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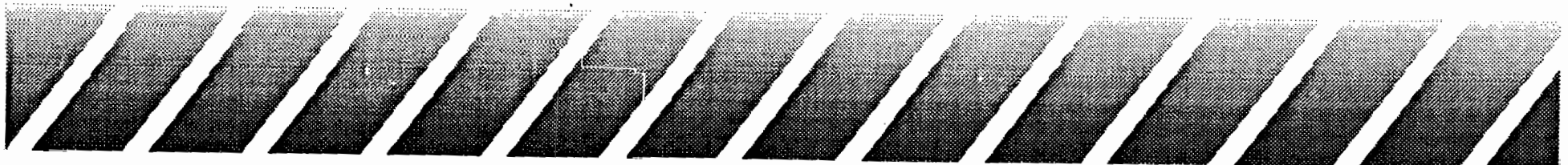


EPA/DOE

CCAP

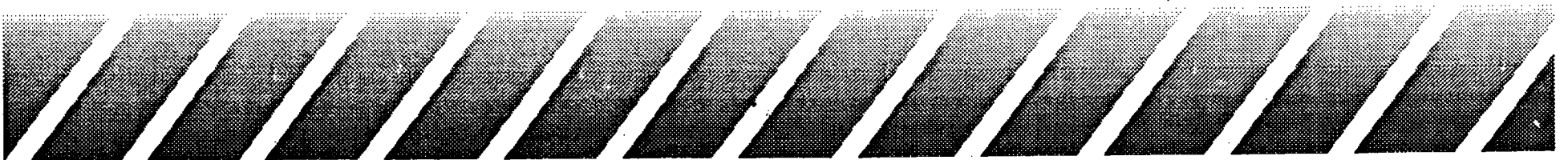
Program Tracking System

July 13, 1994



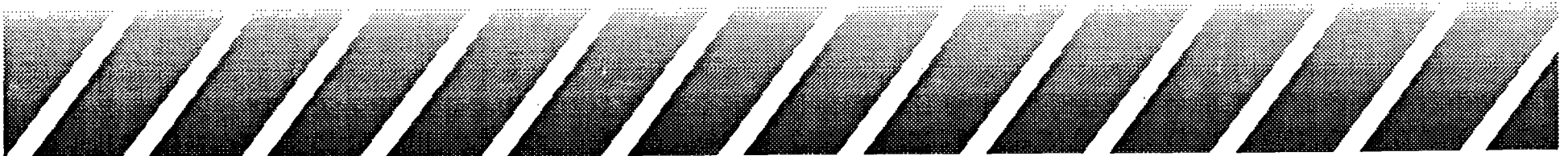
Today's Briefing

- Purpose of Program Tracking System
- Progress and Next Steps
- Summary of Approach



Purpose of Program Tracking System

- To report progress toward our CCAP commitments for decision-makers
- Identify changes in current actions and need for additional policy actions
- To support continuous program development for program managers

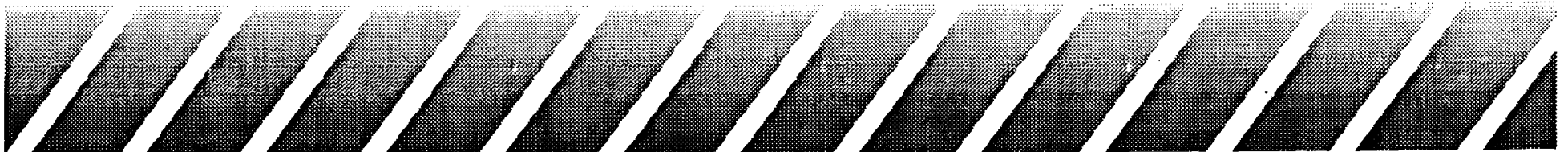


Characteristics of System

Flexible: Takes into account different needs of agencies

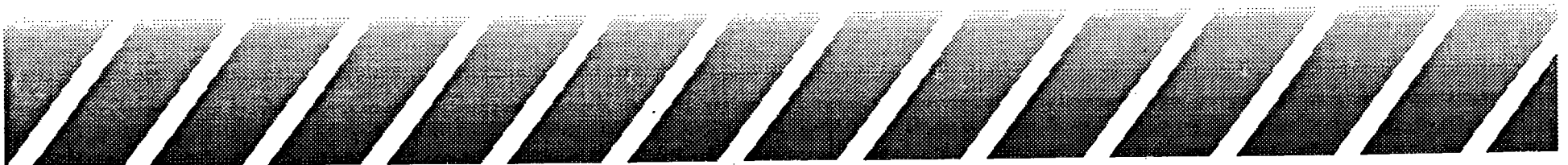
Clear: Succinctly communicate progress to decision-makers and stakeholders

User Friendly: Can be used and understood by all agencies

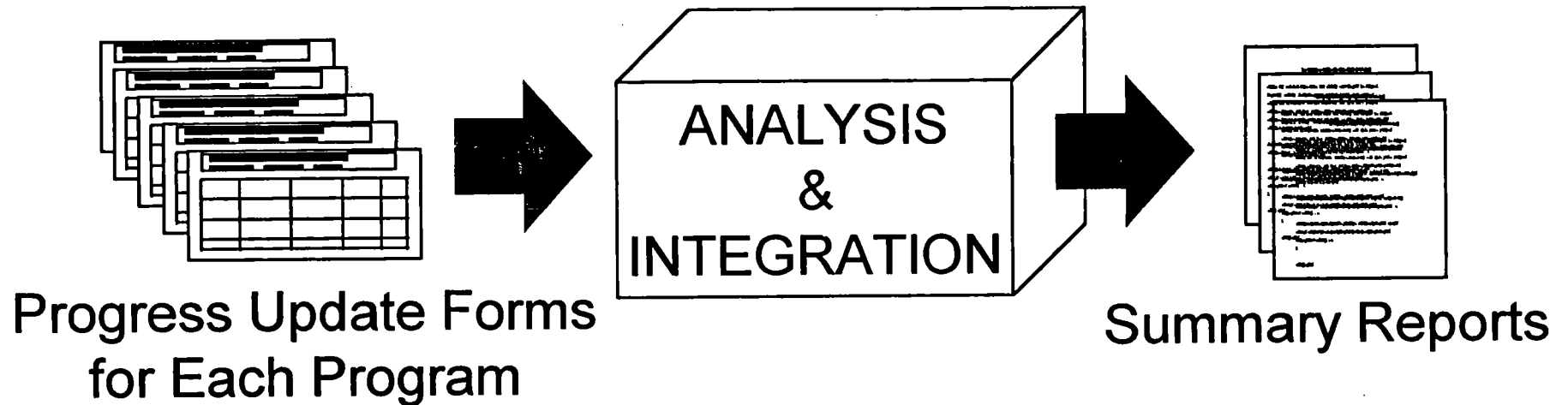


Progress and Next Steps

- May: DOE/EPA exchange and review draft reporting strategies
- June: DOE/EPA develop common approach
- July: Propose inter-agency approach
- August: Inter-agency review
- September: Inter-agency system completed
- Fall 1995: First biennial report on CCAP issued



Tracking CCAP Actions



- Program managers provide progress updates on performance using set indicators
- Agency management analyze & integrate
- Agencies prepare summary reports

Type of Action:

Action #1: U.S. EPA Energy Star Buildings

	CCAP Performance Indicators					Additional Outcome Indicators			
	<u>Cumulative Participation</u>	<u>Cumulative Upgrades</u>	<u>Cumulative Energy Saved</u>	<u>Cumulative Carbon Reduction</u>	<u>Explanation of Deviation from Performance Target</u>	<u>Other Pollution Prevented</u>	<u>Economic Reduced</u>		
	Floorspace Participants (Billion sq. ft.)	Floorspace Upgrades (Billion sq. ft.)	(Quads)	(MMTCe)		SOx NOx	Jobs Created	Energy Expenditures (Millions)	Private Project Investment (Millions)
1994 Target Actual Achievement									
1995 Target Actual Achievement									
1996 Target Actual Achievement									
1997 Target Actual Achievement									
1998 Target Actual Achievement									
1999 Target Actual Achievement									
2000 Action Plan Target									

Notes: Performance indicators are based on the information collected by CCAP programs to measure results.
 Outcome indicators will be calculated and reported using achieved levels of program performance.
 Includes both reductions in Clinton baseline and contribution to Action #1.

THE WHITE HOUSE

WASHINGTON

July 12, 1994

MEMORANDUM TO DISTRIBUTION

FROM: Wesley Warren, OEP

RE: Climate Change Managment Committee Meeting Agenda

The Climate Change Managment Committee will meet on Wednesday, July 13 at 4:00 p.m. in Room 472 of the Old Executive Office Building. The following will be the agenda for discussion at that meeting. Look forward to seeing you there.

I. CLIMATE CHANGE ACTION PLAN (CCAP) UPDATE

- Emission projections
- FY 1995 budget update
- Work on additional measures

II. UPDATE ON DEVELOPING MEASUREMENTS AND MILESTONES TO TRACK PROGRESS IN IMPLEMENTING CCAP

III. AGENCY UPDATES AND ANNOUNCEMENTS

DISTRIBUTION:

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Sue Tierney
Bob Watson

THE WHITE HOUSE

WASHINGTON

July 16, 1993

Copy to
Wen

Emm
MEMORANDUM TO THE CLIMATE CHANGE MITIGATION GROUP

FROM: Marc Chupka
cc: Katie McGinty
SUBJECT: July 20 Meeting

Attached find several documents needed for review:

- 1) Agenda for July 20 Meeting.
- 2) OSTP, DOE, and EPA memoranda on HFC issue (agenda item II).
- 3) Sinks Working Group draft option papers (agenda item III).
- 4) Additional Policy Options recommended by NEC, CEA, EPA, and DOT (agenda item V).

The cost and emission reduction estimates for the initial package of policy options has not been completed by DOE and the working groups. This will be available by the end of next week. While the delay clearly leaves us little time for needed decisions, we still have a full agenda for the meeting and we should try to reach closure on these issues. Only one member (DOT) recommended dropping options from the initial list; a few other options have been dropped, modified, aggregated, or added through consultations with working groups and DOE modelers. Assuming that the CCMG agrees to these modifications and clarifications, the analysis will provide information regarding how much emission reduction we can achieve through the proposed program. While these modifications are likely to represent consensus options, all options remain open for discussion and review at this point.

I am still working on the agenda for the next three weeks. This will be distributed at the meeting, along with a draft outline for the August document. Depending on how the modeling effort proceeds, we should be prepared to meet on Thursday, July 22 at 4:00 (OEP has reserved room 472 for every Tuesday and Thursday at 4:00 through the middle of August as may become necessary).

Distribution:

Brian Burke
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AGENDA
Climate Change Mitigation Group
July 20, 1993

I. Baseline greenhouse gas emission estimates - Abe Haspel, DOE (15 min).

Briefly describe the current baseline for GHG emissions. Updating and revision of initial estimates have slightly changed the size of the gap. Explain the status of the modeling effort for the initial selected options.

II. HFC issue.

Refer to Bob Watson (OSTP), Susan Tierney (DOE) memorandum, EPA July 2 draft emission document. OSTP, DOE, and EPA will present views (3 minutes each).

Discussion regarding whether or not to include HFC emissions in the baseline.

OPTIONS

☐ Include in baseline

☐ Do not include in baseline

III. Sinks issue.

We are trying to get a legal opinion regarding whether or not the Framework Convention on Climate Change allows CO₂ reductions through sink enhancement to "count" toward meeting the 1990 goals. Even though we are not bound by the FCCC, conformity with the Convention objectives may be a desirable feature of the August plan. This issue could impact the relative attractiveness of sink options

Discussion regarding the role of sinks in meeting the goals of the Framework Convention on Climate Change, the advisability of including sinks in light of FCCC interpretation. Discussion of role of sinks in August plan. Consideration of sinks options identified.

	Reject	Include	Hold
SK 1	☐	☐	☐
SK 2	☐	☐	☐
SK 3	☐	☐	☐
SK 4	☐	☐	☐
SK 5	☐	☐	☐
SK 6	☐	☐	☐
SK 7	☐	☐	☐
Other	☐	☐	☐

- ☐ Count sink options toward commitment
- ☐ Do not count sink options toward commitment
- ☐ Hold decision pending results of energy sector options analysis
- ☐ Hold decision pending legal interpretation of FCCC

IV. DOE voluntary commitment outreach.

DOE will describe an outreach effort where they have been soliciting electric utilities and some chemical companies to commit to returning greenhouse gases to 1990 levels by the year 2000. This voluntary effort allows the firms flexibility in choosing control strategies, and utilities have expressed interest in the program as a hedge against future mandates that may not offer the same degree of flexibility.

- ☐ Proceed with voluntary commitment solicitation as currently structured
- ☐ Alter nature of commitment
- ☐ Defer solicitation

V. Additional Options discussion.

We have received additional suggestions for including policy options from NEC, CEA, DOT and EPA (see attachments). Several of these are tougher measures that could be implemented in the case that the analysis of current options estimates that we have fallen short of our commitment. Although the analysis of current options will not be complete by the meeting, it would be useful now to assume that a significant gap remains and get an initial indication from the group regarding the desirability of these new options.

The proponents of these new options will be given 2 minutes per option to make a case for inclusion. For each option, we will ask other members for a decision:

- ☐ Accept
- ☐ Reject
- ☐ Hold for further consideration pending analysis

July 8, 1993

MEMORANDUM

TO: Interagency Analysis Team
FROM: Robert Watson, OSTP
SUBJECT: Greenhouse Gas Baseline: HFCs, PFCs, CF₄ and C₂F₆

The issue addressed in this memorandum is whether to include HFCs, PFCs, CF₄ and C₂F₆ in the baseline.

Why include HFCs, PFCs, CF₄ and C₂F₆, but not Ozone Precursors?

Logic would clearly argue for the inclusion of HFCs, PFCs, CF₄ and C₂F₆ in the baseline because there is no doubt that, on a per molecule basis, they are very strong greenhouse gases. Even though their emissions are relatively low they have high Global Warming Potential (GWP) values, hence they contribute significantly to the "enhanced" greenhouse effect. The lack of accurate GWPs for some of these gases does not support the argument to exclude them from the baseline. Laboratory studies could easily be conducted for such long-lived stable gases within a period of months to establish accurate values for the GWPs and atmospheric lifetimes for any of these gases.

The argument for excluding the oxides of nitrogen, and non-methane hydrocarbons (both ozone precursors) is readily defensible. The GWPs for these gases are much more uncertain because of an inadequate understanding of tropospheric chemical processes (even the sign of the GWP for the oxides of nitrogen is uncertain) and the impact of the emissions of these gases will be localized not global because of their short atmospheric lifetimes. The case for excluding carbon monoxide (another ozone precursor) is less clear because its GWP could be estimated with some measure of accuracy (i.e., similar to that for the indirect GWP of methane) and the impact of its emissions will at least be hemispheric.

HFCs and PFCs are Substitutes for CFCs and Halons:

Until 1990 CFCs were assumed to be powerful greenhouse gases, with very high GWP values. In 1990 IPCC estimated that the contribution of CFCs to the "enhanced" greenhouse effect during the decade of the 1980's was about 24%. However, the International Ozone Assessment in 1991 reported that CFCs may be significantly less powerful greenhouse gases because of their likely role in lower stratospheric ozone depletion. The ozone assessment reported that the net effect of the total ensemble of anthropogenic chlorine and bromine gases may be climate neutral (annually averaged over the globe), i.e., the direct greenhouse effect of the CFCs is being offset by the chlorine- and bromine-induced decrease in ozone. The current international ozone and climate assessments will, in mid-1994, provide quantitative estimates of the GWPs (direct and indirect) for each individual chlorine and bromine containing chemical.

HFCs and PFCs are partial substitutes for CFCs and Halons and, in addition, are limiting the magnitude of the substitution of CFCs by HCFCs. Therefore, it could be argued that if there is not a "greenhouse credit" for the elimination of CFCs and HCFCs, there should not be a "greenhouse" penalty for the HFC substitutes. However, the exact credit, which may be small or zero, that should be allowed for the elimination of chlorinated and brominated chemicals controlled under the Montreal Protocol cannot be accurately quantified at present.

July 8, 1993

In addition, we should remember that the Climate Change Convention specifically excludes consideration of gases controlled under the Montreal Protocol (i.e., CFCs and HCFCs). Therefore, the logical interpretation of the year 2000 non-binding Climate Change Convention goal of limiting greenhouse gas emissions to 1990 levels is that HFCs should be included but CFCs and HCFCs should be excluded. We should also remember that even the Bush Administration did not try to get a greenhouse gas credit for phasing out CFCs because the position was ridiculed by certain influential democrat Senators and all environmental groups.

HFCs and PFCs cannot be controlled under the Montreal Protocol because they are not ozone-depleting gases, hence excluding them from the U.S. baseline may send a message to industry that growth in the consumption, production and emissions of these gases is acceptable. Surely, this cannot be the message we want to send.

CF₄ and C₂F₆:

There is no basis for excluding these fully fluorinated chemicals.

JUL 16 1993

**OTHER GREENHOUSE GASES
HFC and PFC EMISSIONS****BACKGROUND**

In 1990, HFCs (hydrofluorocarbons) and PFCs (perfluorocarbons) were not used widely as commercial chemicals, but there were two main sources of emissions:

HFC-23 By-product from HCFC-22 production (2% of production)

CF₄, C₂F₆ By-product from Aluminum smelting

All three of these compounds are very long lived gases and are expected to have high GWP's.

The main use of HFCs are as replacements for the ozone depleting CFCs and HCFCs, being phased out under the Montreal Protocol and Clean Air Act Amendments of 1990. HFCs are being evaluated and introduced on the market as refrigerants, solvents, fire extinguishing agents, sterilizers and as foam blowing agents.

HFC-23 is currently a by-product emitted during HCFC-22 production. Commercial markets are being explored for HFC-23 as a halon replacement and a specialized refrigerant. Even after the phase out of HCFC-22 to protect the ozone layer, production of HCFC-22 will still continue as a polymer precursor, and therefore, there will still be emissions of HFC-23.

The attached list of atmospheric lifetimes and estimated GWP's have been taken from the 1992 IPCC report and a 1993 Science article by Susan Solomon. It is evident that the HFCs have varying atmospheric lifetimes and GWPs. For chemicals without GWP's, surrogate estimates are used based on comparable measured or expected atmospheric lifetimes.

The intentional manufacture of PFCs are expected to increase as they are introduced as alternatives to CFCs and HCFCs and additives in foam insulation processes.

PRELIMINARY BASELINE EMISSION CALCULATIONS

Preliminary estimates of HFC and PFC emissions are shown for 1990, 2000 and 2010 in the attached tables. The estimates in this analysis represent the "emissions" in those years, not the "consumption". The emissions in millions of kilograms have been converted to million metric tonnes of carbon equivalent (MMTCE).

During the June Workshops, the DuPont Co. provided HFC emission estimates of 44 MMTCE based on their expected market size of the HFCs. The DuPont HFC estimates reflect consumption=emission (see attached).

EPA 1990 HFC/PFC Emissions =	20 MMTCE
EPA 2000 HFC/PFC Emissions =	45 MMTCE
GAP	= 25 MMTCE

By 2010, the growth of HFC and PFC will grow by 60% over 2000 to 69 MMTCE.

METHODOLOGY

The estimates were developed using a set of spreadsheets that estimate HFC and PFC emissions based on:

1. Vintaging Model results related to the stock of equipment in each end use, chemical use per piece of equipment, equipment lifetimes and emission rates from each piece of equipment, and
2. Substitution scenarios that describe the chemicals that will replace CFCs, halons, and HCFCs when they are phased out under the Copenhagen Amendments to the Montreal Protocol. The scenarios are based on estimated market penetration and the number of years it may take to fully implement a substitute.

KEY ASSUMPTIONS

1. HFC-23 was assumed to be emitted as a by-product of HCFC-22 production. Its emission rate was assumed to be 2 percent of total captive and non-captive HCFC-22 production.
2. HFCs are assumed to be recycled after 1995 in all refrigeration, air conditioning and halon end uses. For the refrigeration sector, the recycling rates are assumed to be the same as those for CFCs and HCFCs.
3. The average leak rate for chillers was assumed to be approximately 5% per year (down from the current 10-15%).
4. A range of emission estimates have been estimated for automobile air conditioning, based on the assumption that they require between 0.16-0.19 kilograms of HFC-134a per year to maintain their operation. This analysis shows the estimate for 0.16 kg/year/vehicle.
5. The 1990 estimate for HFC-152a is attributed to its use as a component of a refrigerant blend (R500) used historically in dehumidifiers.
6. GWP's for HFC-227ea, HFC-356, HFC-S (a proposed HFC solvent with a 50-70 year life), and the PFCs have not yet been estimated. The GWP's used for this analysis are estimates based on existing GWP's.

ENERGY IMPACTS

This analysis does not include any impact (positive or negative) the chosen alternative has on the energy efficiency of the system or product.

KEY UNCERTAINTIES

The estimates presented are preliminary, based on various assumptions. The key uncertainties are:

1. The chosen alternatives, the substitution rate, the market penetration, and years to maximum penetration of chemicals that in some cases are not yet even on the market.
2. Leak rates and recycling rates for new equipment which in this case are based on expected system improvements.
3. The total percentage of HFC-23 from HCFC-22 production and the estimated market for HCFC-22 should be reviewed.
4. The GWP's for chemicals where there are no measurements.

**PRELIMINARY BASELINE ESTIMATES
HFCS AND PFCs
1990**

CHEMICAL	QUANTITY MILLION KG	GWP=1KG CO2 100 year	CO2 EQUIVAL MMT	MMTCE	ATM LIFE (YEAR)
HFC-23	3	10,000	30	8.1	
HFC-134A	0.5	1200	.6	0.16	15.6
HFC-152A	3.0	150	.45	0.12	1.8
SUBTOTAL HFCS				8.4	
CF4/C2F6 ALUMINUM				10.2	
TOTAL				18.6	

**PRELIMINARY BASELINE ESTIMATES
HFCs AND PFCs
2000**

CHEMICAL	QUANTITY MILLION KG	GWP=1KG CO2 100 YEAR	CO2 EQUIVAL MMT	MNTCE	ATM LIFE (YEAR)
HFC-23	3.5	10,000	35	9.5	
HFC-32	0.2	600	0.12	.03	~6
HFC-125	4.34	3400	14.8	3.9	40.5
HFC-134A	26.82	1200	32.18	8.7	15.6
HFC-143A	0.31	3800	1.1	0.3	64.2
HFC-152A	0.18	150	.03	0.01	1.8
HFC- 227EA	3.68	2900*	10.6	2.86	31
HFC-8	7.89	2900**	22.9	6.2	20-30
HFC-356	0	600**			~6
SUBTOTAL HFCs			112.58	31.5	
PFC-410	0.12	3400***	.41	0.11	2600
PFC-614	0.05	3400***	.17	0.05	3100
PFC-F	1.61	3400***	5.5	1.5	
CF4/C2F6 ALUMINUM		5100/ 10,000		10.2	< 50,000
TOTAL				43.4	

* GWP may change. Some estimates show it may be 2000.

** GWP's have not yet been calculated for these chemicals. The GWP's listed are estimates based on other chemicals.

*** This is an estimated 100 year GWP using CFC-11 as a surrogate. This class of chemical is extremely persistent and the entire global warming effect is not captured in a 100 year GWP value.

**OTHER GASES BASELINE ESTIMATES
HFCs AND PFCs
2010**

CHEMICAL	QUANTITY MILLION KG	GWP=1KG CO2	CO2 EQUIVAL MMT	MMTCE	ATM LIFE (YEAR)
HFC-23	3.8	10,000	38	10.3	
HFC-32	0.78	600	0.5	0.1	~6
HFC-125	10.3	3400	35.8	9.7	40.5
HFC-134A	62.2	1200	74.6	20	15.6
HFC-143A	1.04	3800	4	1.1	64.2
HFC-152A	2.22	150	0.3	.6	1.8
HFC-227EA	8.96	2900*	26	7	31
HFC-S	8.71	2900**	25.3	6.8	50-70
HFC-356	13.6	600**	8.2	2.2	~6
SUBTOTAL HFCs			201.7	57.8	
PFC-410	0.24	3400***	.8	0.2	2,600
PFC-614	0.05	3400***	.17	.04	3,100
PFC-F	1.72	3400***	5.8	1.6	
CF4/C2F6 ALUMINUM		5100/ 10,000		10.2	~50,000
TOTAL				69.8	

* GWP may change. Some estimates show it may be 2000.

** GWP's have not yet been calculated for these chemicals. The GWP's listed are estimates based on other chemicals.

*** This is an estimated 100 year GWP using CFC-11 as a surrogate. This class of chemical is extremely persistent and the entire global warming effect is not captured in a 100 year GWP value.

Table A2.1: Numerical estimates of the "Direct" GWP and the sign of the "Indirect" effect of several gases. The lifetimes of various non-CO₂ species follow WMO (1992) and Ramanathan et al. (1985). The carbon cycle model employed follows IPCC (1990). The 20, 100 and 500-year time horizons denote the time elapsed after a pulse release of the gas in consideration. The radiative forcing values follow IPCC (1990) and Ramanathan et al. (1985). The following important points should be noted regarding the entries in the Table:

1. The lifetimes of the various species are not as precisely known as the Table indicates; they are used for the GWP calculations primarily to ensure consistency with the lifetime values in the references cited.
2. This assessment does not calculate the "Total" (direct + indirect) GWP as did IPCC (1990). Note that CO, NMHC and NO_x are all short-lived gases having a negligible direct GWP component.
3. The indirect GWPs are uncertain but could conceivably be comparable in magnitude to the direct GWPs. Only the signs of the indirect effects are estimated here, based on current understanding. The estimates of the indirect effects for the chlorine- and bromine-containing compounds are based on the weight of evidence related to the observed lower stratospheric ozone depletion (WMO, 1992).
4. IPCC (1990) contained a typographical error for the indirect effect of methane which led to the inference of an incorrect value for its direct GWP. Also in that report, the indirect effect of NO_x was probably overestimated by a large factor (Johnson et al., 1992).

