Principals

1998

71	1-12	memo from Saile/Doniger (EPA) to Wilcox/Frankel/ et al re draft emissions strategy paper
72	1-12	e-mail from Aldy to Frankel/Gruber/et al re comments on EPA memo on international trading
73	1-15	e-mail from Frankel to Lutter/Morris re meeting on LDCs w/attachments
74	1-15	memo from Hunker (DOC) to inter-agency contacts re developing country participation paper
75	1-15	memo from Hunker (same as above w/hand-written comments)
76	1-15	memo from Saile (EPA) to Karpoff/Haspell/ et. al. re third draft of emissions trading paper
77	1-15	fax from Saile to emissions trading strategy inter-agency group (same as above w/cover sheet)
78	1-15	fax from Saile to emissions trading strategy inter-agency group (same as above w/hand-written comments)
79	1-15	discussion paper re clean development mechanism: answers
80	1-16	e-mail from Morris to Frankel re meeting on LDCs
81	1-20	memo to Saile from Morris re comments on emissions trading strategy paper
82	1-21	fax from Saile to inter-agency contacts w/paper from EPA/Treasury on emissions trading analysis
83	1-21	e-mail from Frankel to Yellen re report on Eizenstat Mtg on GCC
84	1-21	Draft points of consensus paper for assistant secretaries meeting of 1-16
85	1-21	fax of paper on international emissions trading analysis
86	1-23	hand-written notes by Frankel
87	1-28	fax from White (EPA) to inter-agency contacts re growth targets paper
88	1-28	EPA discussion draft paper on developing country growth targets
89	1-30	outcomes and follow up / climate team meeting (w/ attachments)

90	1-30	memo to Aldy from Hohenstein (EPA) re options for addressing hot and super heated air in a post-2000 Kyoto Agreement
91	2-11	e-mail from Yellen to Williams/Branch/Daigle re response to outside calls concerning climate change testimony
92	2-11	memo to Yellen from Lutter re electricity restructuring update
93	2-12	memo to Kimble/Sandalow from Hales/Seabright re USAID's programs and activities that support the USG developing country strategy
94	2-12	e-mail from Frankel to Aldy/Morris re response to Hales on LDC participation
95	2-13	memo to Hales from Frankel re definition of meaningful participation
96	2-13	memo to Hales from Frankel (same as above w/hand-written comments)
97	2-13	another version of above memo to Hales
98	2-13	another version of above memo to Hales
99	2-13	signed version of above memo to Hales
1 0	2-18	predecisional draft on climate change diplomatic policy status report
1 1	2-18	same as above w/distribution notation
1 2	3-3	paper to Morris re getting India to undertake meaningful commitments to limit greenhouse gases
103	3-3	memo to Yellen from Fuglie re Q&As on agriculture and climate change
04	3-4	predecisional draft for discussion re market-based international trading regime
05	3-6	talking points for emissions trading
1 6	3-6	paper on issues regarding trading
1 7	3-6	draft proposal for CEA position on targets for developing countries
108	3-9	fax to Greenfield from Morris re Plan for emissions paper
109	3-11	fax from Saile to interagency working group for international emissions trading re meeting

10	3-12	fax from Saile to Greenfield re how international emissions trading would work
111	3-12	fax from Saile to Morris re same subject as above
12	3-13	draft proposal for developing countries: to cap and trade emissions permits w/handwritten comments
13	3-13	draft proposal as above w/o handwritten comments
114	3-13	draft proposal as above (different version)
115	3-16	fax from Saile to CEA re latest version of comments for New Zealanders
116	3-16	draft proposal for developing countries: to cap and trade emissions permits
117	3-16	fax from Saile to working group re paper to Sandalow (same subject as above)
118	3-19	draft proposal for developing countries: participation in a "target and trade" system
19	3-19	climate change meeting agenda w/hand-written notes by Frankel attached
2	3-23	fax from Steinberg/Antholis/Boone/Odlum to inter-agency contacts re UK climate change draft for Leeds Castle Environmental Ministerial
21	3-25	draft addendum to 3-25 1998 emissions trading paper
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31	4-12	draft paper re targets for developing countries
32	4-12	another version of above
133	4-13	e-mail from Aldy to inter-agency contacts re meeting on international trading
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1-3	Draft memo from R. Prince to Yellen re Administration Position on Climate Change
1-6	Memo from R. Prince to Yellen re Administration Position on Climate Change
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2-26	Memo from R. Kapla (CEQ) to interagency contacts re Climate Change Deputies Meeting of 2-27: attached agenda and documents
3-14	Frankel talking points on coal subsidies for Deputies mtg
3-15	e-mail copy of draft memo from Frankel to McGinty, Tarullo, et.al. re: G-7 summit proposal: on coal subsidies
3-17	e-mail copy of 3-15 memo above re-sent to Jolin
3-19	unsigned memo from Frankel to Tarullo re coal subsidies
3-19	memo from Frankel to Tarullo (as above but w/attachment)
3-19	unsigned memo from Frankel (as above but w/different attachments)
4-3	memo from Mazur to Tarullo re coal subsidies
4-17	buckslip from Frankel to Tarullo w/ memo re coal subsidies (w/attachments)
4-17	buckslip from Frankel to Tarullo w/ memo re coal subsidies (w/different attachments)