Gas	Lifetime (years)	Direct Effect for Time Horizons of			Sign of "Indirect" Effect
		20 years	100 years	500 years	
CO ₂	*	1	1	1	none **
CH ₄	10.5	35	11	4	positive
N ₂ O	132	260	270	170	uncertain
CFC-11	55	4500	3400	1400	negative
CFC-12	116	7100	7100	4100	negative
CFC-13	400	11000	13000	15000	negative
CFC-14	>300	>3500	>4500	>5300	none ***
HCFC-22	15.8	4200	1600	540	negative
CFC-113	110	4600	4500	2500	negative
CFC-114	220	6100	7000	5800	negative
CFC-115	550	5500	7000	8500	negative
CFC-116	>300	>4800	>6200	>7200	none ***
HCFC-123	1.71	330	90	30	negative
HCFC-124	6.9	1500	440	150	negative
HFC-125	40.5	5200	3400	1200	none ***
HFC-134a	15.6	3100	1200	400	none ***
HCFC-141b	10.8	1800	580	200	negative
HCFC-142b	22.4	4000	1800	620	negative
HFC-143a	64.2	4700	3800	1600	none ***
HFC-152a	1.8	530	150	49	none ***
CCl ₄	47	1800	1300	480	negative
CH ₃ CCl ₃	6.1	360	100	34	negative
CF ₃ Br	77	5600	4900	2300	negative
CHCl ₃	0.7	92	25	9	negative
CH ₂ Cl ₂	0.6	54	15	5	negative
CO	months	-	-	-	positive
NMHC	days to months	-	-	-	positive
NO _x	days	-	-	-	uncertain

* The persistence of carbon dioxide has been estimated by explicitly integrating the box-diffusion model of Siegenthaler (1983): an approximate lifetime is 120 years.

** CO₂ is not involved in chemical reactions affecting the concentrations of the radiatively active species. However, it could affect the relevant chemical reactions through its influences on the atmospheric thermal structure.

*** No currently known or negligible indirect effect.

July 6, 1993

Option: Voluntary Program with Aluminum Companies**Lead Agencies:** EPA

Description: Program will encourage aluminum production companies to reduce emissions of CF_4 and C_2F_6 to a target level. Emissions of CF_4 from aluminum smelting are estimated at approximately 3 lb per ton of aluminum produced, or 6,800 tons per year; emissions of C_2F_6 from aluminum smelting are about 680 tons per year. In total, emissions are equivalent to about 10.2 MMTC. Because the factors that cause these emissions result in an efficiency loss, a reduction in emissions will improve smelter efficiency. Emissions of CF_4 and C_2F_6 may be reduced by 30-60% through voluntary efforts of the aluminum industry, including management and technological reforms.

Implementation: Administrative with funding for 2 additional FTE. Program is in development.

Reductions: Medium to Large 3-6 MMTCE in 2000

Costs: Administrative costs of 2 additional FTE and associated program costs of \$ 1 million.

In many cases, reductions will lead to profitable increases in energy efficiency. In some cases, moderate up-front investment in new technology may be necessary.

Cost-Effectiveness: The program will be voluntary, so companies that cannot cost-effectively achieve the target reductions will likely not participate.

Stakeholders: Aluminum companies have expressed interest in working with EPA to reduce these emissions. The details of the program will be developed in close cooperation with the affected industry.

Analysis: Assuming that emissions from U.S. aluminum smelters are approximately 1.5 kg of CF_4 per ton of aluminum produced and .15 kg per ton of C_2F_6 produced, total emissions are approximately 10.2 MMTCE. It is estimated that a voluntary program could achieve 30-60% reductions by 2010. Actual emissions may be lower and therefore reductions would also be lower--the initial results of ongoing measurement programs should be available Fall 1993.

Staff Contact: Cindy Jacobs, EPA
(202) 233-9042
fax: 233-9569

**Option: Voluntary Program with Manufacturers of HCFC-22
to Eliminate HFC-23 Emissions**

Lead Agencies: EPA

Description: Voluntary program to encourage manufacturers of HCFC-22 to develop and implement better management practices or technologies to reduce HFC-23 as a by-product of HCFC-22 production. Currently 2% of the HCFC-22 production is released as HFC-23, a potent greenhouse gas.

The program will involve technology evaluation, economic analysis, MON development and management and technological reform.

Implementation: Administrative with low level of funding. Program has not yet been developed. To implement, would require 2 FTE and \$1 M additional resources to develop program and ensure voluntary compliance.

Reductions: Large ~5 MMTCE

Costs: Costs need to be carefully evaluated for process changes that will increase efficiency and reduce HFC-23 emissions or capture and destroy HFC-23.

Cost-Effectiveness:

Stakeholders: Chemical manufacturers of HCFC-22 (which are manufacturers of CFCs and other HFC alternatives).

Analysis: In preliminary stage. Necessary to develop technical and economic data, and policy analysis.

Staff Contract: Jean Lupinacci, EPA
(202) 233-9137
(202) 233-9579 fax

Option: Product Stewardship for Long Lived Chemicals

Lead Agency: EPA

Description: Program will voluntarily encourage manufacturers of long lived HFCs and PFCs not to sell to emissive uses and to ensure that users of long lived gases handle the material in an environmentally responsible manner, by capturing and destroying rather than emitting the gas to the atmosphere. Examples include written agreements between chemical manufacturers and their customers that recycling or destruction will be adhered to before they sell product to the market.

Implementation: Administrative with low level of funding. Program is being considered by industry. Additional resources would require 1 FTE and \$0.5 million.

Reductions: Low ~1 MMTCE

Costs: Costs to be analyzed includes increases from potentially higher chemical prices (from chemical companies restricting their market size) and destruction technologies and cost reductions from reusing chemicals.

Cost-Effectiveness:

Stakeholders:

Analysis:

Staff Contact: Jean Lupinacci, EPA
(202) 233-9137

Option: Narrow Use Approvals Under SNAP**Lead Agency: EPA**

Description: Under Section 612 of the Clean Air Act Amendments of 1990, EPA is required to determine the acceptability of alternatives based on an overall risk assessment. In May, EPA released a Notice of Proposed Rulemaking which proposed restricted markets and a pending unacceptable determination for the few refrigerants, solvents and halon replacements that use long-lived perfluorocarbons.

Section 612 could be used to narrow uses of HFCs or PFCs to high value uses that protect life or property. One example is to restrict the HFC with a 50-70 atmospheric lifetime to "essential or critical" uses. This would require a regulation, or can be triggered if an outside party petitions the Agency to remove a chemical from the list.

Section 612 can also be in conjunction with voluntary programs, such as product stewardship, where emissive uses of high GWP chemicals would be unacceptable.

Implementation: Administrative/regulatory with low level of funding. To use SNAP to narrow HFC and PFC uses would require additional resources (3 FTE and \$1 M) to evaluate the risks of the HFCs and PFCs against potential alternatives.

Reductions: Medium 4.5 MMTCE

Costs:

Cost-Effectiveness:

Stakeholders: Chemical manufacturers, end-users, environmentalists.

**Staff Contact: Jean Lupinacci, EPA
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Fax(202) 233-9579**



Department of Energy
Washington, DC 20585

MEMORANDUM

July 16, 1993

TO: Mark Chupka

FROM: Susan F. Tierney 

SUBJECT: How Should Halogenated Compounds be Included in the Quantitative Analysis of the August Mitigation Report?

Proposal: For each of the halogenated carbon compounds, the August U.S. Mitigation Plan should tabulate the **physical amounts** estimated to be produced and emitted for 1990 and 2000 consumption. Global Warming Potential (GWP) values should not be reported, even though the issues and uncertainties associated with the GWP of each species and the question of what is controlled under the Montreal Protocol at the time that the first National Action Plan is to be submitted should be discussed in qualitative terms. Finally, the August plan should point out that the U.S. National Action Plan in 1994 will use quantitative estimates of the changes in radiative forcing due to these gases according to the methods agreed to by the Intergovernmental Negotiating Committee.

Discussion: The U.S. Mitigation Plan will provide the Administration's management plan on how to bring annual U.S. greenhouse gas emissions back to a level by year 2000 so that the U.S. annual contribution to radiative forcing is equal or lower than the level in 1990. **The President's commitment is to bring about this physical situation, relating to emissions levels.**

The currently accepted method to determine annual relative radiative forcing contributed by different species of greenhouse gases is to multiply the year's estimated emissions of each gas by the gas' global warming potential (GWP). The total radiative forcing budget is the sum of the results for all the gases.

- o The GWP for chlorofluorocarbons (CFC), hydrochlorofluorocarbons (HCFC), and some of their substitutes are not well defined at this time. However, as pointed out in Bob Watson's July 8 memorandum, all of these GWP will be more fully developed by mid-1994.

- o The changes in production of HFC, FC and PFC since 1990 will be highly dependent on the phase-out schedules for the compounds expected to be controlled under the Montreal Protocol. Because of this close relationship, the change in annual radiative forcing due to the substitutes needs to be examined relative to a 1990 radiative forcing baseline that includes the contribution of the compounds that are being replaced.

The 1991-2 international assessments for the Montreal Protocol and the Intergovernmental Panel on Climate Change (IPCC) pointed out that using the direct GWP only for the fully halogenated carbon compounds and the HCFC provides an unacceptable overcounting of the total GWP (because these compounds cause an indirect effect that partially or fully offsets their direct GWP).

- o In the case of the fully halogenated compounds, the offset appears to be close to equal to the direct effect but, under the present uncertainty, **the combination of the two effects could still result in a GWP that is several hundred times that of carbon dioxide.**
- o For HCFC, the direct GWP might be offset by 25 to 50 percent, leaving a substantial total GWP.
- o Similarly, there is uncertainty about the GWP for several of the recently identified substitutes, because their direct GWP have never been estimated using the models used to estimate the other greenhouse gases.

Thus, any calculations for setting the total contribution of this set of gases for the 1990 baseline or for year 2000 will contain substantial uncertainty as compared to GWP estimates for carbon dioxide, methane, or nitrous oxides for given levels of emissions.

- o For example, if the 1994 definition of total GWP for CFC is 10 percent of the direct values and the total GWP for HCFC is 75 percent, then the 1990 baseline for these gases would be about 60 MMTC, considerably more than the GWP increment in 2000 now estimated for the substitutes for CFC and HCFC.

What we can estimate at this time is the annual quantities of these chemicals in 1990 and 2000 for each species that will be used, and the level of emissions, measured in pounds, for such uses. We do not know at this time even whether the HCFC will be controlled by the version of the Montreal Protocol that will be in place when the Climate Convention enters into force.

However, given that the IPCC provides improved GWP values in mid-1994, we will have these uncertainties resolved (or significantly reduced) by the time the

United States is required to provide the Climate Convention Parties the first U. S. National Action Plan later in 1994.

We must recognize that the proposals of both the July 8 Watson memorandum and this memorandum recognize that is not possible by August to account for all U.S. greenhouse gas emissions and their radiative forcing in either years 1990 or 2000. This proposal would:

- o Clearly state that uncertainties do not provide sufficient information for showing radiative changes in the August plan due to the phase-out of fully halogenated carbon compounds and the associated use of substitutes that are greenhouse gases.
- o Provide estimates of quantities of use and associated emissions of all of these gases for 1990 and 2000 plus give a qualitative discussion of the uncertainties associated with the GWP of these gases.
- o Indicate that the international science assessments will allow resolution of this problem, **for the United States and other countries**, by the time in 1994 when the first set of national action plans are to be submitted to the Climate Convention Parties.

Sinks Policy Options
for
Global Climate Change

July 15, 1993

Attached are summaries of the policy options currently under consideration from the Sinks Working Group. This compilation is an abbreviated version of the 1-2 page descriptions which provide additional information regarding implementation, cost effectiveness and the likely responses of affected stakeholders. The analysis will be finalized by tomorrow, July 16, so all numbers in this document should be regarded as preliminary. The alphanumeric code follows the same convention as for options from the other working groups (SK - Sinks). It should be noted that the numbering does not represent any ordering/preferences by our office or by the working group.

SINKS OPTIONS

SK1 Reduced timber harvest on National Forest land

Annual timber sales volumes for National Forests averaged 10-11 billion board feet through the 1980s. Beginning in 1990, the timber sales program began a decline which is continuing and may amount to 5-6 billion board feet. The land on National Forests is being restricted from timber harvest to protect habitat for threatened and endangered species and for other reasons. However, increase harvesting on private lands will largely offset the reduction in National Forest harvest. This offset plus increased harvest from Canada will almost completely replace the planned Federal harvest reductions, and the net effect on carbon sequestration is minimal (and should perhaps be reflected in the basecase projection of carbon uptake). Some net gain in carbon sequestration may occur due to any inherent differences between the characteristics of National Forest land and private land. Higher prices for timber products will increase the use of plastic, metals and wood-based substitutes that generally require higher energy use in their manufacture.

MMTs of reductions:	18-36 MMT/year in 2000; 27-41 MMT/year in 2010 (gross uptake increase from reduced Federal harvest, before offsets)
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Costs:	No additional cost to the Federal government because programs are implemented for reasons other than carbon sequestration.
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SK2 Accelerated tree planting on non-industrial private lands

In 1992, 2.5 million acres of trees were planted in the United States. Under this proposal, tree planting would be increased to 5 million acres per year over the next five years and then maintained at that level for the next five years. The additional increment of 2.5 million acres will be phased-in according to a schedule that achieves 10 percent in the first year, and then 20 percent, 40 percent, 80 percent and finally 100 percent in the last four years. The record acreage planted in one year is 3.4 million acres in 1988; the proposed schedule should allow for the orderly expansion of nursery production and other required program infrastructure, implying that 5 million acres is feasible.

The tree planting program will have three components: planting on forest land and idled agriculture land, planting on economically marginal and environmentally-sensitive pasture lands, and planting on economically marginal and environmentally-sensitive croplands. The proposed 10-year program, assuming full implementation of all three components, could capture 4.3 MMT of carbon in the year 2000 and 28.5 MMT in the year 2010. More importantly, the carbon capture does not peak until the year 2017 when the rate of uptake reaches 48 MMT per year. Over the ten year program, a total of 18.75 million

acres would be planted beyond the baseline projection. This is not a sufficient amount to adversely affect food prices and probably would have a relatively minimal effect on timber values.

MMTs of reductions:	4.3 MMT/year in 2000
Costs:	\$419 million/year by 2000 (Federal costs only, but have numbers separately for each components; cost-effectiveness ranges from \$3.50 to \$15.50 per metric ton) Cost peaks in year 10 (assumed 2004) at \$695 million.

SK3 Increased recycling of paper and paperboard

This proposal would take credit for increases in carbon sequestration from actions by the states and the paper and paperboard industries to increase recycling. The American Paper Institute has already announced a goal of 40 percent recovery for recycling by 1995, a proposed increase of 8 percent over 1989 figures. Billions of dollars have been invested in recycling facilities, and there is every expectation that the goal will be achieved. An additional feature of the program is that it reduces material going to landfills which in turn reduces methane emissions from landfills.

The recovered paper utilization rate (the ratio of recovered paper consumption to production) measures the rate of paper recycling. The recovered paper utilization rate was 26 percent in 1989 and is projected to reach 38 percent by 2000. Although there will be substantial increases in recycling within any Federal action, a national commitment to waste reduction could increase the recovered paper utilization rate to 45 percent by 2000 and 60 percent by 2020. The national commitment could be met through education, increased research on paper recycling technology, investment tax credits, higher disposal fees and more efficient use of paper and paperboard. However, the emissions reduction is projected to be achieved at little direct cost to the Federal government beyond what is already being spent on research. Analysis is underway to determine the impact of increased recycling on baseline carbon uptake estimates and the carbon reduction available from increasing recycling beyond the baseline trends.

MMTs of reductions:	13-17 MMT/year in 2000 (compared to 1989 recycling levels); 15-19 MMT/year in 2010
Costs:	Not applicable

SK4 Conservation practices

Conservation practices include conservation tilling, which leaves a large portion of the previous crop's residues on the soil surface. Another practice is winter cover cropping, which provides carbon benefits by incorporating additional crop biomass into the soil and prevents erosion. Farmers participating in the commodity support programs are already subject to the cross-compliance provisions of the 1990 Food, Agriculture, Conservation and Trade Act, applicable to highly erodible land. This option would extend cross-compliance to all farm program land. The effect that this may have on soil organic carbon (SOC) over time depends on the expected expansion of conservation tillage practice over tilled area, the current levels of SOC and expected increase in SOC.

MMTs of reductions:	1-3 MMT/year in 2000; 2-4 MMT/year in 2010 (conservative)
Costs:	This could be a no-cost option to the extent that conservation tillage practices are instituted for soil erosion control

SK5 Conservation Reserve Program

This program was designed to remove highly erodible lands from cropping in an effort to reduce erosion and crop over-production. Land is enrolled for a period of 10 years and must be put in permanent cover (grasses, legumes, trees, etc.). Carbon sequestration comes from increased soil organic content or tree growth. In 1995, CRP contracts will begin to expire unless authorization is continued in the Farm Bill. This option would either extend or modify the CRP in the 1995 Farm Bill. Several modifications are listed in the option summary, some of which could reduce the cost of the program. (NB: Eighty percent of the carbon reductions come from tree planting, so it should be verified that there is no double-counting with the more general tree planting option.)

MMTs of reductions:	5 MMT/year in 2000; 10 MMT/year in 2010
Costs:	\$2 billion/year minus \$1.5 billion/year from savings in farm program outlays imply cost/ton of \$100/MMTC

SK6 Trading set asides (Draft)

This option provides for trading of set aside credits under the USDA's Agricultural Conservation Program (ACP) to provide farmers with 100% prime land the opportunity to utilize all their land for production by trading or purchasing the credits from farms with large areas of less productive or more environmentally sensitive land. Implementation is via the 1990 Food, Agriculture, Conservation and Trade Act.

MMTs of reductions: ?
Costs: ?

SK7 Timber Stand Improvements

Timberland productivity varies greatly according to climate, site quality, management practices, tree species, etc. Timber Stand Improvement (TSI) involves active application of silviculture and other forest management practices to improve the quality and/or quantity of merchantable timber. Based on net annual carbon growth, numbers can be derived that illustrate gains in carbon sequestration that can be derived from increases in net annual timber growth. Since most of the techniques involved in TSI produce reductions in growth of non-timber biomass, there appears to be no net benefit in carbon sequestration to be derived from TSI in the short term. However, Ecosystem Management technologies now being developed and demonstrated have the potential of increasing or stabilizing total biomass growth of U.S. forests. No quantifiable results are currently available; a focused effort would take 12 to 18 months to yield such results.

MMTs of reductions: Minimal to none

Costs: Modest increase (\$10 million/year) in research and technology transfer costs

Stimulate use of high quality forest products (New)

There are several benefits to stimulating the use of high quality wood products. These products, especially structural products, will sequester carbon for the period that they do not rot. In addition, they have a high potential to decrease carbon emissions when used as substitutes for more polluting products (steel, aluminum, brick, concrete, plastic). Thirdly, market expansion for higher quality products will mitigate timber industry concerns that increased tree planting will reduce the value of present forests by increasing the supply of wood. Also, demand for high quality wood will increase rotation time, further reducing carbon emissions. Creative, new uses for wood (e.g. ceramic impregnation of wood to increase hardness and rigidity) can be developed with increased R&D, as well as increased emphasis on high quality traditional uses.

MMTs of reductions: ?

Costs: Probably low

Expanded use of forest products

This seems to duplicate an earlier option on increased use of high quality wood products. However, more precise numbers on emissions reductions and costs are available. The goal would be to increase use of solid wood and wood fiber by 20 percent by 2000.

MMTs of reductions: 10-16 MMT/year in 2000; 18-26 MMT/year in 2010
(compared with 1992)

Costs: \$25 million/year for RD&D

Sink Working Group

Policy Options

Climate Change Mitigation Group

July 20

Date: July 8, 1993

ACCELERATED TREE PLANTING ON NONINDUSTRIAL PRIVATE LANDS

Description

In 1992, 2.5 million acres of trees were planted in the United States. Under this proposal, tree planting would be increased to 5 million acres per year over the next five years and then maintained at that level for the next five years. This analysis could readily be extended to maintain tree planting at the expanded level until desired climate change mitigation objectives are achieved.

Based on the pattern of accelerated tree planting under the Soil Bank and the Conservation Reserve Program, it is anticipated that the first increment of 2.5 million acres of tree planting above the current level could be achieved in 5 years according to the following schedule:

<u>Year</u>	<u>Additional Acres of Planting</u>
1	250,000
2	500,000
3	1,000,000
4	2,000,000
5 through year 10	2,500,000

This schedule reflects that 10 percent of the additional acreage would be planted in the first year, 20 percent in the second year, 40 percent in the third year, 30 percent in the fourth year, and 100 percent (2.5 million acres) in the fifth and for five years thereafter. This phase-in is fast but achievable. Over the entire ten year program a total of 18.75 additional acres would be planted.

In 1988, a record high number of 3.4 million acres of trees were planted in the U.S. using 2.3 billion seedlings. That level of tree planting, which was prompted by high levels of tree planting under the Conservation Reserve Program, stressed the production capacities of tree nurseries, especially in the South, where many went to fence-to-fence seedling production and temporarily suspended good nursery practices, such as rotation (resting, fumigation and enhancement) of seedling beds. Shortages of seedlings did occur in some areas of the country. Under the proposed schedule, the 3.4 million acre level would not be reached until the third year (2.5 million acre base plus 1 million increase), allowing for the orderly expansion of nursery production and other required program infrastructure, including the expansion of foresters (public and private) to provide on-the-ground technical assistance to private landowners.

Components of Tree Planting Program

I. Tree Planting on Forest Land and Idled (Inactive) Agricultural Land

Moulton (USFS) and Richards (PNL)

Goal: Increase to one million acres annually in five years. This is an increase of about 700,000 acres over current program levels.

USDA would provide: Technical assistance and up to 75 percent cost sharing for tree planting, including necessary site preparation. There would be no rental payments for this program component.

Contract period: Participants would be required to protect and maintain the planting for a period of 10 years. This is standard for all current USDA forestry cost share programs.

Delivery system: USDA Forest Service-State Foresters

Federal cost: See attached table and graph.

Carbon sequestered and cost per ton: See attached table and graph, \$3.50 per metric ton of carbon.

Comments: (1) In 1992, 161,767 acres were planted to tree under the Forestry Incentives Program for timber production, 119,223 under the Agricultural Conservation Program to meet soil and water conservation objectives, and 3,636 acres under the multi-resources Stewardship Incentive Program. These are cost share programs that do not provided rental payments to participants. In the past, the size of the program has been constrained by appropriations, not by availability of eligible land.

(2) The proposed Presidential USDA Tree Initiative (Trees for the Future) is also a cost share program, and it would be counted in achieving the goal for this component. The Forestry Incentives Program is scheduled to terminate in 1995 under the terms of the 1990 Farm Bill, and would require an equivalent offset to maintain baseline accomplishments.

(3) It is anticipated that two-thirds of the planting would occur on existing but nonstocked or understocked forest land and one-third on idled agricultural lands.

II. Tree Planting on Economically Marginal and Environmentally-Sensitive Pasture Lands

Goal: 900,000 additional acres of tree planting annually.

USDA would provide: Technical assistance, 50 percent cost sharing to plant trees, and annual rental payments for the contract period.

Suggested contract period: Ten years for softwood tree species in the South, 15 years for softwood species elsewhere, and 15 years for hardwood species in all regions. Contract periods of 15 years are suggested for hardwoods and for softwoods in the North and West because of higher planting costs and comparatively longer period of growth before intermediate products can be harvested, both of which are disincentives to landowner participation.

Delivery system: USDA Forest Service-State Foresters

Federal cost: See attached table and graph.

Carbon sequestered: See attached table and graph.

Carbon cost per ton: \$11.80 per metric ton of carbon.

Comments: (1) There are currently no federal programs specifically designed to encourage tree planting on pasture lands, i.e., the Conservation Reserve Program is limited to certain croplands, while cost share-type programs (FIP, ACP) do not offer sufficient incentive for farmers to convert income-producing pasture land—even though environmentally sensitive—to trees.

(2) Pasture land tree planting is less costly than cropland planting, as rental rates for pastureland usually average one-third to one-half of those for croplands in the same geographic area.

(3) To qualify for this program component, a farmer (producer) would have to document a history of active pasture use, such as use for this purpose in three of the five prior years ending with 1993. This would preclude interested parties from grazing inactive agricultural land in an effort to qualify for this rental payments rather than for only cost share assistance under Program Component I.

III. Tree Planting on Economically Marginal and Environmentally-Sensitive Croplands

Goal: 900,000 additional acres of tree planting

USDA would provide: Technical assistance to plant trees, 50 percent cost sharing for tree planting and annual rental payments during the contract period.

Suggested contract period: Ten years for softwood tree species in the South, 15 years for softwood species elsewhere, and 15 years for hardwood species in all regions. Contract periods of 15 years are suggested for hardwoods and for softwoods in the North and West because of higher planting costs and comparatively longer period of growth before intermediate products can be harvested, both of which are disincentives to landowner participation.

Delivery system: USDA Forest Service-State Foresters

Federal cost: See attached table and graph.

Carbon sequestered and cost per ton: See attached table and graph. \$15.50 per metric ton of carbon.

Comments: (1) This program would expand the existing Conservation Reserve Program concept by relaxing the constraints on the types of land that are eligible. By broadening the definition of eligible land to include all environmentally sensitive and economically marginal cropland, the size of the eligible land base is approximately doubled. Rental costs for this option may be lower than those for the CRP because of the increased competition from a larger pool of applicants and a smaller initial program size. (2) Conversion of CRP acres in tree growing area that are now in grass cover are a possible source of lands for this program component.

The proposed 10-year program could capture 4.3 million metric tons in the year 2000 and 28.5 million metric tons in the year 2010. More important, the long term implications are even greater. The carbon capture rate doesn't peak until the year 2017 when the rate of uptake reaches 48 million metric tons per year. This represents a doubling of current tree planting rates in the U.S. which is both technical feasible and socially acceptable. A total of 18.75 million acres would be planted beyond the baseline projection of 2.5 million acres per year. This is not a sufficient amount to adversely affect food prices, and probably would have a relatively minimal effect on timber values.

(1) The costs of carbon sequestration of \$3.50 to \$15.5 per metric ton in this report are significantly lower than the \$5.25 to \$43.33 per short ton reported by Moulton and Richards (1990) and \$8 to \$60 per short ton reported by Richards, Moulton, and Birdsey (1993). These cost, however, are logically consistent; they primarily reflect different accounting stances and points in time. The major reason for the lower costs in the current proposal is that it only includes the Federal costs of the proposed program--which, for example, are limited to a portion of the costs of tree planting and to rental payments (where applicable) for 10 to 15 years, not 40 years or 160 years as assumed in the two referenced reports, respectively. The privately-borne costs in the current proposal would be compensated by the value of the timber which accrues to the landowners. Further, the Moulton and Richards report was extended to much higher levels to demonstrate both the upper limit on potential carbon sequestration and the principle of increasing marginal and total costs associated with increased program size.

107-11702

Percent completion: 0.1 0.2 0.4 0.8 1.0

Social Discount Rate: 0.05

Target Increment by option (acres)

Option 1: Expend FIP/SIP/ACP: 700000

Option 2: CRP for pastureland: 900000

Option 3: Liberal CRP-like program: 900000

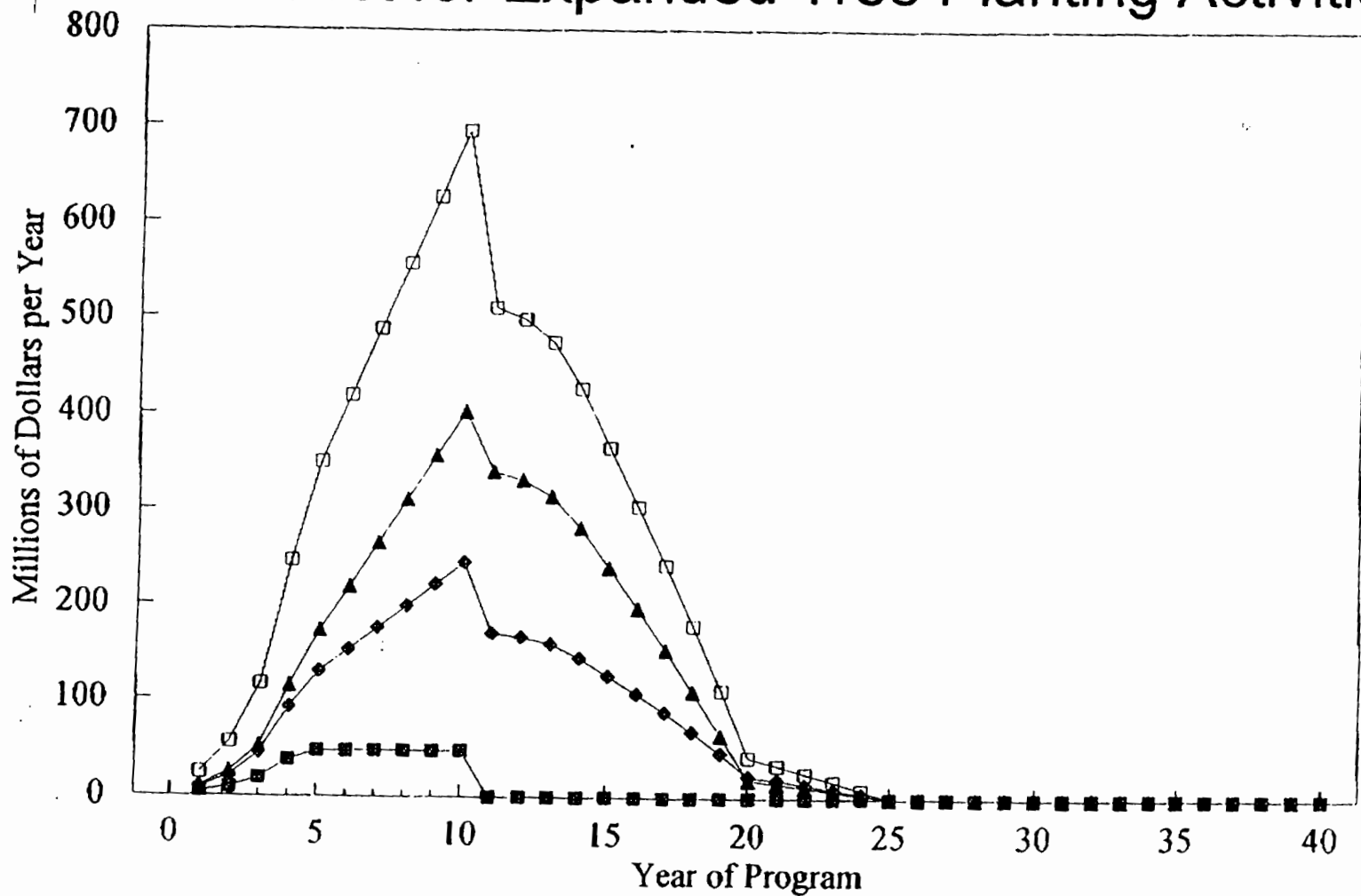
Total: 2500000

Federal Cost and Increment in Carbon Uptake by Year

Year	Option 1		Option 2		Option 3		Total	
	Carbon (Millions of MT)	Federal Cost (Millions of \$)	Carbon (Millions of MT)	Federal Cost (Millions of \$)	Carbon (Millions of MT)	Federal Cost (Millions of \$)	Carbon (Millions of MT)	Federal Cost (Millions of \$)
0								
1	0.009217868	4.76	0.01846862	9.5355	0.02239196	10.3995	0.05007845	24.695
2	0.036871464	9.52	0.0738745	21.3615	0.08956786	25.3935	0.20031382	56.275
3	0.101396526	19.04	0.20315487	45.0135	0.2463116	52.5735	0.550863	116.627
4	0.239664515	38.08	0.48018423	92.3175	0.58219108	115.3575	1.30203981	245.755
5	0.470111164	47.6	0.94189984	129.7125	1.14199016	172.9125	2.55400116	350.225
6	0.788791084	47.6	1.57106968	152.6175	1.90736588	218.8575	4.26722663	419.075
7	1.191758885	47.6	2.35046177	175.5225	2.85997513	264.8025	6.40219578	487.925
8	1.687739257	47.6	3.2456121	198.4275	3.96313187	310.7475	8.89848323	556.775
9	2.25264291	47.6	4.18759267	221.3325	5.14346393	358.6925	11.5836995	625.625
10	2.878579065	47.6	5.14193948	244.2375	6.36428524	402.6375	14.3848038	694.475
11	3.479173918	0	5.94458585	169.965	7.43741471	340.3755	16.8611745	510.3405
12	4.040237638	0	6.61615134	166.32	8.39859088	331.9515	19.0549789	498.2715
13	4.581687671	0	7.19787511	159.03	9.31929088	315.1035	21.0988537	474.1335
14	5.126743443	0	7.77223541	144.45	10.34246889	281.4075	23.2414478	425.8575
15	5.687014665	0	8.38047137	126.225	11.5396021	239.2875	25.6070881	365.5125
16	6.265710227	0	9.17809431	107.532	13.0394583	196.785	28.5132628	304.317
17	6.848300429	0	10.1482955	88.371	14.787375	153.9	31.884971	242.271
18	7.628536827	0	11.2574576	68.274	16.6740272	110.25	35.5800217	178.524
19	8.294922534	0	12.4383459	46.305	18.4807648	65.07	39.2140331	111.375
20	8.829209108	0	13.6573428	22.5	20.0962627	19.125	42.6848145	41.625
21	9.459308593	0	14.6981519	18.72	21.1713027	15.3	45.3267632	34.02
22	9.867700183	0	15.5426722	14.04	21.7020523	11.475	47.1124247	25.515
23	10.13849414	0	16.1727022	9.36	21.894846	7.65	48.0060423	17.01
24	10.23991097	0	16.5378381	4.68	21.1583533	3.825	47.9361025	8.505
25	10.15606094	0	16.6138785	0	20.0969089	0	46.8668483	0
26	9.896632112	0	16.5742732	0	19.0872754	0	45.6381807	0
27	9.757305953	0	16.4243858	0	18.0795902	0	44.2612817	0
28	9.445822298	0	16.1749419	0	17.154128	0	42.7748923	0
29	9.077660833	0	15.8473948	0	16.3314387	0	41.2584943	0
30	8.680561399	0	15.4524705	0	15.631797	0	39.7448289	0
31	8.279978079	0	15.1042715	0	15.0288241	0	38.4130736	0
32	7.937676905	0	14.7958913	0	14.5178146	0	37.2513828	0
33	7.629291682	0	14.5135172	0	14.0893577	0	36.2321666	0
34	7.346090029	0	14.2295237	0	13.724632	0	35.3002457	0
35	7.083705751	0	13.9300098	0	13.4142267	0	34.4280305	0
36	6.803905108	0	13.5742587	0	13.0712937	0	33.4494575	0
37	6.509025468	0	13.1746558	0	12.7103589	0	32.3940402	0
38	6.207896021	0	12.7585897	0	12.3604744	0	31.32496	0
39	5.918175147	0	12.3706608	0	12.079744	0	30.3685798	0
40	5.648692035	0	12.042169	0	11.8972199	0	29.5880809	0

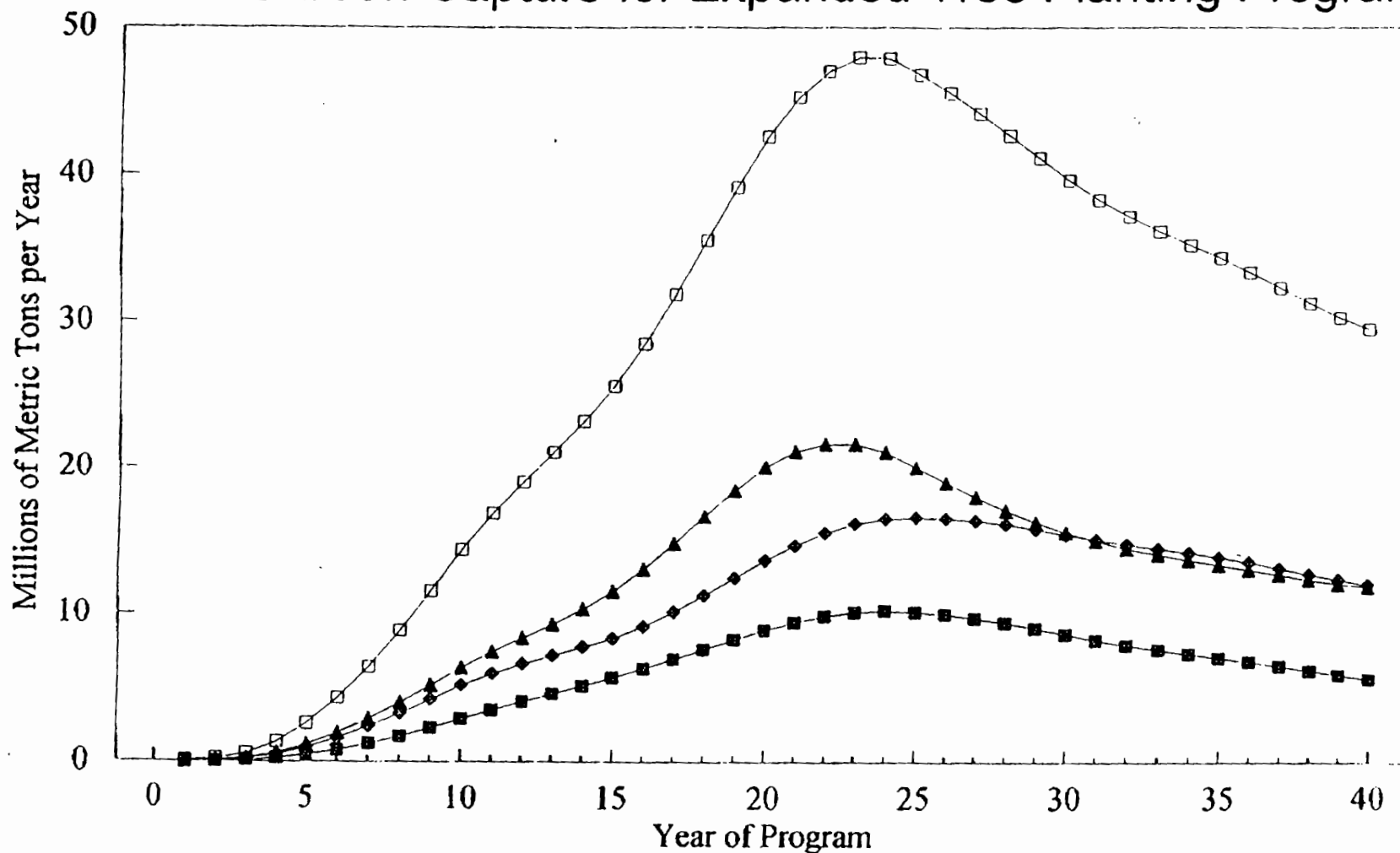
Policy Options for Mitigation Plan: Moulton (USFS) and Richards (PNL)

Federal Cost for Expanded Tree Planting Activities



■ Option 1 ◆ Option 2 ▲ Option 3 □ Total All Options
 If the program starts in 1994, year 6 corresponds to 2000

Annual Carbon Capture for Expanded Tree Planting Program



—■— Option 1
—◆— Option 2
—▲— Option 3
—□— Total All Options

If the program starts in 1994, year 6 corresponds to 2000

Policy Options for Mitigation Plan: Moulton (USFS) and Richards (PNL)

MEMORANDUM

SUBJECT: Harvesting/retention of old-growth forests
TO: Sinks Working Group
FROM: Steven Winnett, EPA, ph. 202-260-6923

Harvesting of old-growth forests appears to have negative implications for carbon storage, even in a highly productive ecosystem like the Douglas fir forests of the Pacific Northwest. In a paper in Science in 1990, Harmon, Farrell and Franklin show that harvesting an old-growth forest and replanting the acreage with vigorously growing young growth leads to a net loss in carbon storage. This is true despite putting as much wood into long-term products, such as housing lumber, as possible. In fact, this analysis is conservative in that it assumes there is no loss of carbon storage in detritus from repeated harvesting, which is not the case.

It is true that young forests sequester carbon more rapidly per unit area than old-growth forests, but this ignores the question of overall storage and how much carbon is in the atmosphere. The analysis indicates that conversion of 5 million acres of old-growth to younger plantations in the Pacific Northwest in the last 100 years as added 1.5-1.8 billion tons carbon to the atmosphere.

The analysis suggests that on-site carbon storage under harvesting and storage in long-term products would not approach the storage capacity of the old-growth forest for at least 200 years. An additional analysis by Oliver, Kershaw and Hinkley (1991) supports the general findings of the Harmon et al. paper. In studies of certain southern forest types, Birdsey (1991) found that retaining mature forest stands generally confers more carbon benefits than harvesting and replanting, with carbon renewal not equaling loss from harvest until sometime in the fourth (40-year) rotation, or at about 130 years. Harvesting of old-growth forests in less productive regions, such as the old-growth ponderosa pine forests of the Rocky Mountains, is likely to be even more deleterious to carbon storage.

From the perspective of biodiversity, the benefits of preserving old-growth forest are undisputed. Harvesting old growth also reduces habitat for endangered species like marbled murrelet, northern spotted owl, and red-cockaded woodpecker.

TITLE: Reduced timber harvests on National Forest land

DESCRIPTION: Annual timber sales volumes for National Forests averaged 10-11 billion board feet through the 1980's. Beginning in 1990, the timber sales program began a decline which is continuing and may amount to 5-6 billion board feet. More and more area on National Forests is being restricted from timber harvest to protect habitat for threatened and endangered species and for protection of other values. These actions will have as an effect the sequestration of carbon.

EMISSIONS REDUCTION FROM BASE:

-in 2000—18-36 MMT-C/Y

-in 2010—28-56 MMT-C/Y

The gain shown from a reduction in timber harvest on National Forest lands will be offset almost entirely by increased harvest on private lands in the United States. Any net gain in carbon sequestration will be due to any inherent differences between the characteristics of National Forest land versus private land. Higher prices for timber products will increase the use of plastics, metals, and wood-based substitutes that generally require higher energy use in their manufacture.

COMPLIANCE COST: Not applicable.

FEDERAL BUDGET COST: There will be no additional cost to the Federal government for any net gain in carbon sequestration--The action has been taken for other reasons.

COST-EFFECTIVENESS: There are no additional costs to exercise this option, but the gains in carbon sequestration are marginal at best.

INTERACTION WITH OTHER OPTIONS: The reduction in harvest on National Forests is already occurring for reasons other than carbon sequestration. Offsets to the reduction in National Forest harvest will be substantial on private lands. These offsets plus increased harvest from Canada almost completely replace the reduction in timber harvest on National Forest lands and mean that the net effect on carbon sequestration is minimal.

AFFECTED STAKEHOLDERS:

Reducing National Forest harvests will have local and regional impacts on timber-dependent communities. It will be disruptive to thousands of people with jobs dependent on National Forest timber harvest. However, the reduction in harvest creates opportunities for owners of private timberland and may create opportunities for recreational and other uses of National Forests. More

lumber will be imported from Canada and increase the balance of payments deficit by some \$4 billion. These and other stakeholders will be so affected without regard to considerations of carbon sequestration, however.

STAFF CONTACT:

DAVID DARR Forest Service Telephone:202-205-1052
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TITLE: Increased recycling of paper and paperboard

DESCRIPTION: The CCM Plan could take credit for increases in carbon sequestration from actions by the states and the paper and paperboard industries to increase recycling. Increased recycling will slow the increase in wood consumption, thereby leading to a build-up in timber inventories as compared with no increase in recycling. There will be substantial increases in recycling without any Federal action. Recycling could be increased even more by Federal actions.

The American Paper Institute in 1990 announced a national goal of 40 percent recovery for recycling by 1995. Establishment of this goal by the industry reflected recognition of opportunities and pressures from state and local governments to keep paper and paperboard out of landfills. Billions of dollars have been invested in recycling facilities and there is every expectation that the goal will be achieved. The recovery rate was about 32 percent in 1989.

The recovered paper utilization rate measures the rate of paper recycling in the United States. It is the ratio of recovered paper consumption in paper and board mills to paper and board production. Recovered paper and paperboard that is not recycled is exported, composted, or burned. The recovered paper utilization rate was 26 percent in 1989 and is projected to reach 38 percent by 2000. After the turn of the century, it varies between 40 and 45 percent. Although the recovered paper utilization rate stays relatively stable, the volume of material recycled increases because U.S. paper and paperboard consumption is expected to increase. These trends assume a modest increase in funding for recycling. Initiation of research on solid wood recycling and recycling of wood fiber into composite products may lead to further opportunities for carbon sequestration.

If there were to be a national commitment for waste reduction through education, increased research on paper recycling technology, investment tax credits, higher disposal fees, and more efficient use of paper and paperboard, the recovered paper utilization rate might reach 45 percent by 2000 and 60 percent by 2020. Some of the increase in the rate would be due to reduced production of paper and paperboard rather than increased recovery of volume. Achievement of this goal is problematic unless considered within an over-all materials management policy.

EMISSIONS REDUCTION FROM BASE:

MMT-C/y

Compared with 1989, net emissions would be reduced by:

18-36 MMT in 2000

and 28-56 MMT in 2010.

COMPLIANCE COST: Not applicable

FEDERAL BUDGET COST: To date, recycling has increased through the actions of state and local governments and voluntary actions of the industry. Federal action has been largely through research to make recycling possible. This research is expected to continue and expand modestly. The emissions reduction is projected to be achieved at no other direct cost to the Federal government.

COST-EFFECTIVENESS: The option is highly cost effective compared with other options requiring a large Federal investment. Furthermore, recycling paper reduces material going to landfills which in turn reduces methane emissions from landfills as well. Some 13-30 percent of all carbon in paper is emitted as methane from landfills and 13-30 percent is emitted as carbon dioxide.

(6) Carbon sequestration is an added benefit from recycling that is occurring mainly because of concerns over landfills. Much of the carbon sequestration occurs through reductions in the rate of increase in timber harvest that would have occurred in the absence of recycling. Timber inventories thus increase faster with recycling than without the projected increase in recycling.

Affected Stakeholders

Increased recycling is generally favored by the public at large. Some private forest land owners see recycling as a market threat for round pulpwood markets.
STAFF CONTACT

DAVID DARR Forest Service Telephone: 202-205-1052
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TITLE: Conservation Practices

DESCRIPTION: There is a long-term trend toward adoption of conservation practices among US farmers. This has been aided by the cross-compliance provisions in the 1985 and 1990 farm bills which require farmers that have highly erodible land enrolled in farm programs to apply an approved soil conservation system whenever it is planted to a crop. The use of conservation tillage in the US is projected to increase from the current level of 27% of total cropland to about 76% in 2030.

Conservation practices include conservation tillage, which leaves a large portion of the previous crop's residues on the soil surface, increasing the amount of organic carbon in agricultural soils. Another practice is winter cover cropping, which provides carbon benefits by incorporating additional crop biomass into the soil and prevents erosion.

IMPLEMENTATION: Farmers participating in the commodity support programs are subject to the cross-compliance provisions of the 1990 Food, Agriculture, Conservation and Trade Act. These provisions apply to highly erodible land. Cross compliance could be extended to all farm program land. In order to accelerate and extend adoption of conservation practices, Agricultural Conservation Program (ACP) provides cost share for conservation practices; this funding could be increased. States currently have tax incentives for the purchase of conservation tillage equipment. The federal government could also provide tax writeoffs for conservation investments. The federal government could provide capital gains tax breaks for capital improvements to cropland that have positive environmental effects.

GHG REDUCTION: In order to determine the effect that this may have on soil organic carbon (SOC) over time, one needs to look at the expected expansion of conservation tillage practice over tilled acres, the current levels of SOC, and expected increase in SOC over time. The EPA study "The Impact of Conservation Tillage Use on Soil and Atmospheric Carbon in the Contiguous United States" takes this approach. A conservative estimate of the total SOC benefit to the year 2000 would be in the range 1–3 MMTC/y and for 2010, 2–4 MMTC/y (some scientists have reservations about these numbers, but new work is in progress).

COST: It costs to plant winter cover crops and to plow them under in the spring, and prepare seed beds. Conservation tillage systems require more skilled management and investments in farm equipment.

If USDA/ASCS were to require enhanced conservation and include a cost share, USDA/SCS would have to develop standards and specs for the practices and disseminate it to the field (i.e., train farmers). This requires staff and administrative time.

Tax incentives for the adoption of conservation tillage would result in some decreases in revenues.

COST EFFECTIVENESS: . Carbon sequestration is one of the benefits of conservation tillage, but the largest benefit is in reducing soil erosion, one of the most damaging environmental problems in the U.S. Conservation tillage helps to maintain soil tilth and quality, reduces nutrient runoff into waterways, and reduces sedimentation in waterways and dams. Perhaps more important to climate change mitigation than the carbon sequestration benefit is the reduction in fossil fuel use due to the reduced number of farm operations.

Investments in conservation practices will accrue relatively small carbon benefits, but there may be other environmental reasons for proceeding. The carbon benefits should be claimed.

Carbon benefits from conservation tillage appear to be limited to middle and southern latitudes. Federal law (Farm Bill) is not usually limited to specific parts of the country.

AFFECTED STAKEHOLDERS: USDA/SCS, ASCS, and farmers would be affected. Farmers may object to more stringent controls, but react favorably to tax incentives.

STATUS OF ANALYSIS:

STAFF CONTACTS:

Carol Whitman, USDA
Steve Winnett, EPA

Tel: 703-235-0918 FAX: 703-235-9046
Tel: 202-260-6923 FAX: 202-260-6405

TITLE: Conservation Reserve Program

DESCRIPTION: This USDA program was designed to remove highly erodible lands from cropping in an effort to reduce erosion and crop overproduction. Land is enrolled for a period of 10 years and must be put in permanent cover (such as grasses or legumes; trees are discussed under tree planting). Currently there are about 36.5 million acres of land enrolled in CRP through FY 92 (2.4 million acres in trees, 34.1 million acres in grasses). Maximum potential enrollment under the 1990 farm bill is 45 million acres.

In 1995, CRP contracts will begin to expire unless authorization for them is continued in the Farm Bill. If the contracts are allowed to expire, CRP land may go back into production, with a concomitant loss of carbon to the atmosphere.

IMPLEMENTATION: Extend/modify the CRP in the 1995 Farm Bill. The current authorization allows extension of CRP contracts on environmentally sensitive acreage for 5–10 years. This would be dependent on appropriations. Modifications include contract extensions or easements with or without haying and grazing privileges, cost-sharing of fencing and watering facilities for assisting conversion to livestock production, transfer or purchase of crop acreage base, or in some circumstances, outright government purchase of CRP land. Another possibility is to link carbon sequestration and other environmental benefits in a credit system that the private sector can buy into through an expanded Fund for Forestry Investment type mechanism. The private sector could buy and trade environmental credits.

GHG REDUCTION: Soil organic carbon (SOC) is expected to increase on these soils. If there are 6 Mg C per acre/1% SOC, then SOC could be expected to increase 0.2–0.3 Mg per acre on this land. That is 7 to 10.5 million Mg for 35 million acres over the 10 year period (approximately 1 MMTC/y from 1990 to 2000). Follett (1993) estimates 0.6 to 1.8 MMTC/y in 2000.