4-23	draft memorandum for the Deputies re climate change
4-25	memo from Munnell to Seidel, Sandalow & Mazur re comments on draft memo for the Deputies re climate change (above)
4-30	hand-written notes by Yellen
5-2	hand-written notes by Frankel from GCC Principals mtg
5-7	unsigned memo from Mazur/Sandalow to inter-agency contacts re 5-8 meeting on climate change: draft deputies decision memo attached
5-19	hand-written notes by Frankel re Deputies meeting
5-30	draft memo from Shogren to Yellen re Principals Meeting on global climate change policy
6-1	talking points on CEA position on global climate change w/ Yellen notes
6-17	fax memo from Forrister to Stern, McGinty, Sandalow, Tarullo, Mazur w/paper on climate change
6-17	fax memo from Forrister to McGinty, Sandalow, Tarullo, Mazur w/revised version of paper on climate change (above)
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7-22	paper from Frankel to Yellen re impact of climate change policies on U.S. industry

7-22	paper from Frankel to Yellen (same as above) w/different hand-written notes
7-22	paper from Frankel to Yellen (same as above) w/different hand-written notes
7-22	paper to Yellen re impact of global climate change on US industry--key points
7-22	revised paper to Yellen (re same as above) w/ hand-written notes
7-22	hand-written notes by Frankel from GCC Principals mtg
7-22	e-mail from Yellen to Frankel, Munnell, Shogren, Orszag re Janet's presentation today; e-mail from McGinty to Tarullo, Sperling, Yellen re same
7-23	fax from Sylvia Liu (Justice) to inter-agency contacts re Principals meeting: draft paper on relationship between domestic and international emissions trading
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9-2	hand-written notes by Frankel from mtg w/ Principals
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9-9	notes on Tim Wirth's Proposal
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9-24	hand-written notes by Frankel from mtg w/ GCC Principals
9-26	buckslip from Frankel to Yellen w/attached paper from Dept of Energy
9-26	hand-written notes by Frankel from GCC Principals mtg
9-29	hand-written notes by Frankel from NEC Principals mtg

10-1	hand-written notes by Yellen from GCC NEC Principals mtg
10-8	Memo from Aldy/Lutter to Yellen re sensitivity of permit prices
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10-22	fax from Gruber to Aldy w/10-22 memo from Gruber to Summers re responses to your questions on climate change
11-2	memo from Orszag to Sperling/Tarullo/Stern/Yellen/Sandalow/Gruber re institution building and climate change
11-2	draft discussion paper re climate negotiations for GCC Deputies
11-7	fax from Kratz (Defense) to Frankel/Stern/Orszag w/attached letter from Goodman to Sandalow
11-18	memo from Lutter/Aldy to Yellen re forecasts of carbon emissions and electricity restructuring
11-24	letter from U/S of Defense to Steinberg
11-26	draft discussion paper for Deputies re climate change treaty national security package
12-23	hand-written notes by Frankel from mtg w/ GCC Principals