Trees have been planted to 2.4 million acres of CRP land with expected carbon sequestration of 4 MMTC/y by 2000 and 9 MMTC/y by 2010. If the entire program is maintained as is at 36.5 million acres, CRP land would sequester about 5 MMTC/y in 2000 and 10 MMTC/y in 2010.

Additional environmental benefits of CRP include: farm supply management (in times of excess production), soil erosion control, water quality benefits, and wildlife habitat improvements.

COST: The cost of the rent on the land is considerable. In FY 92, CRP payments totalled \$1.8 billion for 36.5 million acres, that is, approximately \$49.30/acre. If CRP expands to 40 million acres by 1995, annual cost will be about \$2 billion.

Modifications of CRP could reduce this cost. An extension of only the most environmentally sensitive acreage (say 17 million acres) would halve federal outlays.

Eighty five to 95% of the treed acres (2.4 million) are expected to stay in trees without rental payments. Extensions with haying privileges at reduced rental rates or cost-sharing for conversion to livestock would substantially reduce costs but preserve soil carbon and other benefits on the land. Long-term easements, while more expensive in the short run, would be cheaper over the long run. A mechanism that would allow the private sector to support these environmental benefits would help establish a value for carbon and other environmental benefits.

COST EFFECTIVENESS: CRP has currently reduced base acreage by 22.6 million acres, with a concomitant savings in farm program outlays. Estimates of the savings vary from \$1-1.5 billion/y (John Miranowski, USDA/ERS). CARD has estimated \$2.1 billion/y in savings for the year 2010 if CRP is maintained contrasted with retaining only 17 million acres in CRP and the rest of that acreage going back into program crops (Reese & Bouzaher, 1993).

In terms of cost per carbon stored, CRP in 2000 is around:

$(\$2 \text{ billion} - \$1.5 \text{ billion}) / 5 \text{ MMTC} = \$500 \text{ million} / 5 \text{ MMTC} = \$100 / \text{MTC}.$

Eighty percent of the carbon gain is in the trees, which is likely to be maintained without CRP payments. Rebidding and reduction of acreage in and extended CRP would increase the cost effectiveness. Much of economic and environmental benefits of the grassed CRP land is to soil erosion, water quality, etc. CRP is saving an estimated 633 MMT of soil annually from erosion.

AFFECTED STAKEHOLDERS: Administration of CRP is through USDA/ASCS and SCS. Farmers, ranchers, and cattlemen will be affected.

STATUS OF ANALYSIS: Much of the analysis has been completed by USDA and EPA. Exploration of cost of modifications will require additional analysis.

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TITLE: Stimulate use of high quality forest products to sequester carbon, substitute for more polluting products, and encourage forest planting and longer rotations.

DESCRIPTION: High quality wood products—especially structural products—will sequester carbon for the period they do not rot. The higher the quality, the longer they will be preserved.

High quality wood products—especially structural products—appear have an extremely high potential to keep carbon from the atmosphere when they are used as substitutes for steel, aluminum, brick, concrete, and plastic.

More markets for high quality wood products will avoid the forest industry concern that increased tree planting will reduce the value of present forests by increasing the supply of wood. (It will increase the demand for the increased supply.)

More uses for high quality wood products will encourage longer rotations to obtain the high quality wood. Longer rotations have carbon sequestration benefits, as well as biodiversity benefits.

IMPLEMENTATION: Creative, new uses for wood (e.g., ceramic impregnation of wood which maintains wood's structural strength but increases its hardness and rigidity) can be developed with research and development, as well as increased emphasis on high quality traditional uses.

- More money can be invested in forest products research. Presently, forest products research and teaching programs at universities are being phased out because of lack of funds. This trend could be turned around. Money could go through USDA Forest Service Forest Products Laboratory, Madison, WI; Forestry and Products Engineering Colleges at Universities; and the Forest Products Research Society.
- Positive steps be made to promote wood utilization for structural purposes. Examples might include:
 - 1) Places such as Idaho are promoting wooden bridges where the transportation infrastructure is being upgraded. Such proactive programs at state and federal levels could increase interest and markets for high quality uses.
 - 2) It may be possible/desireable to examine carbon addition to atmosphere in product use as part of EIS statements for buildings. This would dramatically promote wood uses.
- It might be possible to introduce a checkoff program, as currently used for some agricultural commodities, to promote the use of wood products.

GHG REDUCTION: Researchers have not succeeded in calculating exactly how much atmospheric carbon can be stored by wood use in place of other products which

require more fossil fuels, but some feel carbon storage/emission reduction is substantial (Chad Oliver, 1993).

COST: Costs would probably be low. (R&D costs would be low when spread over entire use increase. Costs of emphasizing wood in construction products would probably not be high.

COST EFFECTIVENESS: Needs analysis.

AFFECTED STAKEHOLDERS: All forest landowners, the public (through increased biodiversity associated with growing high quality wood), and rural employment (through secondary manufacture).

STATUS OF ANALYSIS: Needs analysis.

STAFF CONTACTS:

Chad Oliver, University of Washington

TITLE: Trading Set Asides

DESCRIPTION: Provide for trading of set aside credits under the USDA's Agricultural Conservation Program (ACP) to provide farms with 100% prime land the opportunity to utilize all their land for production by trading or purchasing the credits from farms with large areas of less productive or more environmentally sensitive land.

IMPLEMENTATION: 1990 Food, Agriculture, Conservation and Trade Act

GHG REDUCTION: Unknown.

COST: The cost of administering a program.

COST EFFECTIVENESS: Unknown.

AFFECTED STAKEHOLDERS: Farmers.

STATUS OF ANALYSIS: Needs to be done.

STAFF CONTACTS:

DRAFT

TITLE: Timber Stand Improvement (TSI)

DESCRIPTION: Timber Stand Improvement (TSI) involves active application of silviculture and other forest management practices to improve the quality and/or quantity of merchantable timber on timberlands. Of the 731 million acres of forest land in the United States, 483 million acres (almost 70%) are classified as timberland. 57% of that timberland is owned by non-industrial private landowners; 28% is managed by federal, state, and local governments; and 15% is owned by the forest products industry (Burnett, 1989). Timberland productivity varies greatly according to climate, site quality, management practices, tree species, etc. Based on net annual timber growth, and calculations which convert that to net annual carbon sequestration in merchantable lumber -- numbers can be derived that illustrate gains in carbon sequestration that can be derived from increases in net annual timber growth. However, carbon sequestration by forest ecosystems involves computations of total biomass growth. Since most of the techniques involved in TSI produce reductions in growth of non-timber biomass, there appears to be no net benefit in carbon sequestration to be derived from TSI. Ecosystem Management technologies, now being developed and demonstrated, have the potential of increasing or stabilizing total biomass growth of U.S. forests -- but no quantifiable results are currently available.

IMPLEMENTATION: TSI is an ongoing practice that could be increased with additional resources applied. Ecosystem Management (EM) is currently being developed and implemented, emphasis on carbon sequestration as one aspect of EM could be readily incorporated in implementation plans.

GHG REDUCTION: Minimal to no GHG reduction in the short term. In the long term, EM will yield more resilient forest ecosystems better able to sequester carbon as climate change impacts are felt.

COSTS: Modest increase (\$10 million/year) in research and technology transfer costs associated with incorporating carbon sequestration technologies in EM research and practices.

COST EFFECTIVENESS: In the short term (<2000) there is minimal effectiveness. In the longer term (>2000), little effectiveness associated with TSI for pure carbon sequestration, moderate effectiveness of TSI in sequestering carbon in marketable wood products, large effectiveness in EM resulting from integrating carbon sequestration in already planned ecologically sound forest management practices.

AFFECTED STAKEHOLDERS: All stakeholders involved with forests.

STATUS OF ANALYSIS: TSI economics relatively well developed and available.
EM carbon sequestration economics not currently available – focused effort
would take 12 to 18 months to yield quantifiable results.

STAFF CONTACTS:

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TITLE: Expanded use of forest products

DESCRIPTION: We are currently sequestering carbon through use of 160 million tons of solid wood and wood fiber consumer products annually. These products have an average life span ranging from an estimated 67 years for nonresidential construction to about one year for newsprint, tissue paper, and packaging materials. The level of carbon sequestration could be increased significantly if a greater volume of our durable products were made from wood. Forest products are renewable, and have a higher potential to keep carbon from the atmosphere and require less energy to produce than similar products from steel, aluminum, concrete, brick, or plastic.

IMPLEMENTATION: The goal will be to increase use of solid wood and wood fiber by 20 percent by the year 2000 by emphasizing greater life for wood based products and substitution of wood for other more energy consuming products made from nonrenewable resources. Emphasis will be placed in the following areas:

- o Develop effective and environmentally acceptable wood preservation systems to extend service life and make wood products more durable.
- o Expand structural use of wood in commercial housing, and bridges.
- o Utilize wood processing residues and fiber materials to make composite fiber

EMISSION REDUCTION FROM BASE: Compared with reduced by:

10-16 MMT carbon/year in 2000
and 18-26 MMT carbon/year in 2010

COMPLIANCE COST:

Not applicable

FEDERAL BUDGET COST:

Approximately \$25MM will be required per year until the year 2000 for the research, technology transfer, and demonstration for the technologies necessary for the conversion to greater wood products use. Only about \$10 MM will be needed by the year 2010, since much of the technology will be implemented by then.

COST-EFFECTIVENESS:

In 2000 = \$1.60-2.50/ton carbon
In 2010 = \$0.38-0.45/ton carbon

Perhaps of greater significance than the direct costs/ton of carbon are collateral benefits that would accrue from improved forestry operations and waste management as a result of investments to achieve greater carbon sequestration. Greater use of wood in product manufacture would also mean

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reduced use of other more energy-intensive materials and overall energy (fossil fuel) conservation.

AFFECTED STAKEHOLDERS: Forest landowners, manufacturers of steel, plastic, concrete, bricks, and aluminum, and producers of fossil fuels will all be affected. Use of more wood in products will result in more jobs in rural communities. Wood products, for example - timber bridges, will often lead to consumer benefits such as lower costs and improved aesthetic appearance.

STAFF CONTACT

HOWARD ROSEN Forest Service

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July 13, 1993

To: Marc Chupka
From: Heather Ross
Brad Setser
Subject: Climate Change Options

An impressive inventory of options. Those culled so far are heavy on carrots, light on sticks. Carrots are less controversial, but more marginal. We can't afford much encouragement, and advice without changing economics just touches the edges of behavior.

Sticks are more fundamental and material, and change economics the right way -- tackling counterproductive subsidies and unpriced externalities which distort behavior toward vast economic inefficiency. Scale promises significant mitigation and cost-effectiveness, plus the desirable latitude of phasing in on a designed schedule.

Options for the CCMG and the President should include some significant cost items -- reducing subsidies and pricing externalities. At a minimum, these provide benchmarks -- what scale of reductions can be achieved and how cost-effectively -- for judging other options. Beyond that they:

- * allow option packages associated with alternative targets: touch and run, stabilize, continue reductions. The President has not decided among these -- reasonably so as no information to judge among them has been presented to him. But the action plan announcement will need to have a clear answer to question #1, "what path are we on?" Carrot strategies at best make a sizable dent in touch and run.

- * build on public environmental support to attempt difficult, worthwhile progress -- weaning people and processes from great economic inefficiency in energy use. Deciding not to use this rare affirmative handle is certainly Presidential.

The attachment lists options from your inventory for consideration. In addition, an energy tax option of some kind -- large gasoline tax or some carbon tax variant (as the BTU tax was; perhaps working off an ad valorem base this time)-- should be included for benchmarking and inspiration.

cc. Bo Cutter
Bob Rubin
Ellen Seidman

July 12, 1993

CLIMATE CHANGE OPTIONS FOR ADDITIONAL CONSIDERATION

1. ES18: Support the development of externality adders in IRP (Integrated Resource Planning).

Incorporating environmental externalities into utility planning could potentially have a major impact on carbon dioxide emissions. Current estimates indicate that emission reductions of 6 MMTCe by 2000 are possible if utilities incorporate externality adders into the planning for new plants. If externality adders were incorporated into plant dispatch decisions, emission reductions of 31 MMTCe are projected. By incorporating externalities into the pricing system this option offers the additional advantage of increasing economic efficiency. This option, however, is not painless. It might lead to significant price increases, and the effect of electricity prices on the competitiveness of energy intensive industries needs to be carefully examined.

2. TI1: Aggressively Implement the Transportation provisions of the Clean Air Act.

This option, if effective, uses the limits of the EPA's authority under the Clean Air Act to shift local transportation dollars away from roads to mass transit. Very optimistic assumptions about the effectiveness of this option suggest emissions reductions of 18 MMTCe by 2000. However, this option demands an EPA final rule that imposes significant restrictions on the use of federal transportation aid, forcing localities to spend federal funds on mass transit rather than on roads. Like other significant policy changes, it warrants further discussion.

3. TI3: SIP Credits and other incentives for increasing transportation system efficiency.

This option would encourage localities to rely on user fees rather than property taxes to finance roads and other transportation infrastructure. If all local property taxes supporting road construction and maintenance were replaced by road user fees, estimated emission reductions range up to 40 MMTCe. Appropriate pricing for the use of transportation infrastructure potentially encourages efficient use of transportation resources, so this option deserves serious consideration. But the changes in our system of financing transportation infrastructure are politically controversial change and need careful consideration.

The following modified option also deserves consideration by the CCMG.

Modified TI4: Tax Treatment of employee paid parking

The list of 50 preliminary policy options proposes retaining the tax exemption for employee paid parking but giving the employee the right to obtain the fair market value of the parking subsidy in either cash or mass transit subsidies. We propose that the CCMG consider eliminating the tax subsidy altogether and treating employee-paid parking like other taxable fringe benefits. Eliminating the subsidy reduces the incentive to drive to work, promoting energy conservation while also reducing the budget deficit.

7/12/93

Additional Options to be added to CCMG List
(and for IAT to model)

The following are suggested additions to the list of "Selected Policy Options" distributed to the CCMG on July 6. That list states that it is "for discussion only," with "no standing," assembled before the IAT had had a chance to "evaluate these measures from the standpoint of cost-effectiveness." The list also notes that it does not yet include any options from two of the six Working Groups (#5 and #6, on Sinks and Joint Implementation).

Several options therefore need to be added to the list. Clearly, options from Working Groups 5 and 6 need to be added for completeness. They may contain some of the options best able to meet the President's directive to develop a "cost-effective" plan. The IAT is able to model and evaluate their impacts.

In addition, certain paradigm options should be added for evaluation as illustrations of the kind of policies, costs and effectiveness that the Administration is facing. Even if these options are not selected for the August Action Plan for political reasons (a decision reserved for the CCMG and deputies, not the Working Groups), they will helpfully inform the modeling and cost-effectiveness comparisons of the IAT and the CCMG.

Sinks options

- SK1 **Reduce timber harvests on national forest land.**
Protecting certain areas from cutting, or using reduced-impact logging (RIL) techniques that decrease collateral forest damage when harvesting select trees, can significantly reduce carbon releases. The Administration's July 1 Forest Plan for the Pacific Northwest reduces harvests, and includes a new program to measure and market the carbon storage benefits entailed. Calculations from Harmon, Ferrell & Franklin (1990) indicate an average carbon storage gain of 100 tons per acre per year from leaving old-growth forests undisturbed rather than clearing them; Putz (1993) shows analogous gains for RIL.

MMTs of reductions: 18-36 mmtc/yr in 2000
28-56 mmtc/yr in 2010
(per WG paper 7/9/93)

Cost: marginal costs are minimal because
reduced harvests are being undertaken
for biodiversity reasons as well, and

because of potential savings from
decrease of below-cost timber sales

Note: These carbon storage gains might be offset by supply responses, e.g. increased harvests elsewhere, and substitution from wood toward more energy-intensive materials. But these offsets are (i) dependent on the type of forest protected (older forests contain more carbon), (ii) less likely under RIL, which maintains harvests but reduces forest damage, and (iii) relevant to all options, including options which reduce US energy consumption and hence increase quantities consumed elsewhere.

SK2 Accelerated Tree Planting on Nonindustrial Private Lands. (Moulton paper.) Doubles current tree planting rates from 2.5 million acres per year to 5 million acres per year over the next five years and maintains that rate another five years, for a total of 18.75 million new acres planted over ten years.

MMTs of reductions: 4.3 mmtc/yr in 2000
28.5 mmtc/yr in 2010
48 mmtc/yr in 2017
(per 7/9/93 WG paper)
(Could expand acreage; 7/7/93 WG
paper showed 21-37 mmtc/yr in 2000,
and 61-87 mmtc/yr in 2010)

Cost: \$24 million in 1994, \$56m in 1995, \$419m
in 2000, peaks at \$694m in 2004. WG
paper assumes federally financed but
could be privately financed.

Cost-effectiveness: \$3.50 to \$15.50 per mtc
(varies by land employed)

SK2a Tree Planting as an Offset to Carbon Tax. Shows total cost savings if tree planting by private sector is allowed under carbon tax set to achieve stabilization of US CO₂ emissions by 2000 at 1990 levels. Assuming reliable payment stream to tree planters, total cost saving is about 80%.

This option is implicit in the WG papers, and has been modeled by DOE using the updated Moulton & Richards model (just as in Option SK2 above), adapted to the IDEAS model (Rosenthal, Richards, Edmonds & Wise

(1993)). It thus provides a good test of DOE's modeling capabilities, and shows the comparative cost-effectiveness of Option SK2 versus energy market interventions.

MMT of reductions: 100 mmtc/yr in 2000 ?
 200 mmtc/yr in 2010

Cost-effectiveness: \$5/mtc in 1995
 \$25/mtc in 2005
 (assuming reliable payment stream
 to tree planters)

Joint Implementation options

JII1 Allow JI as an offset to domestic carbon tax. Shows illustrative cost-effectiveness gains versus energy market interventions in US. Use cost estimates from current project experience (e.g. Andrasko, Dixon et al. 1993) and models of relative energy elasticities in different regions (e.g. Barrett 1992; Bruniaux et al. 1992). Test the sensitivity of the magnitude of JI investment overseas to the risks of to-be-adopted JI criteria and of foreign siting (e.g., via different implicit discount rates internalized by firms for overseas actions).

JII2 Allow JI as insurance/banking against future restrictions. Using simulations of likely future restrictions (e.g. permanent cap at 1990 levels, or 20% reduction by 2010), given ability to bank early reductions, estimate investment in JI now, as additional insurance reductions over and above Action Plan domestic actions to close projected gap in 2000. Shows relative cost savings versus no-insurance/banking options, plus obtains early reductions that reduce cumulative loading on climate.

Transportation options to add

ATX Alternative fuel efficiency incentives. Several options have been suggested to improve vehicle fuel efficiency, but are not reflected in the Selected List of July 6. (These could also be alternatives to raising CAFE mileage standards. CAFE is a highly cost-ineffective tool for reducing greenhouse gas emissions, because, among other disadvantages, it affects only new sales rather than the existing fleet, it actually slows introduction of new fuel-efficient vehicles and keeps older less-efficient vehicles on the road longer, and

it increases the marginal propensity to drive.)

- ATXa **Pay at the pump insurance.** Very attractive because need not increase costs overall; merely converts a fixed cost (annual insurance premium) to a variable cost of driving (insurance paid in whole or part as a premium on each gallon of gasoline), thus providing incentive for reduced fuel consumption. Gets MMT reductions of fuel tax options, at close to zero cost. Issue: how federal government could encourage states to adopt.
- AT1a **Horsepower tax.** Model the effect of a horsepower tax, either on new cars or on all cars. Variant of fee-bate option AT1.
- AT2 **Fuel tax.** Model the effect of higher fuel taxes. Shows effect of Administration proposal in Budget, Senate alternative, and variations. Crucial for comparing cost-effectiveness of other Transport options.
- AT7 **Incentives for Early Retirement/Scrappage of high-emitting vehicles.** This is an attractive option because it increases fuel efficiency while avoiding some of the cost-ineffective defects in CAFE. Options should include giving auto manufacturers offset credit (under state SIP requirements, and/or under CAFE mileage requirements) for getting high-emitting vehicles off the road. Retired vehicles' avoided emissions would be calculated by their (tested) emissions rates and likely lifetimes.

Energy Demand options

- EDx **Encourage DSM.** The IRP options speak to externality adders, but not to encouraging DSM broadly. DOE could expand its research and demonstration programs in this area.
- EDz **Remove subsidies, e.g. for rural electrification.** These subsidies encourage additional consumption, and are a frequent candidate for being phased out in times of tight federal budgets.

Macro options

- M1 **Taxes.** Modeling these taxes is essential to compare other options to a benchmark cost estimate, whether or not taxes are politically viable or otherwise desirable.
- M1a Carbon tax needed to reach 1990 GHG level by 2000 (shows plausible total cost, though not upper bound)
- M1b Carbon tax to close remaining gap once voluntary programs -- Green Lights, Ag Star, Energy Star, etc. -- are already selected
- M1c Coordinated tax: cost and effectiveness if other OECD member countries impose similar tax, following US lead/conditionality
- M1d GWP tax to achieve a, b, or c above.
- M2a **Mandatory greenhouse emissions reporting.** "1605 meets TRI" -- convert the voluntary reporting under EPC Act 1605 into mandatory reporting, similar to Toxics Release Inventory (TRI) reports required under SARA Title III since 1986. TRI reporting appears to have induced substantial reductions in toxics releases by industry, and GHG reporting could do the same.
- Reporting engenders voluntary reductions (effect of TRI; public scrutiny)
 - Encourages early reductions -- extra benefits for climate protection
 - Makes 1605 complete. Solves sample selection problem in 1605 -- all emissions changes would be recorded, not just reductions. Makes reported reductions creditable.
 - Improves public's information base
 - Sends good signal internationally
 - Cost: Information/paperwork
- M2b **Federal Greenhouse Emissions Reporting.**
- Executive Order directing agencies to report emissions (of operations, or due to policy actions?)
 - Shows government taking the lead, tending to its house while asking same of public
 - Protocols already developed (e.g. by EPA Region IV)
 - Can support EISs

- M3 **Quantity limits.** Like taxes (M1), these need to be modeled to show comparative cost-effectiveness of other options. E.g. Cap (COPE, no new emissions by new electric power sources and those over age 60; diverse offsets allowed); Ton reduction (require 125 mmtc-e reduction by 2000, allow trading, banking & offsets (similar to CAA acid rain title)); Percent reduction (require all sources to achieve a reduction from baseline by 2000 equal to the estimated percentage gap in 2000 over 1990 level, e.g. 10%. Allow trading, banking & offsets); etc.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

OFFICE OF
POLICY, PLANNING AND EVALUATION

MEMORANDUM

FROM: Karl Hausker *BS-Lia K.H.*
TO: Mark Chupka
DATE: July 13, 1993
RE: EPA Comments On Initial Options Package

We have reviewed the package of options presented at the 7/8/93 CCMG meeting. Our comments are presented below, divided into topic headings.

Although our comments in this memo are specifically focused on this original set of "no brainer" options, we think that it is important to expand the process to consider the next tier of options. Based estimates contained in the one-pagers, emissions reduction estimates for the list of options ranges from a high of 244 MMTCe to a low of 144 MMTCe. However, we believe that this simple summing of preliminary estimates wildly overestimates the emissions reductions that can be achieved from this initial list. Reduction estimates should be viewed as very tentative; estimates for individual actions are overly optimistic and interactive effects must be accounted for.

The following are our specific comments on the initial list of options:

Overview

- Voluntary programs are responsible for a large portion of the reductions. We can only rely on voluntary program if the Administration is willing to unwaveringly support funding.
- Package is also heavily reliant on state actions: feebate programs, implementation of TCMs, and public utility commission actions. We must carefully consider what actions the Federal government must take to ensure that the state actions will be implemented.
- No matter what set of options is finally selected, program cost will likely be in the hundreds of millions of dollars. Reforming Federal subsidies could reduce emissions while helping make the package budget neutral.

Baseline

- **HFCs**, an important greenhouse gas, are not counted in baseline emissions. A thorough and complete emissions inventory should include HFCs. Projections place year 2000 HFC emissions at 23 to 24 MMTCe over 1990 levels.

Programs exist to help reduce HFC emissions growth. Two "no brainers" and two additional programs would reduce HFCs by 12 MMTCe.

- **Green Nylon** program (ME-10) is already included in the current baseline and should be removed from the list of additional actions.

Sequestration and Joint Implementation

- Sequestration and joint implementation both raise concerns regarding baseline calculation, measurement, double counting, and enforcement. As an initial step, the Federal government needs to support demonstration programs for both sequestration and joint implementation to help resolve implementation concerns. EPA believes that joint implementation should go forward but not be counted towards meeting the year 2000 goal. Domestic forestry sequestration options should be examined more thoroughly if they are to be used in meeting the year 2000 goal.

If the Administration uses joint implementation to meet year 2000 goal, EPA believes partners should be Annex I countries that have committed to reducing their greenhouse gas emissions.

Programs That Should Be Included On First-Tier List

- **Golden Carrot**/market pull programs will get 12 MMTCe for 10 FTE and \$6 million.

Improved appliance standard setting rule (established to work in a complementary way with the Golden Carrot programs, where applicable) will get up to an additional 5 to 10 MMTCe with no increase in Federal funding required.

- **Coalbed methane** programs are missing. Senator Byrd and others are particularly supportive of these programs. 5.5 MMTCe would be avoided for 3 FTE and \$1 million.

- The following new and revised options that have one-pagers attached to this memo should be considered for inclusion in the first tier of options:
 - Enhanced Technical Assistance to States and Localities for GHG Reduction [new option]
 - Source Reduction and Recycling of Municipal Solid Waste [revised SK-02]
 - Enhanced Green Fleet Initiative [variant of AT-09]
 - Consolidated Biomass Options [new, includes revised ES-7]
 - Expanded Cool Communities Program in Cities and Federal Facilities [revised SK-10 and CD-11]
 - Low-Income Weatherization [revised RD-11]

Corrections To Option Characterization/Emission Reduction Estimates

- Options TI-01, TI-03, TI-04. We have reviewed the analysis behind *Aggressively Implementing the Transportation Provisions of the CAA*, *SIP Credits for Increasing Transportation System Efficiency*, and *Cashing Out Employer Paid Parking*, recalculated the emissions reductions benefits to account for interactive effects and avoid double counting, made certain that cost issues are addressed as best as possible, and considered the budgetary implications of each option.

The enclosed set of revised one-pagers more accurately and specifically describe the infrastructure efficiency measures TI-01, TI-03, and TI-04. Former options TI-01 and TI-03 should be grouped as: *Aggressively Implementing the Transportation Provisions of the Clean Air Act*. Expected emissions reductions are 8 MMTcE in 2000. We have articulated the former two options into six one-pagers as follows:

- Tough Clean Air Act Transportation Conformity Rule
- Increase Outreach Efforts on Transportation
- Clean Air Act SIP Credits for Innovative Transportation Strategies
- Increase Transportation System Efficiency Through Finance Reform
- Reform ISTEA Congestion Mitigation and Air Quality (CMAQ) Program into a Fund for Innovation and Experimentation
- Maximize IVHS for Environmental Benefits

EPA believes that these options represent an appropriate packaging of efforts needed to make the Clean Air Act's transportation provisions work cost-effectively in the service of air quality and greenhouse gas emissions reduction.

Option TI-04, *Cashing Out Employer Paid Parking*, has also been revised and is described in an enclosed one-pager. Expected emissions reductions are 11 MMTCe in 2000.

Reductions from *Aggressively Implementing the Transportation Provisions of the Clean Air Act* and *Cashing Out Employer Paid Parking* are not fully additive. Assessment of the size of the overlap is difficult. EPA estimates that these two programs together will produce 15 to 20 MMTCe reductions in 2000.

The options in the Clean Air Act compliance category involve both a strong process to ensure that Clean Air Act goals are adhered to (a tough *Conformity Rule*) and actions to provide as many options as possible that states may use to achieve those goals at least cost. As evidenced by the intense interest in *Conformity* from transit, highway, and environmental interests, this too is not a 'no brainer'. By providing SIP credits and guidance on innovative transportation strategies, increasing DOT/EPA technical and public outreach on transportation demand management and alternative transportation strategies, making a start on transportation finance reform, and focusing existing funding and research programs such as CMAQ and IVHS on air quality and transportation demand measures, the Action Plan would reduce the burdens of Clean Air Act compliance and move the states toward strategies that produce the reductions in growth of vehicle travel we know are necessary if the goals of the Act are to be met and if greenhouse gas reductions are to be achieved.

Parking subsidy reform involves converting an existing subsidy to park into a more flexible employee benefit. EPA believes strongly that this option should be included in the Action Plan. The option has many advantages from an analytic standpoint and the success of parking reform at reducing vehicle travel is well documented.

However, like any substantive action, parking subsidy reform is also not a simple "no-brainer." The change will require Congressional action, and despite its many advantages, explaining parking subsidy reform is tricky. Some effort will need to be put into selling it on Capitol Hill. And though millions of employees would benefit from the more flexible subsidy, there would also be losers, principally the owners of large parking lots who will no longer have the subsidy focused exclusively on them.

- Options ME-01, ME-02, ME-04, ME-07, ME-09. ME-01, *Increase Stringency of Landfill Rule*, revised emissions reduction estimate is 4.6 to 4.9 MMTCe. ME-02, *Landfill Outreach Program*, revised estimate is 1.1 MMTCe. ME-04, *Expanded AgStar*, revised estimate is 1.0 to 2.0 MMTCe. ME-07, *Improve Ruminant Productivity and Product Marketing*, revised estimate is 1.0 to 2.6 MMTCe. ME-09, *Expanded Natural Gas Star*, revised estimate is 1.8 to 3.4 MMTCe.
- Option ID-19. "Electric Motor Systems Initiative" has been updated and is now defined as *Motor Challenge*.
- Option ID-21. "Green Companies, Energy Efficiency Targets and Reporting" is outdated. This option is now entitled *Industrial Golden Carrot*. Green Companies is a separate one pager.



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL 15 1993

OFFICE OF
POLICY, PLANNING AND EVALUATIONMEMORANDUM

SUBJECT: EPA's "Tough Choices" options for the climate change National Action Plan

FROM: Karl Hausker *Karl Hausker*
Deputy Assistant Administrator

TO: Mark Chupka, Office of Environmental Policy

Attached are the longer descriptions of EPA's "tough choices" options and a revised summary. We have indicated similarities between these options and the options listed by your office on June 25 by referencing the code number in the left hand column. The longer descriptions are in draft form and should not be circulated at this time.

AL FORM 99 (7-90)

AX TRANSMITTAL		# of pages
To	<i>Mark Chupka</i>	<i>17</i>
Dept./Agency	<i>Andrew</i>	
Phone #	<i>260-4336</i>	
Fax #	<i>202 456-2710</i>	<i>260-0275</i>

NSN 7540-01-317-7353 5099-101 GENERAL SERVICES ADMINISTRATION

EPA "Tough Choices" for consideration in the National Action Plan

WH Option #	EPA Option Title	MMTce reduction by 2000
AT03	CAFE -- a 40 mpg target sometime after 2000	2 - 5
ES21 - ES24	Phase out power subsidy with cash - out	5
-ES2, 8, 18, 26, 27	Federal Advocacy of IRP	3 - 5
SU3,ES1	Consider Energy Efficiency in FERC Proceedings	2 - 3
RD2	Tighter Efficiency Standards for Residential and Commercial Appliances	5 - 30
ES17	Utility Sector Emissions Cap (with Trading) at 90% - 100% of 1990 emissions	39 - 87
SU4	Pollution Prevention Programs as RACT, LEAR, and BACT	10 - 30
ID13	Promote and/or require source reduction and recycling	13 - 25
TI04	Eliminate Parking Subsidies	17.5
ES4-ES11	Promote Renewable Energy Technologies	16 - 44

ES 2, 8, 18, 26, 27

JUL 13 1993

ENERGY SUPPLY/DEMAND - FEDERAL ADVOCACY OF IRP POLICIES THAT PRODUCE GREENHOUSE GAS REDUCTIONS

Description: The EPA and DOE (including the labs) would participate in State regulatory proceedings to provide information and make the case for IRP policies that contribute to emission reductions (including CO₂) and economic efficiency. This would include advocacy for regulatory reforms that remove existing disincentives and promote policies that provide for increased energy efficiency (both supply-side and demand-side). Policies that would be supported by these Federal activities include: (1) IRP for electric and natural gas utilities; (2) inclusion of environmental externalities in planning decisions; (3) least-social-cost approaches to Clean Air Act compliance; (4) removal of regulatory disincentives that discourage supply-side efficiency improvements (i.e., the reconciling fuel adjustment clause); (5) revenue neutrality provisions (e.g., decoupling profits from sales); (6) seasonal marginal-cost-based rate design for gas and electric utilities; and (7) removal of barriers to increased use of cost-effective natural gas and renewable resources.

Implementation: This is an administrative option that could be implemented under EPA's current authority. A detailed implementation plan/proposal is attached.

Carbon Reductions: As more states adopt IRP, and implement the policies described above, carbon emissions from the utility sector will decline. If efforts under this proposal are focused on states with no IRP activities and/or high carbon emissions, the program could produce sizable carbon reductions in the range of 3-5 MMT C.

Cost Effectiveness: IRP will tend to make utilities more efficient, and this program should thus produce net benefits for society. As states institute IRP, and include environmental considerations in their decisions, electric rates may go up slightly.

Stakeholders: Environmental groups should support this, as long as Federal efforts are complimentary to efforts already underway by local environmental intervenor groups. Some utilities may oppose, as may some states who could resent a Federal presence in their cases.

Status of Analysis: Complete.

Staff Contact:

Linda Latham, EPA, OAP, 233-9091 fax: 233-9578
Rick Morgan, EPA, OAP, 233-9143 fax: 233-9585

SU3
ES1

**Demand Working Group
State/Utility Issues Sub-Group**

Option Title: CONSIDER ENERGY EFFICIENCY IN FERC PROCEEDINGS

Description: The FERC has sole jurisdiction over certain types of electric utility transactions which significantly affect energy efficiency and hence carbon emissions, yet the agency generally does not address such issues. State utility regulators and energy efficiency advocates believe the FERC's inaction in this regard is a major impediment to increased energy efficiency. Among the determinations that the FERC currently makes with implications for energy efficiency are the design of fuel adjustment clauses and the allocation of costs between demand and energy components of wholesale rates.

The White House could request that the FERC investigate and report on opportunities to foster energy efficiency through its existing regulatory authorities. Possible FERC actions include reform of fuel adjustment clauses and capacity cost allocations and the application of integrated resource planning (IRP) principles to the licensing of hydroelectric facilities. The agency should consider how actions to encourage energy efficiency might affect its relationship with state regulatory authorities. FERC should also be asked to identify any new statutory authority that is needed to further encourage opportunities for energy efficiency.

Implementation

- o **Statutory Authority:** The Federal Power Act authorizes FERC to regulate wholesale electricity transactions "in the public interest" and "with regard to the proper utilization and conservation of natural resources." Also, Federal Water Power Act and EPCA.
- o **Required Regulatory or Other Actions:** White House request to FERC, followed by appropriate regulatory actions.
- o **Additional Federal Funding:** No funding required.

Estimated Reduction from Greenhouse Gas Emission Baseline:

- o 2 to 3 MMTCe in 2000
- o 2 MMTCe in 2010

Public and Private Costs: No measurable cost to government; savings to utilities and their customers could be substantial.

Cost-Effectiveness: Negative cost.

Affected Stakeholders: Opposition expected from wholesale utilities and holding companies. Consumers, environmentalists and small utilities should favor it. Some DOE and FERC staff have voiced objections to this option.

Status of Analysis: Further analysis needed.

Staff Contact: Rick Morgan, EPA/OAR/ARD, 233-9143, FAX: 233-9584

**Title of Option: [Demand Working Group; Residential]
Residential Appliance Standards**

Brief Description: DOE is directed by law to promulgate minimum energy-efficiency standards for major residential appliances and equipment with periodic updates, if technologically feasible and economically justified for some products. DOE is behind the statutory schedule for amending the standards. DOE's analysis indicates more stringent standards are now justified. This option would strengthen the program, get it back on schedule, and deliver these potential savings.

Level 1 would result in standards for 10 appliances; 7 effective by 1998, 3 by 1999. Level 2 would explicitly include reductions in carbon emissions indecisions, both from energy savings from the appliance and the power source. Level 3 would, in addition, accelerate standard setting from current schedules by 1 year. Standards would be developed in coordination with market-pull programs (market pull improves performance of the best units; standards eliminate the less energy-efficient units).

Implementation: Administrative. Authority is in the Energy Policy and Conservation Act (Public Law 94-163), as amended by the National Appliance Energy Conservation Act, and the Energy Policy Act of 1992. An increased appropriation was requested by the Administration in its FY 1994 budget request, but has not been fully funded by the House Appropriations Committee.

Rough Estimate of Greenhouse-Gas Reduction with Full Implementation: In 2000 for 10 of 13 appliances Level 1 5.4 - 9.6; Level 2 6.4 - 11.6; Level 3 9.4 - 14.6.

Rough Estimate of Costs: Federal costs are low to relatively modest. Levels 1 & 2 require no additional funds. The Appliance Standards program is funded at \$3.2 million in FY 1993. Level 3 requires an additional \$2 million annually to speed timing of the standards. The marginal cost of stricter standards to manufacturers for investing in new plant and equipment is large.

Cost-Effectiveness: Levels 1 & 2 require no Federal cost. Level 3's Federal is cost \$1.5 to 2.6 M/MMT. Consumers as a group save money on standards over the life of the covered products. The impact on manufacturers would need to be considered carefully.

Prospective Interactions with Other Options: see matrix WH option RD^e

Affected Stakeholders: Affected stakeholders are consumers, utilities, manufacturers, and the Federal Trade Commission. Some manufacturers may oppose more stringent efficiency standards because of the need for increased investments in plant and equipment for individual products and the cumulative impact from all appliances.

Contact(s): Carl Adams, DOE - phone 202/586 7140; fax 202/586 1628

ES17
ES27

**Energy Supply Option: A Carbon Emissions Cap with Trading for the Utility Sector
(to Coincide with Phase II of the Acid Rain Program)**

Background: Under the Clean Air Act Amendments of 1990, most fossil-fueled electric power plants in the U.S. must reduce their SO₂ emissions in the year 2000 to a rate of 1.2 lbs/mmBtu, unless they purchase additional SO₂ emission allowances, thereby enacting Phase II of the Acid Rain Program. Acid Rain compliance options, however, are not neutral with respect to CO₂ emissions that contribute to global climate change: while options such as natural gas, conservation, and renewables also reduce carbon emissions, other options such as scrubbing and switching to lower sulfur coals may increase carbon emissions. Consequently, it is important for electric utilities to plan jointly for SO₂ and CO₂ control. At least five utilities (New England Electric System, Niagara Mohawk, Southern California Edison, Los Angeles Department of Water & Power, and Pacific Gas & Electric) already have policies to stabilize or reduce carbon emissions.

Description: This policy option would impose a national CO₂ emissions cap with a tradeable permits system on the electric utilities. The Clean Air Act would be amended to create Phase I of the *Global Climate Program*, whereby emission allowances would be allocated to all electric utility carbon emitters nationwide at a rate at or below 1990 levels, based on the average plant carbon emission rate in 1988-1990. This initiative could be pursued at any level, e.g., stabilization, 5% or 10% reduction over 1990 carbon emissions levels. This sector could be targeted for beyond stabilization because of the greater difficulty of reducing emissions in the transportation sector. Compliance would begin in 2000. Forestry offsets could be considered, subject to strict verification requirements. The Phase II Acid Rain Program requirements would remain intact, although permits would have to be issued that include the CO₂ requirements and plans. Quarterly emissions monitoring reports would be required based on the Continuous Emissions Monitoring Systems (CEMS) that are now required to include, in most cases, CO₂, for the utilities in the Acid Rain Program.

Implementation: The Clean Air Act would have to be amended to establish a national CO₂ emissions trading system, and delegating administrative authority to EPA would be required. EPA would implement this option by writing rules and establishing permitting, emissions trading, and emissions monitoring systems (or close proxies) for the affected utilities, similar to those under the SO₂ allowance trading program.

Emissions Reduction: A CO₂ allowance system that stabilized utility sector emissions at 1990 levels would reduce emissions by 39 MMTCe in 2000, and 131 in 2010; a 5% carbon cut below 1990 levels would reduce emissions by 63 MMTCe in 2000, and 155 MMTCe in 2010; a 10% cut would reduce emissions by 87 MMTCe in 2000 and 179 MMTCe in 2010.

Compliance Cost: The cost of this option is highly dependent on the implementation of other options. If other options add up to a stabilization of utility sector CO₂ emissions, an emissions stabilization cap would have only minor administrative costs. In the absence of other options, the cost of this initiative could be small to moderate.

Budget Costs: \$10 million per year to EPA for the administrative costs of the program.

Cost Effectiveness: See above.

Status of Agency Analysis: Further analysis of specific program designs is possible.

Interaction with Other Options: This option can be considered an accelerated version of option ES17, greenhouse gas emissions cap with trading, with some possibly minor differences. Additionally, if this option is pursued it would also replace option ES27, regarding education and outreach on reducing greenhouse emissions through planning for cost-effective compliance with the Clean Air Act Amendments.

Affected Stakeholders: Most electric utilities would rather avoid additional regulation, although the flexibility allowed by the allowance trading option would be very appealing, including the possibility of forestry offsets. Generally most utilities would prefer emissions trading to a carbon tax. A small but growing number of utilities will like the option, as will most environmental groups.

Staff Contact: Barry Solomon, EPA/OAR, 233-9166 (voice), 233-9585 (fax). Bruce Schillo, EPA/OPPE, 260-1030 (voice), 260-0512 (fax).

Pollution Prevention Programs as BACT, RACT, and LAER

NOTE: *This option was floated during the Workgroup process but never formally submitted. It is similar to option SU-04, but more inclusive. Stationary sources will be required to explicitly consider all pollution prevention strategies, not just DSM. And, the requirement will be extended to all review and permitting processes.*

Description: Under the Clean Air Act, new sources, such as new electric power plants, are required to obtain emissions permits for their air waste streams. Depending upon whether the plant is located in an airsheds that is or is not out of attainment with the *National Ambient Air Quality Standards* (NAAQS), it will be required to install emissions control technology meeting either a *best available control technology* (BACT) standard or *lowest achievable emission rate* (LAER) standard. In addition, in order to obtain an operating permit, existing sources located in regions out of attainment with NAAQS are required to install *reasonably available control technology* (RACT).

EPA can redefine BACT, RACT, and LAER to include a requirement that utilities and other large sources include pollution prevention strategies in their planning and operating processes.

Implementation: Administrative changes to redefine BACT, RACT, and LAER.

Emissions Reduction: Likely to be large.

Cost: Pollution prevention strategies are likely to be cost-effective on their own merits, and especially cost-effective *vis-a-vis* traditional end-of-tail-pipe control technologies.

Cost Effectiveness: Likely to be low.

Stakeholders: Utilities and industry will be uncomfortable with this redefinition. Environmental and energy efficiency advocates will favor.

Status of Agency Analysis: Underway.

Staff Contacts: Bruce Schillo, EPA/OPPE, 260-1030 (voice), 260-0512 (fax).

ID 13
SK 3
Recycling: Broad Based

7/14/93,
6:29 PM
ID: Brett Van Akkeren, EPA
260-6914
SK: Bill Hohenstein, EPA
260-7019

Implement and Expand Programs to Accelerate Source Reduction and Recycling of Paper and Other Municipal Solid Waste.

1) Description:

Source reduction and recycling of paper and other municipal solid waste (MSW) offers the potential of significant greenhouse gas savings by increasing carbon sequestration in forests and reducing of energy use in virgin materials extraction and processing. Carbon sequestration is an substantial added benefit from paper recycling. Increased paper recycling will lower demand for virgin fiber, thereby reducing harvests, leading to a build up in timber inventories, enhancing the forest carbon sink.¹

The government has several options to encourage or mandate source reduction and recycling. These options are divided into four groups: Expansion of current federal policies, VOC credits for Clean Air Act (CAA) State Implementation Plans (SIPS), Tax Policies and Legislative mandates.

Policy Options:

Expand and Coordinate Federal Programs (EPA, Forest Service, and DOE):

- IMPROVE MARKETS:
 - Create information clearinghouses to link producers and consumers of recycled materials.
 - Promote the Administration's Earth Day announcement to develop an executive order on new federal procurement guidelines for buying recycled products.²
 - Develop "buy recycled" programs to get industry commitment and educate consumers.
 - Stimulate markets for, and research and development to, encourage the use of longer life, repairable products to reduce the generation of non-packaging waste.
 - Encourage the use of "unit pricing" of municipal solid waste services.
 - Expand and target existing government loan guarantees (SBA and HUD) for use by manufacturers who use secondary materials
- PROMOTE VOLUNTARY PROGRAMS
 - Encourage industry recycling goals in public private partnerships. (e.g., join with the American Paper Institute to support its announced 1990 goal of achieving 40% paper recovery by 1995)
 - Incentives and education to individuals governments and business to source reduce, e.g., "paper-less offices" and using less preconsumer packaging.
 - Research and development support for manufacturers of consumer durables that wish to develop products that are "designed for recovery".
 - Research to examine opportunities for source reduction and recycling of industrial nonhazardous waste.

Clean Air Act SIP VOC Credits:³ This program would give states VOC credits for the level of source reduction and recycling they achieve in products that create VOCs and NOX when manufactured with virgin materials. The amount of credit will be equal the savings in VOC and NOX that result from source reduction or the manufacture with secondary materials instead of virgin materials.

Tax Policy: A revenue-neutral combination of tax credits and either virgin material use fees, advance disposal fees or packaging use fees. Designed to spur investment in capacity to process and manufacture with secondary materials.

Mandatory Legislative Options:

- National beverage container deposit legislation and/or mandatory recycling levels in conjunction with minimum recycled material content standards or utilization requirements
- Manufacturers responsibility for packaging: Requires manufacturers of consumer products to be responsible for waste management.

2) Implementation:

Administrative: Program Expansion and CAA SIP credits

Legislative: Tax Policy and Mandates.

¹ Extensive modeling of the carbon benefits and economic impacts of sequestration have been completed under a joint project by the Forest Service and EPA.

² Including federal procurement of compost as erosion control ground cover in federal road construction

³ This option may be difficult to implement due to the difficulty of measuring source reduction. Therefore, it could result in significant administrative and enforcement costs.

3) Energy Savings and Greenhouse Gas Reductions for Separate Options:⁴

Option	Energy Savings: x10 ¹² BTUs	Carbon Sequestration: Million Metric Tons	Carbon From Energy: Million Metric Tons	Total Carbon: Million Metric Tons
Expand Federal Programs	Paper: 0-96 All Other: 0-204	Paper: 13-17 All Other: 0	Paper: 0-.001 All Other: 0-.399	Paper: 13-17 All Other: 0-4 Total: 13-21
CAA SIP Credits	0-140		0-2	0-2
Tax Policy	Impact depends on the level of tax credits and fees.			
Mandates	Paper: 88-176 All Other: 187-374	Paper: 13-17 All Other: 0	Paper: .012 All Other: 3.98-7.98	Paper: 13-17 All Other: 4-8 Total: 17-25

4) Life Cycle Private Costs for Separate Options:

While we don't have cost analysis for intermediate levels of implementation, we believe costs rise geometrically.

Expand Federal Programs	NA: R&D, information education, etc.
CAA SIP Credits	\$0: Voluntary state compliance.
Tax Policy	NA: Depends on level of tax credits and fees and industry response.
Mandates	\$104-\$248 billion, not discounted, if cost entirely attributed to carbon reduction

Federal Budget Costs for Separate Options:

Option:	FY 94	FY 95	FY 96
Expand Federal Programs ⁵	\$9 million	\$8 million	\$7 Million
CAA SIP Credits	NA	NA	NA
Tax Policy	NA	NA	NA
Mandates	\$11 million	\$3.1 million	\$1.4 million

5) Cost Effectiveness for Separate Options:

Expand Federal Programs	NA
CAA SIP Credits	\$0 per ton carbon
Tax Policy	NA
Mandates ⁶	\$230-\$928 per ton of carbon if cost entirely attributed to carbon reduction

6) Affected Stakeholders:

Environmental groups would support recycling efforts but would oppose greater use of waste derived fuels. They would specifically oppose any change in the definition of recycling to include waste-to-energy. Industry would favor voluntary efforts, R&D support, loans, and tax breaks. Private forest landowners see recycling as a market threat, while consumers would benefit from lower prices. Industry would strongly oppose any mandatory regulations or taxes.

7) Status of Agency Analysis: Underway.

8) Interaction with other options:

This option is being submitted by both the sink and industrial demand work groups. This option does not incorporate option on federal waste paper recycling. As a result, an undetermined amount of double counting will occur.

9) Staff Contacts:

Staff Contacts	Telephone	FAX
Ken Andrasko, EPA	(202) 260-6803	(202) 260-6405
Bill Hohenstein, EPA	(202) 260-7019	(202) 260-6405
Bret Van Akkeren, EPA	(202) 260-6914	(202) 260-0174
David Darr, Forest Service	(202) 205-1052	(202) 205-1087
Carol Whitman, USDA	(703) 235-0918	(703) 235-9046

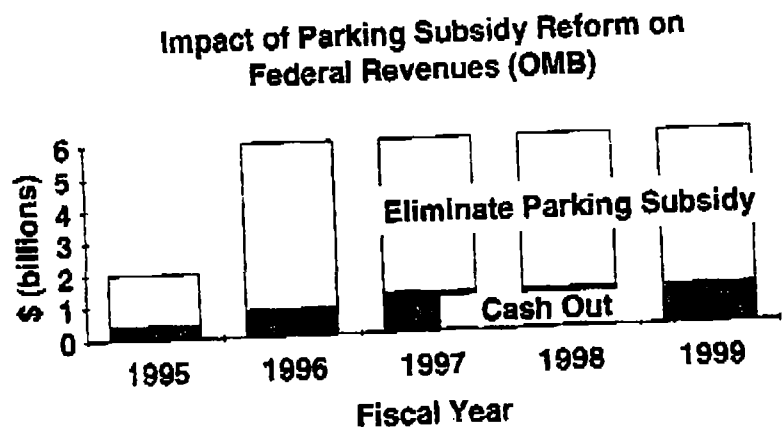
⁴These reduction are not additive. All energy savings are in the industrial sector.

⁵Does not include cost of federal loan guarantees.

⁶Average annual costs (not discounted) divided by tons of carbon saved in 2000.

Option: Eliminate the Tax Exemption for Employer-Paid Parking

Description: Over 95% of the US labor force drives to work and parks free. These commuters benefit from a special tax exemption for employer-paid parking contained in the Tax Code. IRC Section 132 exempts employer-paid parking valued at up to \$155 per month (indexed to inflation) from federal income tax. The exemption is automatically extended to Social Security, Medicare, unemployment insurance, state income taxes and other taxes calculated on the basis of gross income. OMB conservatively estimates the value of the tax exemption to the federal treasury at \$6 billion per year. The exemption applies only to parking spaces. A \$60 per month tax exemption is available for transit passes, as is an exemption for employer-paid vanpool services, but neither is frequently used. Eliminating the tax exemption for parking is a more stringent alternative to cashing out the parking subsidy (NAP option TI-04). Eliminating the exemption would make taxable a good (employer-paid parking) which is now tax-exempt, effectively raising taxes by a small amount on individuals and employers. The cash out option would retain the exemption, but on the contingency that the employee was offered the choice of taxable cash in lieu of the parking space.