1998

1-12	memo from Saile/Doniger (EPA) to Wilcox/Frankel/ et al re draft emissions strategy paper
1-12	e-mail from Aldy to Frankel/Gruber/et al re comments on EPA memo on international trading
1-15	e-mail from Frankel to Lutter/Morris re meeting on LDCs w/attachments
1-15	memo from Hunker (DOC) to inter-agency contacts re developing country participation paper
1-15	memo from Hunker (same as above w/hand-written comments)
1-15	memo from Saile (EPA) to Karpoff/Haspell/ et. al. re third draft of emissions trading paper
1-15	fax from Saile to emissions trading strategy inter-agency group (same as above w/cover sheet)
1-15	fax from Saile to emissions trading strategy inter-agency group (same as above w/hand-written comments)
1-15	discussion paper re clean development mechanism: answers
1-16	e-mail from Morris to Frankel re meeting on LDCs
1-20	memo to Saile from Morris re comments on emissions trading strategy paper
1-21	fax from Saile to inter-agency contacts w/paper from EPA/Treasury on emissions trading analysis
1-21	e-mail from Frankel to Yellen re report on Eizenstat Mtg on GCC
1-21	Draft points of consensus paper for assistant secretaries meeting of 1-16
1-21	fax of paper on international emissions trading analysis
1-23	hand-written notes by Frankel
1-28	fax from White (EPA) to inter-agency contacts re growth targets paper
1-28	EPA discussion draft paper on developing country growth targets
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2-13	memo to Hales from Frankel (same as above w/hand-written comments)
2-13	another version of above memo to Hales
2-13	another version of above memo to Hales
2-13	signed version of above memo to Hales
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3-3	memo to Yellen from Fuglie re Q&As on agriculture and climate change
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3-6	talking points for emissions trading
3-6	paper on issues regarding trading
3-6	draft proposal for CEA position on targets for developing countries
3-9	fax to Greenfield from Morris re Plan for emissions paper
3-11	fax from Saile to interagency working group for international emissions trading re meeting

3-12	fax from Saile to Greenfield re how international emissions trading would work
3-12	fax from Saile to Morris re same subject as above
3-13	draft proposal for developing countries: to cap and trade emissions permits w/handwritten comments
3-13	draft proposal as above w/o handwritten comments
3-13	draft proposal as above (different version)
3-16	fax from Saile to CEA re latest version of comments for New Zealanders
3-16	draft proposal for developing countries: to cap and trade emissions permits
3-16	fax from Saile to working group re paper to Sandalow (same subject as above)
3-19	draft proposal for developing countries: participation in a "target and trade" system
3-19	climate change meeting agenda w/hand-written notes by Frankel attached
3-23	fax from Steinberg/Antholis/Boone/Odlum to inter-agency contacts re UK climate change draft for Leeds Castle Environmental Ministerial
3-25	draft addendum to 3-25 1998 emissions trading paper
3-25	paper re ancillary environmental benefits of cap and trade for developing countries
3-25	draft US position paper re clean development mechanism
3-25	draft US position paper re compliance
3-25	draft US position paper re emissions trading
3-30	comments from Frankel to Aldy/Lutter/Morris re paper on LDC commitments
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4-9	paper re emissions trading goals, issues, and roadmap

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4-12	another version of above
4-13	e-mail from Aldy to inter-agency contacts re meeting on international trading
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4-15	draft CDM structure chart
4-24	draft paper re CDM vs target and trade

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Talking Points: NEC Principals Meeting on Climate Change

Treasury's Agenda for Climate Change (quotes from Summers)

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Memo from Gruber to Summers re effect of stabilizing US carbon emissions

Note to Stern w/ EPI Study attached

Chart re liability options in trading regime

Paper on developing countries

handwritten note by Frankel re Summers position

hand-written notes by Yellen

memo on impact of climate change policies on US "competitiveness" for Yellen

Yellen notes

Schedule of Climate Change activities (describes memo to President) w/ Yellen notes

CEA Climate Change Documents-- Members Only Review

Joint Implementation (JI)

11-14-97	e-mail from Frankel to Yellen w/ attached discussion paper on JI

Emissions Trading

1-15-98	fax memo from Saile to interagency distribution re third draft emissions trading paper
1-20-98	fax memo from Reifsnyder to interagency distribution re discussion paper on rules for emissions trading
1-20-98	fax memo from Reifsnyder (same as above) w/handwritten comment
1-20-98	fax memo from Reifsnyder (same as above) w/different handwritten comments
3-25-98	draft position paper re emissions trading
3-25-98	draft paper re "Could we use Article 4 (the 'Bubble')?"
4-3-98	fax memo from Pershing to interagency distribution re meeting to continue discussion of issues related to emissions trading
7-17-98	fax from Saile to Lutter re draft list of questions for liability and tradking system topics
7-20-98	paper re allocation of risk under international emissions trading
7-22-98	draft questions re emissions trading and risk allocation (seller/buyer beware)
7-28-98	e-mail from Polasky to Saile re summary of findings at Friday's Experts Meeting on liability and reporting
8-4-98	e-mail from Frankel to Aldy, Polasky reliability & trading limitations
8-5-98	e-mail from Frankel to Squitieri, Cumby re rewrite of bs liability
8-5-98	fax memo from State attaching EPA liability paper
8-6-98	e-mail from Karpoff (DoE) to Frankel re liability memo
8-6-98	e-mail from Polasky to Frankel re feasibility of limits on trading
8-6-98	e-mail from Polasky to Frankel re feasibility of limits on trading (as above) w/handwritten comments.
8-6-98	e-mail from Frankel to Karpoff (DoE) re liability memo
8-6-98	paper titled, "Are limitations on trading institutionally workable?"
8-7-98	paper titled, "Allocation of risk under international emissions trading"
8-8-98	e-mail from Aldy to Egner re emissions and marginal abatement cost curves
8-8-98	e-mail from Aldy to Egner (same as above) w/handwritten comments
8-10-98	e-mail from Polasky to Frankel re language on alternative version of seller plus
8-10-98	e-mail from Frankel to Polasky re alternative language of seller plus
8-10-98	e-mail from Polasky to Franco re current version of Frankel proposed rule
8-10-98	e-mail from Polasky to Frankel re seller plus
8-10-98	e-mail from Frankel to Polasky re seller plus
8-10-98	e-mail from Polasky to Frankel re seller plus
8-10-98	e-mail from Frankel to Polasky re seller plus