The exemption makes it tax-efficient for employers to provide free parking. It costs an employer \$2.02 to provide an additional \$1 of take-home pay to an employee making \$50,000 per year. A dollar's worth of parking costs the employer only \$1. Thus, the offer of free parking is 10 - 20 times more than the federal gas tax, roughly equivalent to free gasoline and often more valuable than free gas and a car for the trip! That parking is tax exempt makes it all the more valuable relative to any existing disincentive to drive.

Implementation: This option would require a legislative change in Section 132 of the Internal Revenue Code.

Analytic assumptions: Eliminating the parking subsidy in the Tax Code produces reductions in work commuting for two reasons: (1) it increases the price of parking spaces, and (2) it eliminates the tax incentive for employers to subsidize parking, and only parking. Studies show that eliminating free parking, a likely impact of eliminating the subsidy, produces about a 20% - 50% reduction in home-to-work travel at typical worksites. Emissions reduction projections are made assuming a 25% decline in home-to-work vehicle miles traveled. Although studies show that those who drive to work

also make far more non-work trips by car, no impact is assumed here on non-work travel. Eliminating the parking subsidy is assumed to have no impact outside of urbanized areas.

Emissions reduction: Eliminating the parking subsidy would reduce emissions in 2000 by 17.5 MMTCe. The alternative cash out option would reduce emissions by 11 MMTCe in 2000. These options are substitutes.

Cost: As with other tax options, the impact of this option on overall welfare depends on the use of the revenues it would generate. The funds could be used for deficit reduction or perhaps to finance other greenhouse gas mitigation strategies. Declines in peak-hour travel might free up highway funds for other uses.

Cost-effectiveness: Uncertain, but likely cost-effective relative to other further steps

Stakeholders: Workers and employees who benefit from the existing subsidy would be losers. Removing the subsidy would hurt those with lowest incomes the least - they get the fewest and least valuable parking spaces. Owners of parking facilities would also lose revenue. Total tax increase would be small: \$7 per month per employee in urban areas using OMB estimates.

Status: Analysis continuing.

Staff contacts: Jon Kessler, EPA/OPPE, (202) 260-3761, Paula Van Lare, EPA/OAR, (202) 260-3450, Fred Ducca DOT/FHWA, (202) 366-5843, Lew Fulton, DOE/Policy, (202) 586 1197.

Title: Renewable Energy Technologies Options Package

Description: In the near term renewable energy is rapidly becoming competitive in a number of market niches; it can contribute significantly to the President's target of stabilizing emissions by 2000. In the long term, renewable energy will be the key source for meeting future demand once energy efficiency and natural gas resources have reached maximum potential.

Implementation: In order to realize this near-term and long-term potential from renewable energy, a comprehensive approach is needed to lower market barriers to the widespread use of renewable energy. Because technologies are at various stages of development and market penetration, a range of incentives and support activities are needed. Such a comprehensive approach would consist of 4 major activities:

Demonstration and commercialization programs serve to reduce the risk to investors of innovative technologies, increasing investor confidence.

- Joint-Venture Demonstrations of Renewable Technologies (including Solar, Wind, Biomass, Geothermal, Cogeneration, etc.) (Expanded ES-9) [0.7 - 2 MMT C by 2000, 1 - 8 MMT C by 2010; \$35 - 94 M/yr for 5 yrs; \$3.50 - \$7.00/T]
- Ramp up Funding for Solar Energy Manufacturing and Commercialization Initiatives (ES-30) [\$50 - 100 M]
- Upgrade Hydropower Generation at Existing Sites (ES-4) [6 MMT C by 2000; negligible costs]
- Reorient DOE R & D Program Toward Commercialization (ES-37) [No cost]

Market Stimulation is needed to achieve economies of scale of production that are the most important elements in reducing the costs for many renewable energy technologies that have been technically proven.

- Establish Renewable Energy Power Marketing Authorities (Combine ES-5, ES-6, ES-10, ES-35, and ES-40) [Estimates range from 0.4 - 9 MMT C for components by 2000; \$0.3 - \$60/T C]

Fiscal incentives take into account renewable energy's non-quantifiable benefits to the nations in terms of greater energy security, reduced imports of fuel, greater flexibility for utility planning, economic development, and environmental benefits, which are treated below.

- Alternative Minimum Tax Relief for Renewable Projects (ES-39) [3 - 8 MMT C by 2000; no cost]
- Promote Biomass Co-Firing through Modifying EPACT Incentives (ES-7) [4.8 - 14.1 MMT C by 2000; \$32M/yr ramping up to \$797/yr by 2000; \$44 - 53/T C]

Environmental adders are a specific way for incorporating the environmental benefits of renewables in power planning decisions.

- Promote Effective and Innovative State Regulation of Renewable Electric Technologies (ES-8) [1 - 5 MMT C by 2010; < \$5 M/yr]

Emissions Reductions, Costs, and Cost Effectiveness: Estimates are noted above where available (based on estimates reported by option authors July 9, 1993).

Affected Stakeholders: This option would be supported by Independent Power Producers, Industry Cogenerators, States, Environmentalists, and a substantial number of utilities and many public utility commissions. It may be opposed by fossil fuel industry representatives.

Staff Contacts: R.H. Annan, DOE (202-586-1720, fax: 202-586-5127), P. M. Tidd, DOA (202-720-1870), M.A. Adler, EPA (202-260-9013, fax: 202-260-6405)

[CCD/OPPE/EPA - July 14, 1993]

AT-03

Option: Raise Corporate Average Fuel Economy (CAFE) Standards

Description: The Energy Policy and Conservation Act (EPCA) of 1975 established fuel economy standards for cars and directed that standards for all light duty vehicles be kept at "maximum feasible" levels according to four criteria: technological feasibility; economic practicability; the effect of other Federal motor vehicle standards (e.g. emissions or safety standards) on fuel economy; and the need of the Nation to conserve energy. After substantial gains in the late 1970's, new car fuel economy has stabilized near the statutory 27.5 MPG standard; new truck fuel economy also rose substantially in earlier years, and the standards have been set through 1994. The light truck standard for that year is 20.7 MPG. It will rise to 20.8 MPG in 1995. For cars and trucks, the "economic practicability" criterion has been a roadblock to substantially raising the post-1985 CAFE standards.

Implementation: CAFE standards can be raised by legislation or by DOT through a rulemaking process. Rulemaking can start more quickly, but a legislative approach might avoid litigation and lead to better long term results. A number of studies have noted that the current CAFE regulatory approach has several weaknesses, including (a) placing a disproportionate share of the compliance burden on domestic full-line companies and (b) a lack of incentive for consumers to buy fuel-efficient vehicles. Projected higher fuel prices and the demonstrated need of the Nation to conserve energy in response to the greenhouse threat could be the basis for either a legislative or administrative change in CAFE. Several studies (including studies by the federal government) also have raised concerns about the safety implications of smaller and lighter vehicles; continuing strengthening of motor vehicle safety standards by NHTSA is expected to improve the safety of cars and trucks of all sizes. A recent study by the National Academy of Sciences (NAS) concluded that fuel economy levels of 31-33 MPG for cars and 24-25 MPG for light trucks are "technically achievable" by 2000. Other studies point to larger possible gains, particularly if consumers shift away from demand for high-performance options.

Results for three different scenarios are presented here. In all cases, new light truck CAFE is raised proportionally to new car CAFE. In all cases, new car fuel economy is assumed to begin rising from baseline in 1996. The scenarios are:

Option I: Raise new car CAFE to 32 mpg for MY 2000, and to 40 mpg by MY 2010 and thereafter

Option II: Raise new car CAFE to 37 mpg for MY 2000 and 2001, and to 40 mpg by MY 2002 and thereafter

Option III: Raise CAFE by 2% of its 1993 level in each year from MY 1996 to MY 2000, and by 2.5% of its 1993 level in each year from MY 2001 to MY 2010.

Analytic assumptions: Updated analyses of the impacts of raising CAFE are forthcoming from four separate sources: DOE's IDEAS model, EPA's Office of Mobile Sources, DRI/McGraw Hill, and the Consumer Automotive Response (CAR) model developed jointly by the Policy Offices of EPA and DOE. A complete presentation of outputs should be available by the end of the week.

The numbers presented here are preliminary, off-line calculations from OMS.

Emissions reduction: The preliminary emission reduction projections for 2000 and 2010 are as follows:

	MMTCe Reductions	
	2000	2010
Option I	1.5	15.8
Option II	5.1	32.1
Option III	0	4.7

Note that the reductions presented here are off a baseline developed using DOE's IDEAS model. In the IDEAS baseline projections fuel economy rises to 29.7 mpg by 2000 without any change in CAFE. The gains are a result of rising fuel prices and improved technology. Alternatively, new car fuel economy may not exceed mandated CAFE levels and vehicle travel may grow at a rate faster than projected in the IDEAS baseline. In this case, 40 - 60 MMTCe more reductions would be needed to stabilize emissions in 2000 and even greater reductions would be needed to maintain stabilization through 2010. Carbon benefits of raising CAFE would be larger. In 2000, Options I, II, and III would produce reductions of 3.8, 7.4 and 7.0 respectively. In 2010, the reductions would be 94.1, 115.7 and 77.5. In any case, raising CAFE standards guarantees that actual reductions in carbon emissions will occur.

Cost: Cost estimates for each of the three CAFE options are forthcoming. Raising fuel economy has several different kinds of costs. Higher CAFE requirements will increase the price of new vehicles by a modest amount. These technology costs are largely offset by fuel savings. Estimates of the cost of CAFE are highly sensitive to assumptions about technology costs. To achieve greater fuel economy, manufacturers will offer somewhat smaller cars with less performance, a vehicle attribute valued highly by consumers. The cost to consumers of these tradeoffs may be far larger than the commonly discussed technology costs.

Since American manufacturers produce a full line of vehicles and many foreign manufacturers produce mostly smaller cars, raising CAFE may disproportionately impact the domestic industry in the short run. However, rising CAFE may spur the domestic industry to invest additional effort in innovative technologies to improve fuel efficiency, just as high fuel costs in Japan have shaped auto production there. Estimates of the precise effect of the three CAFE scenarios on the auto industry are forthcoming.

Cost-effectiveness: Forthcoming

Stakeholders: Domestic auto manufacturers and auto workers oppose raising CAFE. Environmentalists have long contended that rising CAFE spurs technological progress, and is the only way to guarantee increased fuel economy and reduced carbon emissions.

Status: Analysis ongoing.

Staff contacts: Paula Van Lare, EPA/OAR (202) 260-3450; Jon Kessler, EPA/OPPE, (202) 260-3761; Lew Fulton, DOE/Policy (202) 586-1197; Camile Mittelholtz, DOT/OST (202) 366-4861.

Energy Supply Working Group:

**ES-21 — Energy Pricing Reform:
Cashout Federal Power Subsidies**

Description: Five Federal Power Marketing Administrations (PMAs) and the Tennessee Valley Authority (TVA) account for approximately 10% of national electricity generation. The price charged by the Federal utilities is substantially below that of investor owned utilities. For industrial customers, Federal utilities charge 29% less; for commercial customers it is 27%; and for residential it is 44%. The price difference is due, in part, to Federal utilities' access to very low cost hydro power. However, a significant portion of the price difference is due to numerous subsidies which result in an artificially low price for electricity, encouraging excess consumption and the addition of fossil-fired generation capacity.

Among the subsidies promoting excessive consumption and CO₂ emissions:

- PMAs do not amortize their loans on a regular, standard business practice schedule.
- Federal utilities receive below market rate (and below Treasury rate) loans.

Implementation: Price federal power competitively; additional revenues can be rebated to affected regions for energy efficiency or environmental remediation programs. Administrative action by DOE may be enough to reform PMA's pricing policies. Or change Congressional mandate, which currently sets PMA electricity "at the lowest possible rate," to "a rate equal to the lowest priced alternative."

Emissions Reduction: Medium to large. Energy sector model projects carbon reductions of 5 MMTC in year 2000 if power is priced at a market rate; carbon reduction would be larger if full historic cost recovery was required.

Cost: Net Federal outlays would decrease by \$1.3 billion if retained by the Treasury, less if rebated to regions. Since the removal of a subsidy will ultimately improve economic performance, there are little or no social costs associated with this option. There may be adjustment costs while the subsidy is being phased-out.

Cost Effectiveness: No-cost in dollars per tonne of CO₂ offset.

Stakeholders: Public power will oppose. Environmental and energy efficiency advocates will favor.

Status of Agency Analysis: Analysis using an energy sector/electric utility dispatch model has been completed.

Staff Contacts: Bruce Schillo, EPA/OPPE, 260-1030 (voice), 260-0512 (fax).

**U.S. Department of
Transportation**Office of the Secretary
of Transportation

Assistant Secretary

400 Seventh St., S.W.
Washington, D.C. 20590

JUL 12 1993

MEMORANDUM TO: Marc Chupka
Chief Economist
Office of Environmental Policy

FROM: Joseph Canny
Deputy Assistant Secretary for Policy
and International Affairs

SUBJECT: Policy Options for Global Climate Change

To follow-up on last Thursday's meeting, I have three comments on the transportation items included in the list of selected policy options for global climate change.

1. Item TT1 - Aggressively implement the transportation provisions (conformity) of the Clean Air Act (CAA). As I mentioned in an earlier meeting of working group chairs, the Department of Transportation objects strongly to inclusion of this policy option in the package. The conformity regulation required by the CAA is now in the final stages of development. It is approximately two years overdue, and we and the Environmental Protection Agency have a deadline mandated by a consent decree to have the final rules published by October 15. Secretary Peña is personally committed to have these rules issued as quickly as possible, because there is a tremendous demand among state and metropolitan area transportation planners, as well as the air quality community.

We believe it is inappropriate to reopen at this juncture the issues raised in the EPA options paper. Further, we expect that all of the outstanding issues will be resolved within the next couple of weeks, as a result of a planned meeting between Secretary Peña and Administrator Browner. The benefits of the conformity regulation as it emerges from that meeting can be counted in the base.

2. TI3 - SIP credits and other incentives for increasing transportation system efficiency. We seriously question the 20-40 MMT reductions estimate. Benefits at that level are likely to develop only if there are drastic (that is, politically unpalatable) requirements that would severely restrict travel in urban areas.

3. Item AT15 - End Federal preemption of state feebate programs.
We are reviewing the legal opinion that we previously prepared on this issue. However, the option paper indicates that there will be very modest benefits and a revised policy could meet strong objections from the auto industry. This is not a "no brainer".

On the other side of the coin, we would suggest possible inclusion of the following options:

Commercial Transportation

Off-road vehicles

Propane and CNG

Demonstrations of operating procedures and new technologies

Personal Transport Vehicles

Increased use of alternative fuels by fleets

Transportation Infrastructure

Telecommuting

Ensure infrastructure for alternative fuels

I will be happy to discuss this further if you wish.

F. G. ...
CCCCAQ

THE WHITE HOUSE
WASHINGTON

October 18, 1993

Dear Colleague:

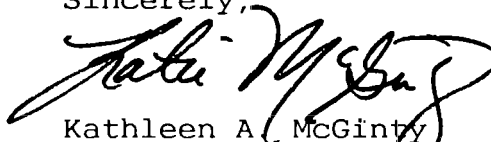
I would like to take this opportunity to extend an invitation for you to attend the President's unveiling of his Climate Change Action Plan. The ceremony will be held on the South Lawn of the White House at 12:00 noon on Tuesday, October 19, 1993.

In his Earth Day Address, the President announced this Administration's intention to return U.S. greenhouse gas emissions to 1990 levels by the year 2000. President Clinton will be announcing his Climate Change Action Plan to accomplish his goals as outlined on Earth Day in April.

If you are coming from outside the White House, you will need to plan on arriving at the East Visitors Gate of the White House with picture identification by 11:00 a.m. for the announcement on Tuesday. If you have any questions, please feel free to contact Mr. Trey Lindseth or Ms. Jennifer Colamonico on my staff at 456-6224.

I hope you will be able to join us at the ceremony, and I look forward to seeing you soon.

Sincerely,



Kathleen A. McGinty
Director, White House Office on
Environmental Policy

KAM/avl

CLIMATE CHANGE ACTION PLAN

Background Briefing
October 19, 1993

- Scientists and the environmental community agree that climate change is the highest-risk environmental problem we face.
- The President committed his Administration to respond by issuing a dual directive: to reduce our nation's emissions of greenhouse gases to 1990 levels by the year 2000, and to do so in a cost-effective way.
- After Earth Day, the White House Office on Environmental Policy (OEP) established a process to produce the plan.
 - OEP hosted the White House Conference on Global Climate Change on June 10-11, where 300 invited participants shared their views with about 800 who attended.
 - Climate Change Mitigation Group selected; Six working groups established: Energy Demand, Energy Supply, Transportation, Methane and other Gases, Sinks, Joint Implementation. The group consisted of representatives from EPA, DOE, DOT, Treasury, DOC, USDA, DOI, and White House Offices: CEA, OSTP, OMB, and DPC.
 - Interagency Analysis Team tasked with analyzing policy options. Co-chaired by OEP and CEA, involved economists and analysts from OSTP, OMB, EPA, DOE, USDA, DOC, DOT, Treasury. The policy options were analyzed as individual actions and in an integrated modeling framework.
- The President's Climate Change Action Plan is a detailed global warming strategy that demonstrates world leadership on a crucial issue. It reduces greenhouse gas emissions and its good for the economy.
 - The Plan relies on the positive link between environment and the economy -- relying on cost-effective and profitable pollution reductions.
 - The Action Plan takes the important first step toward protecting the Earth's climate system -- reducing U.S. greenhouse gas emissions to 1990 levels by the year 2000. But further actions will be required to protect the climate in the long term. The U.S. will lead both through domestic actions and international agreements.

OVERVIEW AND KEY ELEMENTS OF THE PLAN

THE CLIMATE CHANGE ACTION PLAN:

- Contains nearly **50 initiatives**, covering **all sectors of the economy**. This is an economy-wide problem that requires economy-wide solutions.
- Covers **all greenhouse gases** -- carbon dioxide, methane, nitrous oxide and other gases. Also includes forestry actions that preserve carbon stored in U.S. forests.
- Is designed for **rapid and aggressive implementation** and minimizes actions subject to legislative or regulatory delay.
- **Fosters partnerships** with business where focused government guidance and flexible approaches can produce cost-effective emission reductions. The plan stimulates investments in the technologies of the future, strengthening the American position in the global environmental technology marketplace.
- Is backed up with **real Federal resources** -- between \$200 and \$300 million per year annually of new and redirected funding between 1994 and 2000, a total of \$1.9 billion between 1994 and 2000.
- **Reduces the deficit** through two new policies. One would allow commuters the option of "cashing-out" employer-paid parking, by taking the value of the fringe benefit as taxable income. The second would permit private developers to upgrade existing Federal hydroelectric facilities and sell the extra generation in exchange for lease payments. These reforms generate revenues from new market transactions that help reduce greenhouse gases, and raise \$2.7 billion between 1994 and 2000.
- **Leverages over \$60 billion in private investment** between 1994 and 2000 in environmental technologies. These investments pay off for U.S. businesses and citizens -- the investments lead to over \$60 billion in reduced energy costs between 1994 and 2000, with continued benefits of over \$200 billion in energy savings between 2001 and 2010.
- Includes a **pilot program of joint implementation** to gain experience in evaluating investments in other countries for emission reduction benefits.
- **Will be actively monitored to review progress** toward meeting the President's goal, and will institute new programs as needed to ensure that emission reductions are made.
- **Establishes a White House team to develop strategies for long term emission reductions**, including emissions from automobiles and trucks.

KEY PROGRAMS BY SECTOR

Residential Sector

- **Energy-efficient mortgage initiative** to allow homeowners to finance efficiency improvements under conventional mortgages where the decreased energy bills more than offset the increased mortgage payment.
- More aggressive **appliance efficiency standards** on a wide range of household appliances to help reduce consumer energy consumption and utility bills. Standards are complemented with **innovative public/private consortia** that encourage manufacturers to develop more energy efficient appliances by offering guaranteed markets to the best technology.

Commercial Sector

- **Significantly expanded partnership programs** for energy efficiency in commercial buildings. These are modeled on successful efforts at EPA, and include an expanded EPA Green Lights program, and a new coordinated effort between EPA and DOE called the Energy Star Buildings (EPA) and Rebuild America program (DOE).
- Help fund **cost-shared demonstration** projects for commercial building technology in federal, state, and local government buildings and private buildings.

Industrial Sector

- **Motor Challenge** -- a partnership between industrial motor users (one of the biggest energy uses), manufacturers, utilities and DOE to promote efficient motor systems.
- Establish **market consortia** to purchase advanced energy-saving industrial equipment.

Transportation

- **Parking reform** that gives a worker the option to take the cash value of employer-paid parking as an incentive to reduce solo-commuting -- and to generate revenues (the "cash-out" accepted in lieu of parking benefit is taxable income).
- **One-year transportation strategy.** OEP/NEC/OSTP will lead a team to identify an implement regulatory or non-regulatory means to reduce greenhouse gas emissions from transportation -- the fastest growing sector.

Electric Utilities

- **Voluntary commitments from utilities** to reduce greenhouse gases. DOE has received letters of intent to negotiate limits on greenhouse gas emissions from about 60 utilities, representing over 60 percent of generation and CO₂ emissions from this sector.
- Expand **Integrated Resource Planning** assistance for state utility regulators to improve performance of utility conservation programs and renewable energy development.
- **Electric transformer standards** to increase transmission efficiency.

Methane and other Gases

- **Aggressive landfill methane capture rule** from EPA to limit methane emissions from landfills and to encourage capture for energy use.
- Expanded **Natural Gas Star** program at EPA to reduce methane leaks from natural gas pipeline distribution systems.
- **Voluntary agreements and partnerships with HFC and aluminum producers** to encourage state of the art process equipment to reduce potent greenhouse gas emissions from manufacturing operations.

Forestry Actions

- Expand USDA technical assistance to small landowners for **better forest management**, which increases carbon storage in standing forests.
- Expand EPA/USDA **recycling programs** that help reduce the demand for virgin timber for paper and pulp.

International

- **Joint Implementation pilot program.** Joint Implementation is undertaking emission reduction projects overseas, and will be a large part of many countries' plans in the future. However, the international framework needs further development. The President's pilot program will help build experience and advance international framework. The plan meets the 2000 target with domestic actions.

Monitoring and Assessment

- The Action Plan includes provisions for ongoing monitoring, evaluation, and possible revision if emissions trends indicate that more needs to be done to achieve the goal of returning emissions to 1990 levels. The plan also establishes White House chaired interagency task forces to develop long term climate change strategy, including emissions from transportation sector.

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STAKEHOLDER SUPPORT

Business Support

- Expect broad business support because of the flexibility inherent in the partnership and technical assistance programs. Many business interests stand to benefit from the plan -- e.g. firms who manufacture energy efficient products, methane capture equipment, building trades.
- The electric utility industry, aluminum and chemical industries have indicated a willingness to negotiate voluntary reductions in greenhouse gases.
- No industry, sector, fuel, or technology has been singled out to carry a heavy burden of emission reduction. The plan is fair to American business and workers.

Congressional Support

- Many Members of Congress who are concerned about climate change or energy efficiency have indicated support for the Action Plan. It expands some popular EPA programs and breathes some life into the Energy Policy Act of 1992, which received wide support. Forestry measures have wide support on the Hill, and we are moving the joint implementation agenda forward, which also has much Congressional support.

Environmental Community

- Environmental groups should support the Plan because it proposes to expand programs that they have long supported and because the Plan represents a serious step toward greenhouse gas emission reductions.

International

- The U.S. will regain leadership on climate change by proposing a detailed plan that takes direct aim at returning U.S. greenhouse gas emissions to 1990 levels by the year 2000.
- Including control measures for HFCs sends a strong international signal for other countries to follow suit.
- Pilot program on joint implementation will signal support for the concept of international mitigation strategies, while strict rules and criteria proposed will alleviate concerns regarding exaggerated emission reduction claims.

NOT FOR DISTRIBUTION

State of Scientific Understanding of Climate Change

J. D. Mahlman, D. Albritton, and R. T. Watson

This brief summary is largely based on the IPCC scientific assessments and summarizes our views of what already is known and what remains uncertain concerning the greenhouse warming issue.

What Scientists Understand Very Well

- * The atmospheric abundances of greenhouse gases (carbon dioxide, methane, nitrous oxide, and halocarbons) are increasing due to human activities.
- * Greenhouse gases absorb infrared radiation, altering the atmospheric radiative balance.
- * Greenhouse gases affect the Earth's climate for centuries because of their very long residence times and the associated time response of the climate system.
- * Changes in other substances partially offset the impact of greenhouse gases (stratospheric ozone depletion and increases in sulfate aerosols and carbonaceous soot).
- * Natural climate variability makes it difficult to detect an enhanced greenhouse warming.
- * Global surface temperatures have increased (0.3 to 0.6°C) over the past century.
- * Global surface temperatures were anomalously high in the late 1980s, 1990 and 1991.
- * No inconsistency is found between surface, radiosonde and satellite observations of temperature trends during the 1980's.
- * Substantial reduction of key uncertainties (detailed quantification of the timing, magnitude and regional patterns of climate change) needs a decade or more.
- * The stratosphere is expected to cool significantly because of increases in carbon dioxide and decreases in stratospheric ozone.

What Scientists Understand Reasonably Well

- * Observed global temperature changes are not inconsistent with model predictions especially if allowance is made for the cooling effect due to anthropogenic aerosols and stratospheric ozone depletion. Natural climate variability could be the cause of the observed temperature increase, alternatively, natural variability could have masked an even larger human-induced increase.
- * Doubled carbon dioxide abundances are predicted to increase temperatures by 1.5 to 4.5 °C.
- * Significant warming is expected by the mid-21st century (1-5 °C), assuming that the global emissions of greenhouse gases continue at the levels of the central IPCC scenarios.
- * Sea level is expected to rise for many centuries (4-12 inches by the middle of the next century)
- * Greater warming is likely in the northern polar winter.
- * Reductions in northern, but not southern, sea ice are expected.
- * Global mean precipitation will increase: changes in regional distribution are less certain.
- * Climate change will impact ecological and socio-economic systems. Changes in temperature, precipitation and soil moisture will affect water availability, agricultural productivity, and will alter the productivity and boundaries of natural terrestrial ecosystems.

What Greenhouse Predictions are Less Certain

- * The prediction of mid-continental summer dryness.
- * The prediction that ocean overturning will diminish.

The Most Serious Uncertainties that Need to be Resolved

- * Future atmospheric abundances of carbon dioxide.
- * Cloud-radiation feedbacks.
- * Regional-scale predictions of climate change.
- * Changes in the frequency and intensity of tropical storms.

SELECTED QUESTIONS AND ANSWERS ON THE
PRESIDENT'S CLIMATE CHANGE ACTION PLAN

THE APPROACH: PARTNERSHIPS/FLEXIBILITY/VOLUNTEERISM

Q: What percentage of the plan is voluntary?

A: The plan is really a strategic combination of carrots and sticks -- for example, efficiency standards for appliances are reinforced by market-enhancing programs with the private sector. We are all responsible for causing greenhouse gas emissions, and through this plan we will all be responsible for helping to reduce them. This approach has demonstrated results where it has been tried -- our plan expands this approach to new areas.

Most of the estimates for the partnership programs include a certain amount of reenforcement from utility demand-side management programs, where utilities pay people to be efficient, and from standards -- so it's a little bit misleading to try to split out the effect of the programs alone. But as a rough estimate, it's one-half to two-thirds. Keep in mind that if we're not on track, we will adjust our programs and efforts so that the President's target is reached.

Q: How much of the plan is under existing authority? How much needs legislation?

A: The plan is designed for rapid implementation and minimizes actions likely to be delayed through legislative or regulatory processes, in order to meet the year 2000 goal. About 90% of the emissions reductions are from administrative actions. About 10% require legislation. The parking "cash-out" reform, and the hydroelectric leasing reform require legislation.

Q: Let me get this straight: You ducked everything politically difficult. You squeaked by on voluntary programs -- but only because you added sinks. You backed away from a campaign pledge to do CAFE. You won't commit to anything beyond 2000 -- and you won't commit to renegotiate a good treaty. What would Senator Gore say?

A: Some people have very short memories. Just a year ago, the US was a world FOLLOWER on the environment. George Bush was pulled to Rio by the American people and by other countries. President Clinton, with this plan, re-establishes the United States as the world leader on the global environment. President Clinton has committed the U.S. to reaching a target within a time-table and this Administration will do whatever is necessary to get there.

I heard someone say this plan could have been George Bush's. Whether or not he could have prepared this plan, HE DID NOT.

Q: But didn't Bush have a program like this?

A: No he didn't. Although the Bush Administration did outline a series of climate initiatives, there are major differences.

The first is Leadership: President Bush was largely a follower on international environmental issues. Under his Administration, the U.S. was among the most reluctant nations to participate in the development of the climate convention in Rio, and did so only after the commitment reduce to 1990 levels in 2000 had been taken away. President Clinton made that commitment, and with this plan, the U.S. is regaining its leadership position.

Second: Funding. The Bush plan was a plan that existed mostly on paper. The Bush program was proposed, but left essentially unfunded -- in the agencies, nothing really changed and most of the new programs were never initiated. The Clinton strategy is accompanied by real resources -- almost \$2 billion in mostly redirected funding between now and 2000.

Finally, the program itself: The Clinton strategy is broader and more diverse (has two times as many initiatives). The Bush programs that were working have been built into our "baseline" -- the starting place for our strategy, and some of the successful programs operating in the agencies on shoestring budgets during the Bush years are being expanded.

(see side-by-side comparison, below)

Q: This voluntary stuff seems pretty squishy. How real are these programs?

A: THE PARTNERSHIP PROGRAMS ARE BASED ON SUCCESS. For example, the EPA Green Lights program began in January, 1991. So our savings projections are based on two and a half years of successful program experience. Participants in the program sign a voluntary contract with EPA which establishes their commitment to achieving results. The Green Lights savings estimates have received substantial independent review. The "voluntary" program estimates are based not only on the success of the program itself, but also on the fact that they are strengthened by utility DSM programs and in many cases, standards. (We took extreme care not to "double count".)

THE PARTNERSHIP PROGRAMS WILL BE STRICTLY MONITORED. For example, partners in the Green Lights, Energy Star Buildings and Rebuild America Programs will report their progress in completing energy-efficient upgrades at least once each year. EPA collects and analyzes the implementation data, thus tracking program success. If program results were to fall below expectations, the recruiting of participants could be accelerated. EPA's experience with Green Lights has shown that recruitment is primarily limited by internal staff and budget constraints, not by the interest of outside parties.

(See the voluntary section for more detail -- below)

Q: How did you choose the programs?

A: President Clinton instructed his administration to produce a cost-effective plan and issued a "clarion call, not for more bureaucracy or regulation or unnecessary costs, but instead for American ingenuity and creativity, to produce the best and most energy-efficient technology."

In response to that call the White House formed a groundbreaking interagency task force, the Climate Change Mitigation Group, to identify the best opportunities for reducing greenhouse gas emissions. This interagency group relied on the expertise of scores of program managers, analysts, and economists and the experience of people around the country who have been engaged in energy efficiency work, technology development, and agriculture.

EMISSIONS PROJECTIONS

Q: How much do emissions rise without your plan between 1990 and 2000?

A: Emissions grow from 1462 to 1568 million metric tons of carbon equivalent (MMTCE), an increase of 7 percent.

Q: What happens to CO2 emissions in this plan?

A: CO2 rises slightly, about 2% -- that's about 24 MMT. HFCs also rise, although their growth is cut in one-half. Cuts in methane and nitrous oxide emissions make up the difference.

(The carbon number above includes CO2 offset by forestry)

Q: What percentage of the reductions come from non-CO2 sources?

A: About one-third.

(For other questions about numbers, see the first few pages of the plan following the overview)

CONTINUOUS MONITORING

Q: What if the plan doesn't deliver the promised reductions?

A: Remember, this is NOT a set and forget plan! In order to meet the goal of returning greenhouse gas emissions to 1990 levels, the President is committing his Administration to a biannual evaluation of emission trends and program effectiveness. In reality, we will be updating the plan even sooner in order to meet international commitments associated with the treaty. The Office on Environmental Policy will chair an interagency task force to monitor progress and pursue additional policy initiatives if needed to attain our goal.

In addition, to ensure that we are rolling, a major climate conference will be held in Washington six months from now with all of the key stakeholders -- from government, business and the environmental community.

The Action Plan detailed here is the beginning of a process, not a one-time product. This Administration is committed to seeking out all cost-effective actions that will reduce greenhouse gas emissions and improve our quality of life through economic growth, job creation and environmental protection.

Q: What were the next actions? If something happens and you need another good program, what would it be?

A: We're confident that the plan will achieve its expected results. Of course, our plan does call for extensive monitoring and adjustments to keep the emissions reductions on track. If for some reason the plan needs adjusting, we'll look again at all of the options available -- new initiatives, changes to existing programs, or more resources for the programs that are working best.

Q: How committed are you to the 1990 goal? If, in 1997 you discover that the plan is falling short, will you be willing to take strong measures to make the target?

A: Yes. Monitoring and evaluation is one of the most important elements of this plan (see above). Starting next year, and every two years after that we'll take a long hard look at our programs, and modify them accordingly. We're absolutely confident that we'll meet our commitment.

INTERNATIONAL NEGOTIATIONS

Q: If you are so sure about the plan making its goal, will you renegotiate the treaty? If were really serious about climate change, you would agree to hard targets and timetables, in a treaty that has teeth.

A: This plan establishes the U.S. as a world leader in climate. We're doing everything called for under the treaty and more. Our position in the next negotiating session will certainly reflect this progress, and reflect whatever progress is made by the other countries.

POST-2000

Q: What happens after the year 2000?

A: The initiatives in the President's plan will continue to achieve emission reductions relative to expected levels beyond the year 2000. Climate change is a long term problem; and the Administration will sustain a long term effort.

This plan by itself is unlikely to stabilize emissions at 1990 levels under reasonable assumptions regarding economic growth, the diffusion of existing technologies, and new technology development.

Therefore, we will continue to develop policies to address the longer term trends in greenhouse gas emissions. The White House National Economic Council, Office on Environmental Policy and Office of Science and Technology Policy will lead a task force to recommend strategies beyond 2000. This long term strategy will build on this plan's support of the development and diffusion of technologies that reduce greenhouse gas emissions. The group will examine all budget, technology, R&D, regulatory and economic policies that could impact emissions beyond 2000, and make initial recommendations by the end of 1994.

Much of the anticipated growth in greenhouse gas emissions after the year 2000 will be in the transportation sector. As such, the President is directing his Administration to develop cost-effective measures to significantly reduce greenhouse gas emissions from personal motor vehicles, including light cars and trucks, and make recommendations in one year (see above).

Q: How short are you in 2010?

A: We haven't fully evaluated the impacts of these new programs beyond the year 2000. The R&D programs and the programs that create markets for efficiency will lead to technical innovation and new designs in ways that haven't yet been quantified.

Q: Why won't you COMMIT to stabilizing emissions in 2010?

A: We're not going to stop when we reach the first milestone. Climate change is a long-term problem that will require sustained effort, and the United States will continue to cut greenhouse gases. The treaty calls us to stabilize emissions at a level that prevents "dangerous anthropogenic interference with the climate system" in a "time frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner" -- and that's what we'll do.

BUDGET, ECONOMICS AND JOBS

Q: How much do the programs cost to operate?

A: This climate plan is backed up with real resources, about \$1.9 billion in Federal funding between 1994 and 2000, most of which is redirected money.

However, the plan as a whole reduces the deficit, through two new policies. One would allow commuters the option of "cashing-out" employer-paid parking, by taking the value of the fringe benefit as taxable income. The second would permit private development at existing Federal hydroelectric facilities in exchange for lease payments. These reforms would raise \$2.7 billion between 1994 and 2000.

Q: Congress has historically left many of these programs underfunded. Even this year, a Democratic Congress did not fully fund the President's FY 1994 request for some of these programs, such as the EPA programs. What makes you think they will be funded in the future?

A: The President and Vice President have made their commitment to the climate programs abundantly clear, and we will ensure that this plan is funded -- this year, and every year. And it will be funded at levels that get us to our commitment.

Congress made this year's decisions without knowing how the pieces of the plan fit together toward the overall climate strategy. With the release of the plan, and with a concerted Administration effort in the future appropriations bills, we will get the funding necessary to meet the President's goal.

Q: How do these programs benefit the economy? Do they really create jobs?

A: Through the programs, businesses and homeowners will have greater access to technologies that save them money. Now it is difficult to find energy efficient technologies and the expertise needed to get them in place. Using these technologies cuts costs, makes companies more competitive and allows them to invest in new designs, new manufacturing and new jobs. (It also is more labor-intensive to install energy efficiency than build power plants.)

TRANSPORTATION

Q: If transportation GHG emissions are increasing faster than emissions in other sectors, why isn't more action being taken in the transportation sector?

A: The plan emphasizes long-run strategies to deal with an issue that has long-term implications. As part of the action plan, President Clinton is directing the White House National Economic Council, Office on Environmental Policy, and Office of Science and Technology Policy to develop measures within one year that will significantly reduce greenhouse gas emissions from personal motor vehicles.

This task force will:

- Seek broad public input from industry, state and local government, the environmental community and others
- Cut greenhouse gas emissions from cars and light trucks while meeting or exceeding all vehicle safety and clean air requirements
- Include regulatory and/or non-regulatory actions.

Q: Why did you break your campaign pledge and not increase the CAFE standard?

A: The Administration is taking a different approach at this point.

1. Transportation Strategy Task Force: In addition to the transportation measures included in the plan, we've established a White House group to prepare a transportation strategy. (see above)

2. Clean Car: By working with the auto industry through the Clean Car Initiative, we're pursuing a whole new generation of cars. These cars are not incrementally more fuel efficient -- they're miles ahead. And we're helping to position Detroit for world-leadership into the 21st century. These new cars should have fuel efficiency 300% better than the current standard and all the safety and affordability of their competition, and they could hit the market in just 10 years.

Due to the lead time needed to change CAFE standards and have those changes reflected in vehicle design, CAFE is unlikely to produce significant improvements in the technology of new vehicle offerings before model year 1998 or 1999. Then, since new vehicles replace less than a tenth of the on-the-road fleet in any given year, the impact of CAFE on GHG emissions before the year 2000 would be minimal -- less than 5% of our total.

(Note: We don't want to rule out CAFE, just point out that it isn't the silver bullet it's cracked up to be.)

FORESTRY

Q: What are "sinks" and why are they in the Plan?

A: Scientifically, what matters to the climate system is the atmospheric concentration of greenhouse gases -- and it doesn't matter how you reduce them. Since atmospheric concentrations are the result of both emissions and uptake (plants take in CO₂ from the atmosphere as they grow, through photosynthesis), a good plan should address both -- and use the most cost-effective options available. This plan does.

In fact, the forestry actions themselves address both emissions and uptake: By reducing cutting of forests, the plan prevents additional emissions, and extra tree planting and tree growth take carbon dioxide out of the atmosphere (that's why they are called "sinks"). The forestry actions are some of the most cost-effective actions in the plan.



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GLOBAL CLIMATE COALITION

February 3, 1994

Mr. Thomas F. McLarty
Chief of Staff to the President
The White House
1600 Pennsylvania Avenue, N.W.
Washington, D.C. 20500

Dear Mr. McLarty:

The Global Climate Coalition (GCC) has been briefed by members of the State Department that the US delegation to the 9th Intergovernmental Negotiating Committee (INC) meeting will state that the commitments of the industrialized countries under the Framework Convention on Climate Change are "not adequate". We are very concerned this may be perceived as the first step towards mandatory targets and timetables.

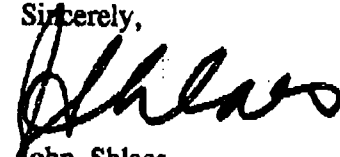
The GCC believes this is an inappropriate policy position for the US government and that it is premature to consider reopening the treaty because:

1. There is no new scientific information to justify such a change in policy. The Intergovernmental Panel on Climate Change (IPCC) Second Assessment Report is not due to be completed until the fourth quarter of 1995. Scientific data since the signing of the Framework Convention does not support increased concern over the possibility of man-induced global warming.
2. The relevant technical, social, and economic impacts of climate change and the cost of mitigation efforts are not established with any reasonable degree of certainty. Mitigation efforts which go beyond those called for in the treaty and in President Clinton's Climate Change Action Plan could have a significant negative effect on the US and international economy.
3. The Climate Change Action Plan, with its correct emphasis on voluntary actions to reduce greenhouse gas emissions, is less than four months old. Many businesses and trade associations have indicated that they will participate in cost effective voluntary action plan programs, such as Climate Challenge, Motor Challenge and Green Lights. To conclude that the efforts now being undertaken are "not adequate", even before these programs are underway, could be seen as a repudiation of voluntary actions and could discourage participation by many organizations in these programs.
4. National Action Plans by developed countries, including the U.S., are currently unavailable or unassessed and are not required to be filed until eight months from now. All of these plans must be evaluated before a determination of "adequacy" can be made.

5. There has been no "process" for the development of a US position on the adequacy of treaty commitments. Such a process should include careful evaluation of the views of the public, the business and scientific communities, the members of Congress and the various agencies within the federal government working with voluntary programs.

Industry has worked in good faith with the U.S. government in the development of the treaty, and President Clinton's Climate Change Action Plan and its implementation. Precipitous action by the United States to change the treaty before it is implemented is not in keeping with the spirit of government/industry partnerships and cooperation. We urge the Administration to review the points we have made and revise its position.

Sincerely,



John Schlaes
Executive Director

enclosures



GLOBAL CLIMATE COALITION

GLOBAL CLIMATE COALITION MEMBERSHIP

Board Membership

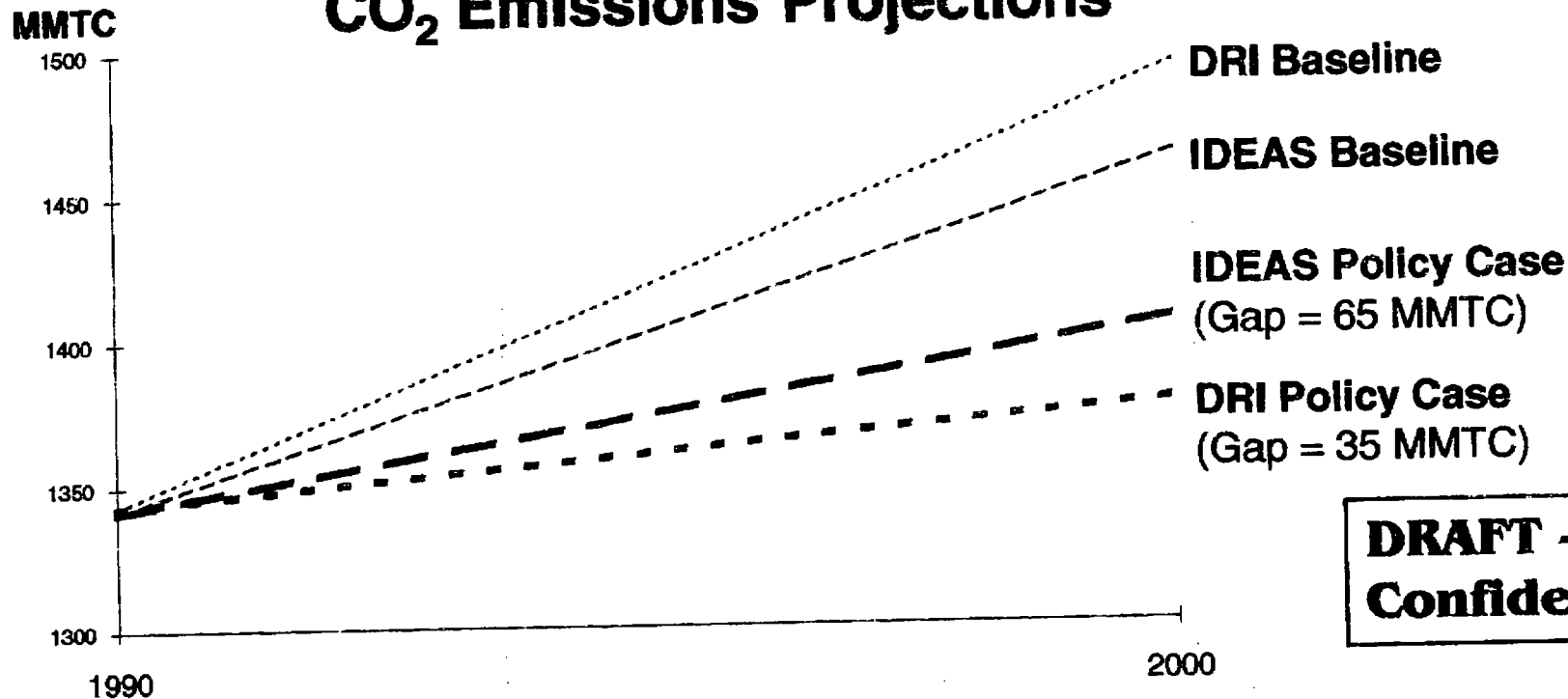
Aluminum Association, Inc.
 American Automobile Manufacturers Association
 American Electric Power Service Corporation
 American Forest & Paper Institute
 American Mining Congress
 American Iron & Steel Institute
 American Petroleum Institute
 American Portland Cement Alliance
 Association of American Railroads
 Atlantic Richfield Company
 Chemical Manufacturers Association
 Cincinnati Gas & Electric Company
 CSX Transportation, Inc.
 Dow Chemical Company
 Drummond Company
 Duke Power Company
 Duquesne Light Company
 Edison Electric Institute
 ELCON
 Exxon
 Illinois Power Company
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 National Coal Association
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 Northern Indiana Public Service Co.
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 Railway Progress Institute
 Shell Oil Company
 Union Pacific Railroad

F Ennis (CCM)

CO₂ Emissions Projections



- EPA requested DRI calculate the effect of the proposed mitigation plan. An alternative representation of the energy sector would help bound a reasonable range of projected CO₂ reductions resulting from the implementation of the various elements of the mitigation plan.
- At EPA's direction, DRI implemented in its energy model: (1) a 0.7% annual electricity demand growth rate (this represents a larger reduction from baseline growth rates in the DRI model than IDEAS); (2) aggregate non-electric sectoral fossil fuel changes as projected by IDEAS (expressed in percentage terms), including fuel switching in the electric sector due to hydro, other renewables, and natural gas policies (expressed in quads); and, (3) the effects of a 4.3 cents/gallon gasoline tax. (The effects of the gasoline tax were included in IDEAS baseline emissions estimates, but not in DRI's baseline.)
- The effect of these policies reduces CO₂ emissions by 119 MMTC compared to DRI baseline levels, with year 2000 emissions 35 MMTC above 1990 levels. In IDEAS, the same policies resulted in a 57 MMTC reduction and a 65 MMTC gap.

Alan Krupnick
EXECUTIVE OFFICE OF THE PRESIDENT
COUNCIL OF ECONOMIC ADVISERS

URGENT

DATE: 9/30/93

TO: Joe Stiglitz
Alan Blinder

(Economic
CCMG)

FROM: Jonathan Wiener

Subject: Climate Action Plan & Jobs

Attached are a revised memo,
and the EPA analysis.

If we want this issue
resolved / nailed down, we
probably need to act expeditiously
— i.e. — send the memo today or shortly.
(I've already advised Marc Chupka,
Karl Hanke and Abe Harpel
of our views by phone. A call
to Katie might also do the trick.)

cc: Rob Wescott
Alan Krupnick
Tom O'Donnell
Did this go
out

October 1, 1993

MEMORANDUM FOR KATIE MCGINTY
Director, Office on Environmental Policy

FROM: JOE STIGLITZ

SUBJECT: **Employment effects of Climate Change Action Plan**

The Climate Change Action Plan appears to be shaping up very well. One issue of essential economic policy has been raised recently that I felt it important to mention to you. I and my macroeconomic colleagues at CEA have reviewed the preliminary efforts to project the impact of the Climate Change Action Plan on future employment levels, undertaken by DOE and EPA as they were requested to do. We conclude that, for both methodological and substantive reasons, government agencies should not attempt to *quantify* the jobs impacts of the Action Plan, whether in the action plan text, in an ancillary document, or otherwise. Instead, the Action Plan should contain a *qualitative* statement of the important new jobs opportunities it will bring.

Overview and Conclusion

We firmly believe that intelligent environmental policies can create new job opportunities in environmental technology and in a more efficient economy. However, judging from the quantification efforts by DOE and EPA regarding the climate change action plan, we believe equally firmly that strained or shortcut attempts to quantify a precise number of jobs created will do more to harm the Administration than to help it. In the long run, hasty and unduly precise jobs forecasts will only undermine the adoption of economically benign environmental policies.

Forecasting the jobs impact of high-profile Administration policies is not a minor issue, nor is it confined to the environmental policy context. The problem of forecasting macroeconomic and employment impacts arises across a variety of policy issues, from the Budget to Health Care, and must be entrusted to the economics advisers to the President to handle in a consistent and careful manner; non-consensus, unreviewed forecasts only boomerang to haunt the Administration -- and the President -- when more sober analyses are conducted and the Administration must disavow preliminary estimates. This is especially true when, as in this instance, the jobs forecast has been performed based on premises and methods that are inconsistent with calculations for other policy issues, and with

the Climate Change Action Plan itself.

Therefore, the Action Plan should contain a *qualitative* statement of future employment effects, emphasizing the new opportunities for jobs created in industries and occupations that will help lower national emissions. Meanwhile, EPA should expressly withdraw its jobs estimates to avoid any public confusion.

Specific forecasting efforts by DOE and EPA

DOE and EPA have been requested to project the impact on employment of the forthcoming Climate Change Action Plan. We understand from DOE that their effort to project the employment effects of the action plan showed no clear net effect on the economy. DOE suggests that the action plan could describe its impact on employment in qualitative terms, fostering a gradual positive transition in employment from higher-emissions-associated occupations to new opportunities in lower-emissions-associated occupations. We agree that such a statement would be appropriate.

EPA asked DRI to use its macro model to estimate the effect of the action plan on employment in each year through 2000. We believe the EPA/DRI estimates are rendered essentially meaningless by the following problems:

1. EPA/DRI's estimates of the changes in employment are not statistically significantly different from zero. Thus they cannot be relied on as estimates of real jobs.
2. EPA/DRI's run starts from a very different baseline from the IDEAS baseline: DRI assumes almost twice as rapid growth in electricity demand (1.9%/year) as does IDEAS (1.0%/year). But for some reason EPA/DRI assumes that the action plan will bring electricity demand growth down to the same absolute level as is projected in the IDEAS model (0.7%/year).
 - A. It is implausible that the same policies to increase the market penetration of energy-efficient technologies would achieve a 30% reduction in electricity demand growth from the IDEAS baseline but a 63% reduction from the DRI baseline. This assumption in the DRI run renders it facially invalid.
 - B. The magnitude of EPA/DRI's calculated jobs impact is only an artifact of the choice of baseline, not a result of the policy measures in the action plan. If DRI had used the same baseline as IDEAS, the estimated jobs impact would have

been closer to zero.

C. We are mystified as to why EPA did not ask DRI to use the same baseline assumptions as agreed by the Administration for use in the climate change action plan and as used in the IDEAS model. The CCMG and IAT spent weeks working to achieve consensus on these assumptions, and in particular the projection of future electricity demand growth -- a factor on which EPA especially argued for using a lower growth rate estimate. The Administration cannot now use one baseline to project GHG emissions but another baseline to project employment effects.