8-11-98	handwritten notes re meeting on emission trading
8-11-98	e-mail from Polasky to Frankel re outside proposals re liability
8-12-98	e-mail from Polasky to Sirrie re risk allocation between buyer/seller
8-12-98	draft paper titled, "Limits to Trade: Workable but Distortionary"
8-19-98	draft paper titled "Limits to Trade can be Workable"
8-19-98	draft paper titled "Limits to Trade are Highly Distortionary"
8-20-98	E-mail from Squitieri to Forrister, Frankel, Glauthier, Rubin re paper on emissions trading rules
8-21-98	e-mail from Frankel to Polasky, Aldy, Franco re paper on emissions trading rules
8-21-98	e-mail from Polasky to Frankel re paper on emissions trading rules
8-21-98	e-mail from Frankel to Squitieiri re paper on emissions trading rules
8-21-98	e-mail from Frankel to Squitieri re further reaction re paper on emissions trading rules
8-21-98	draft paper, "Limits to Trade can be Workable, even though Undesirable"
8-24-98	e-mail from Rubin to Frankel, Polasky re seller cap proposal
8-24-98	e-mail from Polasky to Frankel re seller cap proposal
8-24-98	e-mail from Polasky to Frankel re seller cap proposal
8-25-98	draft paper, "Limits to Trade can be Workable, even though Undesirable"
8-25-98	memo from Frankel to Stern re Unworkability and Inefficiency of Limits on Trading
8-26-98	fax memo from Kimble to interagency distribution re Meeting on Emissions Trading/Liability 8-28
8-26-98	fax memo from Kimble to interagency distribution (same as above) w/handwritten comments
8-26-98	paper "Addressing the risk of overselling in international emissions trading"
8-26-98	fax from WHCCTF to interagency distribution w/draft revised options memo on allocation of risk and cover memo on strategy
9-16-98	fax version of 8-17 paper, "International Emissions Trading: Market Power Issues"
9-27-98	draft paper on "Seller Plus" proposal (Revised)
9-29-98	draft paper on Allocation of Risk (Liability)
9-29-98	e-mail to Polasky from Frankel re seller-plus-plus
9-29-98	e-mail from Frankel to Polasky re seller-plus-plus
10-1-98	paper titled "Durable Goods Monopoly"
undated	Allocation of Risk (Liability)
undated	FSU paper w/handwritten comments
undated	Spreadsheet on permit market, FSU Monopoly w/chart attached
undated	Addressing the risk of overselling in international emissions trading
undated	Table re Maximum Abuse
undated	Table on Sample Calculations for Seller-Plus Options
undated	Spreadsheet on Annex 1 + Key LDC
undated	paper on Registries w/handwritten comments

undated	Example: Seller Plus Plus
undated	Draft memo to Stern from Frankel re Unworkability and Inefficienty of Limits on Trading
undated	Buyer Versus Seller Liability and Transactions Costs
undated	Addressing the risk of overselling in international emissions trading
undated	Restrictions on International Trading Would be Potentially Unworkable, Inefficient, and Counterproductive
undated	Monopoly with multiple transactions dates within a single budget period: Illustrative example"
undated	handwritten notes w/graph
undated	Memo from Polasky to Doniger re "Seller Plus" Option
undated	Memo from Biniaz to Doniger re Allocation of Risk (aka "liability") paper

Umbrella Group

1-27-98	fax memo from Reifsnyder to interagency distribution re discussion paper on the "Umbrella Group"
5-14-98	cable (cc'd to Frankel and CEA staff) re Umbrella Group progress at Reykjavik
7-22-98	draft paper re formalizing the Umbrella Arrangement
9-2-98	fax memo from Rubin to interagency distribution re Umbrella Group Talking Points
undated	Formalizing the Umbrella Arrangement
undated	Technical Aspects of Using Article 4 (the "Bubble")

Developing Countries

1-28-98	fax from Hales to interagency distribution re discussion paper on defining "Meaningful Participation" for developing countries
3-14-98	e-mail from P Orszag to Aldy re developing countries paper
3-20-98	handwritten notes re global climate change developing country meeting
3-25-98	draft paper re developing countries
3-25-98	draft paper re developing countries w/handwritten comments
3-26-98	draft proposal for developing countries: participation in a "Target and Trade" system
3-30-98	draft proposal for developing countries: participation in a "Target and Trade" system
5-13-98	e-mail from Frankel to Yellen re Stern request re case for int'l emissions trading
6-9-98	memo from Bhagat to U/S Eizenstat re Follow-up to conversation on "Target and Trade"/Meaningful Participation
8-14-98	fax memo from Reifsnyder to interagency distribution re revised responses to G-77/China Qs on Flex Mechs
8-14-98	fax memo from Reifsnyder (same as above) w/handwritten comments
undated	Draft #5 "Developing Country Options"
undated	Draft "Engagement with the European Union prior to Buenos Aires:

Approaches on Developing Country Issues and Forestalling Caps"

Sinks

2-13-98	fax memo from Reifsnyder to interagency distribution re paper on Sink Options
2-18-98	draft chart on carbon sinks / analysis of Kyoto Protocol w/attached discussions of alternatives
3-25-98	draft position paper re sinks
8-21-98	e-mail from Frankel to Polasky re sinks
9-17-98	e-mail from Aldy to Frankel, Polasky, Franco re sinks update
undated	paper on Sinks w/handwritten comments
undated	sinks paper

Compliance

3-3-98	fax memo from Reifsnyder to interagency distribution re discussion paper on compliance
3-25-98	draft position paper re compliance
8-17-98	draft paper on Russian Market Power and Compliance
10-1-98	draft paper, "Russian Market Power and Compliance"
undated	Market Power: Will FSU Comply?
Undated	Handwritten notes

Clean Development Mechanism (CDM)

3-25-98	draft position paper re clean development mechanism
3-25-98	draft position paper re clean development mechanism w/handwritten comments
8-19-98	fax from Seabright to interagency contacts re clean development mechanism
8-19-98	fax from Seabright (same as above) w/handwritten comments
9-25-98	draft paper on clean development mechanism
9-28-98	fax from Greenfield to Cumby, Aldy re clean development mechanism--summary of position
9-28-98	e-mail from Colby (Treas.) To Squitieri, Cumby, Wilcox, Aldy, Franco re CDM Paper addendum

Climate Change Process/Decision Points Memos

3-26-98	fax memo from Nigel Purvis to interagency distribution re Sherman/Eizenstat climate change meeting
3-31-98	fax from Nigel Purvis to interagency distribution re Sherman/Eizenstat Climate Change meeting
4-23-98	fax memo from Kimble to Assistant Secretary Group re Draft summary policy papers: climate change

7-24-98	fax from Nigel Purvis to interagency distribution re Sherman/Eizenstat climate change meeting
7-27-98	draft outline of decisions required by principals for the FCCC 4th Conference of the parties at Buenos Aires (Nov 2-13)
7-31-98	fax memo from Kimble,Sandalow to interagency distribution re Monday Climate Change Oversight Meeting
Undated	Interagency Processes: Climate Change Policy and Diplomatic Development
Undated	Interagency Processes: Climate Change Policy and Diplomatic Development"

Micellaneous

4-4-98	memo from Breidenich to interagency distribution re technical analysis of Brazilian protocol proposal
7-14-98	fax from Anne Pence to Greenfield attaching revised Doniger paper plus Canada paper
1-31-98	e-mail from Stern to P. Orszag re Byrd statement
6-25-98	fax memo from Wirth to interagency distribution re conversation with Senator Byrd
9-15-98	e-mail from Stern to Jolin re validators
9-18-98	e-mail from Aldy to Yellen, Frankel, Stern re new and improved table of EMF modeling results of Kyoto
9-24-98	fax memo from Cumby to Early Action Group re latest draft of early action memo
10-1-98	draft paper, "Climate Change and the Agricultural and Forestry Sectors"
undated	Yellen Q&As for Climate Change Testimony
1-21-98	e-mail from Frankel to Yellen re Eiszenstat meeting
3-13-98	e-mail from Orszag to Stern re economic validators
3-15-98	e-mail from Frankel to Orszag re economic validators