3. EPA/DRI's estimates of the changes in aggregate employment each year (in either direction) are so small that they would be lost in the noise of larger changes in the economy. (This is of course a distinct point from the statistical insignificance of the estimates themselves.)
4. For the purpose of the climate change action plan, EPA/DRI's macro estimate is internally inconsistent. It fails to account for the increased GHG emissions that would occur as a result of the higher economic growth and employment it projects. Put another way, it takes a general equilibrium approach to employment levels but only a partial equilibrium approach to GHG emissions. The reason that employment is projected to rise by the EPA/DRI forecast is that the energy and labor savings resulting from reduced electricity demand growth -- which if considered alone would reduce employment -- are freed up to be "redirected to other uses." If so, those other uses of energy and labor (and the projected slightly higher overall GDP) will also emit GHGs, but the EPA/DRI forecast omits this fact.

cc: Marc Chupka, OEP
 Abe Haspel, DOE
 Karl Hausker, EPA

MEMORANDUM

FROM: Bruce Schillo, EPA

TO: Abe Haspel, DOE
Mark Chupka, OEP
Jonathan Wiener, CEA

DATE: September 21, 1993

RE: DRI Macro Runs

Below is a brief summary of the key findings of DRI's macroeconomic analysis of the climate change mitigation program.:

	Change In Employment	Change In Direct Energy Expenditures (\$ billion)	Change In Gross Government Expenditures (\$ billion)	Change In Gross Private Expenditures (\$ billion)
1994	(1,000)	(\$5)	\$0.03	\$1.84
1995	4,000	(\$7)	\$0.16	\$4.97
1996	4,000	(\$10)	\$0.19	\$7.80
1997	23,000	(\$13)	\$0.20	\$8.60
1998	44,000	(\$17)	\$0.03	\$9.82
1999	68,000	(\$20)	\$0.05	\$11.62
2000	51,000	(\$24)	\$0.32	\$12.66

- Based on assumptions provided by DOE, demand for energy drops due to adoption of improved technologies.
- Consumption of energy inputs is lowered, and energy-related capital and labor inputs are redirected to other uses. Potential GDP rises; the general efficiency improvement allows the economy at full employment to produce more.
- In year 2000:
 - GDP is 0.2% higher
 - New job creation is up 51,000; new job creation is 0.5% larger than in the base case
- The assumption regarding a 0.7% electricity demand growth rate through the year 2000 is responsible for the majority of energy savings and capital and labor redirection.
- The assumption that \$5 billion in savings can be achieved in 1994 for only \$2.1 billion in combined government and private expenditures allows for a relatively easy redirection of capital and labor. The savings/expenditure ratio is similar in later years.

9/23/93; 17:16:00

1 of 1

MEMORANDUM

FROM: Bruce Schillo, EPA

TO: Abe Haspel, DOE
Mark Chupka, OEP
Jonathan Wiener, CEA

DATE: September 21, 1993

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- The assumption that \$5 billion in savings can be achieved in 1994 for only \$2.1 billion in combined government and private expenditures allows for a relatively easy redirection of capital and labor. The savings/expenditure ratio is similar in later years.

July (CCMC)

TITLE: Conservation Reserve Program

DESCRIPTION: This USDA program was designed to remove highly erodible and some environmentally sensitive lands from cropping in an effort to reduce erosion and crop overproduction. Land is enrolled for a period of 10-15 years and must be put in permanent cover (such as grasses or legumes; trees are discussed under tree planting). Currently there are about 36.5 million acres of land enrolled in CRP through FY 92 (2.4 million acres in trees, 34.1 million acres in grasses). Maximum potential enrollment under the 1990 farm bill is 45 million acres.

In late 1995, CRP contracts will begin to expire unless authorization for them is continued in the next Farm Bill. If the contracts are allowed to expire, many CRP acres may go back into production, with a concomitant loss of carbon to the atmosphere both from foregone grasses and trees as well as increased crop production activities.

IMPLEMENTATION: Extend/modify the CRP in the 1995 Farm Bill. The current authorization allows extension of CRP contracts on environmentally sensitive acreage for 5-10 years. CRP could also be extended specifically for tree planting, which contains much of the carbon benefits of this program. This would be dependent on appropriations. Modifications include contract extensions or easements with or without haying and grazing privileges, cost-sharing of fencing and watering facilities for assisting conversion to livestock production, transfer or purchase of crop acreage base, or in some circumstances, outright government purchase of CRP land. Another possibility is to link carbon sequestration and other environmental benefits in a credit system that the private sector can buy into through an expanded Fund for Forestry Investment type mechanism. The private sector could buy and trade environmental chits.

GHG REDUCTION: Soil organic carbon (SOC) is expected to increase on these soils. As a conservative estimate, SOC can be expected to increase 10-15% total over 10 years. These damaged soils are low in soil organic matter (0.3-0.5%). If there are 6 Mg C per acre/1% SOC (range from 0.5% to 1.5% SOC), then SOC could be expected to increase 0.2-0.3 Mg per acre on this land. That is 7 to 10.5 million Mg for 35 million acres over the 10 year period (approximately 1 MMTC/y from 1990 to 2000). Follett (1993) estimates 0.6 to 1.8 MMTC/y in 2000.

Planting	Acreage		Carbon Benefit
	2000	2010	
	M acres		MMTC/y
Trees	2.4	4	9
Grasses	34.1	1	1
Total	36.5	5	10

Trees have been planted to 2.4 million acres of CRP land with expected carbon sequestration of 4 MMTC/y by 2000 and 9 MMTC/y by 2010. If the entire program is maintained as is at 36.5 million acres, CRP land would sequester about 5 MMTC/y in 2000 and 10 MMTC/y in 2010. Further increases in enrollment would increase these figures, especially if more tree acres were enrolled.

Additional environmental benefits of CRP include: commodity supply management (in times of excess production), soil erosion control, water quality benefits, and wildlife habitat improvements.

COST: The cost of the rent on the land is considerable. In FY 92, CRP payments totaled \$1.74 billion for 36.5 million acres, that is, approximately \$49.30/acre. If CRP expands to 40 million acres by 1995, annual cost will be about \$2 billion. Because CRP enrollment entails temporary retirement of commodity program base acres and may increase crop prices, federal outlays for commodity support programs are reduced by approximately \$0.9-1.0 billion/y. The exact amount is difficult to calculate because of annual variation in deficiency payments and set asides.

Modifications of CRP could also reduce program cost. An extension of only the most environmentally sensitive acreage (say 17 million acres) would more than halve federal outlays. Eighty five to 95% of the treed acres (2.4 million) are expected to stay in trees without rental payments. Extensions with haying privileges at reduced rental rates or cost-sharing for conversion to livestock would substantially reduce costs but preserve soil carbon and other benefits on the land. Long-term easements, while more expensive in the short run, would be cheaper over the long run. A mechanism that would allow the private sector to support these environmental benefits would help establish a value for carbon and other environmental benefits.

COST EFFECTIVENESS: CRP has currently reduced base acreage by 23.2 million acres, with a concomitant savings in farm program outlays. Estimates of the savings vary from \$0.9-1.0 billion/y (John Miranowski, USDA/ERS). CARD has estimated \$2.1 billion/y in savings for the year 2010 if CRP is maintained contrasted with retaining only 17 million acres in CRP and the rest of that acreage going back into program crops (Reese & Bouzaher, 1993).

In terms of dollars per carbon stored cost of CRP in 2000 is around \$200/MTC.

Eighty percent of the carbon gain is in the trees, which is likely to be maintained without CRP payments. Rebidding and reduction of acreage in and extended CRP would increase the cost effectiveness. Much of economic and environmental benefits of the grassed CRP land is to soil erosion, water quality, etc. CRP is saving an estimated 633 MMT of soil annually from erosion.

AFFECTED STAKEHOLDERS: Administration of CRP is through USDA/ASCS and SCS.

AFFECTED STAKEHOLDERS: Administration of CRP is through USDA/ASCS and SCS.

Farmers, ranchers, and cattlemen will be affected.

STATUS OF ANALYSIS: Much of the analysis has been completed by USDA and EPA. Exploration of cost of modifications will require additional analysis.

STAFF CONTACTS:

Carol Whitman, USDA	Tel: 703-235-0918	FAX: 703-235-9046
Steve Winnett, EPA	Tel: 202-260-6923	FAX: 202-260-6405
John Miranowski, USDA	Tel: 202-219-0455	FAX: 202-219-0029

TITLE: Conservation Practices on Croplands

DESCRIPTION: There is a long-term trend toward adoption of conservation practices among US farmers. This has been aided by the cross-compliance provisions in the 1985 and 1990 farm bills which require farmers that have highly erodible land to apply an approved soil conservation system whenever it is planted to a crop in order to retain eligibility for farm program benefits . The use of conservation tillage in the US is projected by some to increase from the 1992 level of 31% of total cropland (88 million acres) to somewhere between 57% and 76% in 2030, 160 and 210 million acres, respectively.

Conservation practices include conservation tillage (no-till, ridge-till, and mulch-till), which leaves a large portion of the previous crop's residues on the soil surface, increasing the amount of organic carbon in agricultural soils. Another practice is winter cover cropping, which provides carbon benefits by incorporating additional crop biomass into the soil. Both types of practices reduce soil erosion.

IMPLEMENTATION: Farmers participating in the commodity support programs and other USDA programs (FmHA, CRP, etc.) are subject to the cross-compliance provisions of the 1990 Food, Agriculture, Conservation and Trade Act. These provisions apply to highly erodible land. Options to increase conservation practices include:

- (1) Cross compliance could be extended to all farm program land.
- (2) In order to accelerate and extend adoption of conservation practices, Agricultural Conservation Program (ACP) provides cost share for conservation practices; this funding could be increased.
- (3) States currently provide tax incentives for the purchase of conservation tillage equipment. The federal government could also provide tax writeoffs for conservation investments.
- (4) The federal government could provide capital gains tax breaks for capital improvements to cropland that have positive environmental effects.

GHG REDUCTION: In order to determine the effect that this may have on soil organic carbon (SOC) over time, one needs to look at the expected expansion of conservation tillage practice over tilled acres, the current levels of SOC, and expected increase in SOC over time. The EPA study "The Impact of Conservation Tillage Use on Soil and Atmospheric Carbon in the Contiguous United States" takes this approach. A conservative estimate of the total SOC benefit to the year 2000 would be in the range 1-3 MMTC/y and for 2010, 2-4 MMTC/y . There is also reduced fossil fuel carbon emissions due to fewer tillage operations.

Carbon benefits from conservation tillage appear to be limited to middle and southern latitudes. Federal law (Farm Bill) is not usually limited to specific parts of the country.

Estimates of GHG reduction due to winter cover crop practices are unavailable.

COST: It costs to plant winter cover crops and to plow them under in the spring, and prepare seed beds. An analysis by Iowa State University researchers show costs of \$13 -\$22 per acre for winter cover crops.

Conservation tillage systems require more skilled management and investments in farm equipment. But savings accrue to farmers in terms of less fuel needed, water conservation, etc.

If USDA/ASCS were to require enhanced conservation and include a cost share, USDA/SCS would have to develop standards and specs for the practices and disseminate it to the field (i.e., train farmers). This requires staff and administrative time, plus outlays for the cost share.

Tax incentives for the adoption of conservation tillage would result in some decreases in revenues.

COST EFFECTIVENESS: Carbon sequestration is one of the benefits of conservation tillage, but the largest benefit is in reducing soil erosion, one of the most damaging environmental problems in the U.S. Conservation tillage helps to maintain soil tilth and quality, reduces nutrient runoff into waterways, and reduces sedimentation in waterways and dams. In addition to the carbon sequestration benefit is the reduction in fossil fuel use due to the reduced number of farm operations.

Investments in conservation practices will accrue relatively small carbon benefits, but there may be other environmental reasons for proceeding. The carbon benefits should be claimed.

AFFECTED STAKEHOLDERS: USDA/SCS, ASCS, and farmers would be affected. Farmers may object to more stringent controls, but react favorably to tax incentives. They like cost share programs more.

STATUS OF ANALYSIS:

STAFF CONTACTS:

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TITLE: Wetland Reserve Program

DESCRIPTION: WRP was designed to restore cropped wetlands to their natural state through the USG purchase of long-term easements on the land. The program was authorized for 1 million acres. WRP has finished a pilot signup of 50,000 acres in 9 states. There was a high level of interest in the program. Sixty percent of the land, or 30,000 acres, will be forested. Benefits in addition to carbon storage include habitat restoration for diverse biological species, water quality benefits, and flood control.

IMPLEMENTATION: USDA's authorization is the 1990 Food, Agriculture, Conservation and Trade Act. New news that Congress will fund 1 million acres.

GHG REDUCTION:

Reforest alluvial wetlands through WRP, 5 million acres

By 2000, 3-5 MMT C/y sequestered

By 2010, 9-11 MMT C/y sequestered

easements, restoration and establishment (McCarl & Calloway, 1993; Bouzaher et al., 1993). These analyses all assume harvesting is permitted as trees become merchantable. The recent WRP signup averaged \$742/acre for perpetual easements. SCS believes that in subsequent signups easement costs will decline. For bottom wetlands, costs of planting could be minimal since trees will just move in.

COST EFFECTIVENESS: Cost would be \$7-9/MT.

AFFECTED STAKEHOLDERS: Due to concerns for wetlands and water quality, many wetlands may soon be removed from cropping.

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SINKS WORKING GROUP: OPTIONS TO PROMOTE ECOSYSTEM MANAGEMENT				
Program Options		Carbon Increment (MMTC/yr)		Cost Effectiveness*
		2000	2010	\$/Ton Carbon
SK1	Promote Transition from Harvesting Old-Growth to Younger Stands (Reduced Timber Harvests)	10-20	15-23	N/A
SK2	Stimulate Tree Planting on Private Lands	4.3	28.6	3.50-15.50
SK3	Promote Accelerated Recycling to 45% Utilization Rate*	3-4	3-4	N/A
	Promote Accelerate Recycling to 50% Utilization Rate	6-8	6-8	N/A
SK4	Conservation Practices on Croplands to Increase Soil Carbon	1-3	2-4	N/A
SK5	Continue and Expand Conservation Reserve Program	5	10	200
SK7	Improved Timber Management and Harvesting to Promote Ecosystem Health	7-9	7-9	0.20-5.25
SK9	Fund for Forestry: Shared Risk for Forest Investments	5-10	5-10	10-20
SK10	Promote Urban Forestry -- Cool Communities	0.1-1.0	0.3-3.0	0.83-8.00
SK11	Restore Forested Wetlands -- Wetlands Reserve Program	3-5	9-11	7-9
SK12	Expanded Use of Forest Products	10-16	18-26	0.38-2.50

New Options Suggested at Second Sinks Workshop, 7/15/93

- * Improved management of federal forest lands to promote ecosystem health (especially lands at risk of catastrophic loss).
- * Encourage expansion of growth and utilization of bioenergy feedstocks.

Notes:

*Cost effectiveness estimates assumes all costs are attributed to carbon capture. In reality, there are other benefits associated with these options that increase cost effectiveness.

New sinks baseline approved 7/16/93 by Assistant Secretary of Agriculture contains 40% utilization rate of recycled fiber. Recycling option promotes acceleration of utilization rate of recycled fiber from 40% to 45 or 50% by the year 2000.

TELEFAX -

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Date: 7/16/93To: Joseph StiglitzOffice: CEATelefax# 395-6947 Phone# _____From: Cindy JacobsOffice: Methane Reduction Branch / Global Change DivisionTelefax# (202) 233-9569 Phone# (202) 233-9110 ⁹⁰⁴²Number of Pages Including Cover Sheet: 16

Remarks:

Methane info. for Monday
Background info ~~is~~ will be reformulated

The Methane Baseline

Emissions:

Report to Congress on U.S. Anthropogenic Emissions

Coal and natural gas estimates for 2000 revised to reflect updated production figures

Reductions:

Landfills -- assumes 75 Mg NMOC rule

◆ **Coal Mining -- ownership uncertainty was significant barrier to gas recovery**

- **As a result of action to resolve ownership issues in VA, methane recovery projects were initiated during 1992 at 5 coal mines $\Rightarrow$ 1.2 MMTCE reduction by 2000**
- **EPAct requires resolution of ownership issues in other key states, causing an estimated reduction in degasification system emissions of 50% $\Rightarrow$ 0.6-3.6 MMTCE reduction by 2000**

Natural Gas Star -- assumes reduction equivalent to 5% of total emissions with current FTE

AgStar -- assumes reduction of 15% of total estimated profitable reductions with current FTE

Three Options

ME9: Expand Natural Gas Star

1.8 - 3.4 MMTCE

ME1: Increase Stringency of Landfill Rule

4.6 MMTCE

ME4: Expand AgStar

1.0 - 2.0 MMTCE

Expand Natural Gas Star

Reductions in 2000	Cumulative Budget Cost	Agency
1.8 - 3.4 MMTCE	\$6.15 million	EPA: 3 FTE

Description:

Voluntary program that promotes adoption of cost-effective technologies - companies agree to identify and implement BMPs to reduce emissions

Currently includes 20 transmission and distribution companies

Transmission:

- **directed I&M at compressor stations**
- **consider turbines when replacing or introducing compressor horse power**
- **replace high-bleed pneumatics**

Distribution:

- **directed I&M at surface facilities**
- **rehabilitate leaky pipe**

- ◆ **Will be expanded in these areas and to include production companies**

Expand Natural Gas Star (continued)

Analysis:

1. 2000 emissions with no program = 13.8 - 26.4 MMTCE
 2. Approximately 25% of total natural gas system emissions could be reduced profitably
 3. 5% reduction from existing program = 0.7 - 1.3 MMTCE
 4. 13% additional reductions from expanded program = 1.8 - 3.4 MMTCE
 5. 18% total reductions from program in 2000 = 2.5 - 4.7 MMTCE
- ⇒ total reductions equivalent to about 70% of total profitable reductions

Increase Stringency of Landfill Rule

Reductions in 2000	Cumulative Budget Cost	Agency
4.6 MMTCE	\$0 incremental cost	EPA: 0 FTE

Description:

- ◆ **Proposed NSPS and Existing Source Guidelines ("Rule") to control NMOC emissions from landfills issued in May 1991**
- ◆ **Rule proposed at trigger level of 150 Mg NMOC per year**
- ◆ **Requested comment on higher stringency levels and conducted new analysis that shows higher stringency levels are more cost-effective than at proposal**
- ◆ **Option would increase stringency from baseline level of 75 Mg NMOC (internal EPA recommendation) to 50 Mg NMOC**
- ◆ **Rule as finalized will likely include exemption for landfills with design capacity less than 1 million tons of waste, protecting small communities**

Increase Stringency of Landfill Rule (continued)

Analysis:

1. Analysis conducted for the Rule shows that a 75 Mg stringency level would reduce methane emissions by 54.5%
2. A 50 Mg stringency level would reduce methane emissions by 60.6%.
3. The analysis conducted for the rule results in an estimate of methane emissions of about 78 MMTCE from landfills in 2000, approximately equal to the high end of the range (76.2) in the baseline.
4. The incremental reductions from adopting a 50 Mg rather than a 75 Mg stringency level are equal to 6.1 % of total emissions.
5. Using the high end of the baseline range to correspond most closely to the rule analysis, year 2000 incremental reductions from promulgating the 50 Mg rule = 4.6 MMTCE

Private Cost:

The estimated incremental private cost of the 50 Mg stringency is \$30 million per year

Expand AgStar

Reductions in 2000	Cumulative Budget Cost	Agency
1.0 - 2.0 MMTCE	\$6.5 million	EPA: 5 FTE
	\$24.5 million	USDA: 36 FTE

Description:

Voluntary program that encourages dairy and swine facilities to capture methane emitted from animal waste and use it for on-farm energy needs

Farms agree to identify and implement profitable measures for capturing and utilizing methane emitted from animal waste

Focused on selected regions where most of large dairy and swine operations are located

Demonstration programs already in place

The program will be officially launched in key states in late Summer 1993

Expand AgStar (continued)

Analysis:

- 1. Profitable reductions in 2000 = 3.0 - 6.0 MMTCE**
- 2. 15% reduction from program with current FTE level = 0.5 - 1.0 MMTCE**
- 3. Remaining profitable reductions = 2.5 - 5.0 MMTCE**
- 4. 35% additional reductions from expanded program = 1.0 - 2.0 MMTCE**
- 5. Total reductions equivalent to 50% of profitable reductions = 1.5 - 3.0 MMTCE**

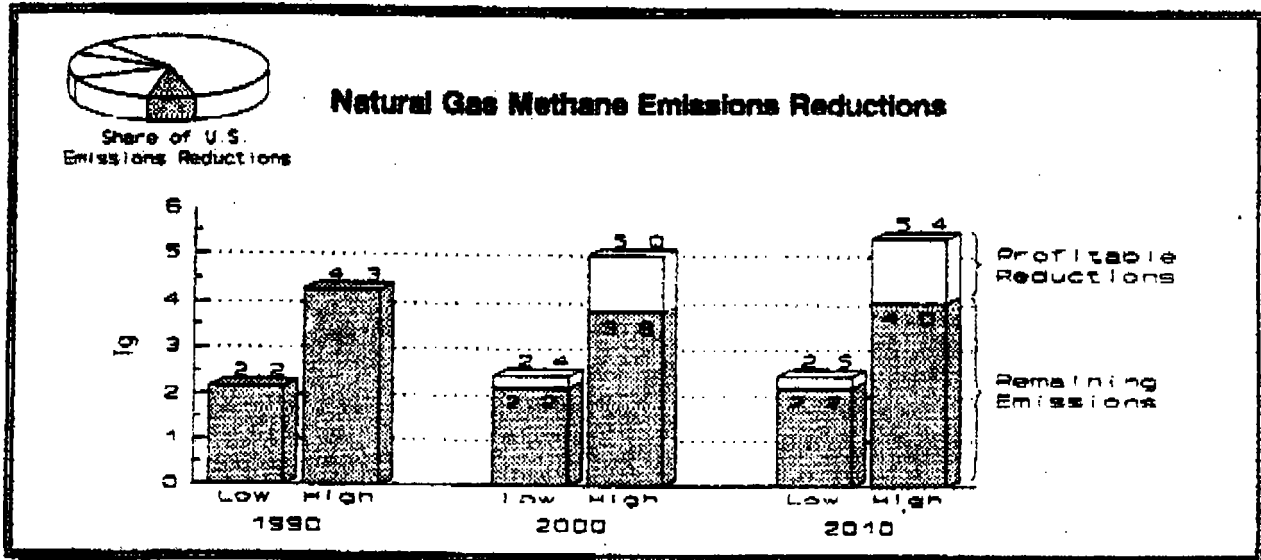
METHANE BASELINE

July 12, 1993

Methane Emissions (MMTCE/yr)						
Source	1990		2000		2010	
	Low	High	Low	High	Low	High
Landfills	48.6	70.8	52.8	76.2	56.8	80.5
Energy Prod&Distr:						
Coal Mining	21.6	34.2	24.8	38.4	25.9	40.2
Natural Gas	13.1	25.6	13.8	26.4	16.3	31.9
Petroleum	0.6	3.7	0.7	4.2	0.8	4.7
Total	35.3	63.5	39.2	69.0	43.0	76.8
Combustion	1.8	10.2	1.8	10.2	1.8	10.2
Agriculture:						
Ruminants	27.6	41.4	30.0	47.4	28.8	49.2
Manure	10.2	21.6	10.8	33.6	11.4	36.0
Rice	0.6	4.2	0.6	4.2	0.6	4.2
Total	38.4	67.2	41.4	85.2	40.8	89.4
TOTAL EMISSIONS	124.1	211.7	135.2	240.6	142.4	256.9
Reductions from Existing Programs						
Source	1990		2000		2010	
	Low	High	Low	High	Low	High
Landfills:						
NMOC Rule (new analysis)	0.0	0.0	28.8	41.5	31.0	43.9
Energy Prod&Distr:						
Coal Mining						
Current Actions (VA)	0.0	0.0	1.2	1.2	1.2	1.2
Energy Policy Act	0.0	0.0	0.6	3.6	2.4	7.8
Natural Gas:						
Natural Gas Star	0.0	0.0	0.7	1.3	0.8	1.6
Combustion	0.0	0.0	0.0	0.0	0.0	0.0
Agriculture:						
AgStar	0.0	0.0	0.5	1.0	0.5	1.6
TOTAL REDUCTIONS	0.0	0.0	31.8	48.6	35.9	56.1
TOTAL BASELINE EMISSIONS	124.1	211.7	103.5	192.0	106.6	200.8

See P 2-2

CHAPTER 2

OPTIONS FOR REDUCING METHANE EMISSIONS
FROM NATURAL GAS SYSTEMS

Natural Gas System Methane Emissions (Tg)			
Year	Baseline Emissions ^a	Technically Feasible Emission Reductions	Profitable Emission Reductions
1990	2.18 - 4.26 ^b	—	—
2000	2.43 - 5.00	0.76 - 1.60	0.26 - 1.20
2010	2.45 - 5.38	0.83 - 1.83	0.26 - 1.34

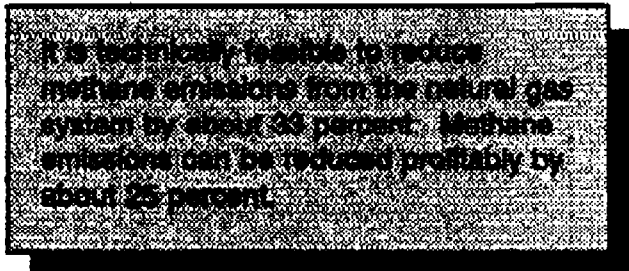
a Baseline emissions from USEPA (1993).
b Ranges based on the Low and High Emissions Scenarios.

2.1 SUMMARY

Methane is the principal component of natural gas, and therefore leaks from the wide variety of components, processes, and activities that make up the natural gas system contribute to methane emissions. Methane emissions from the U.S. natural gas system in 1990 are estimated to range from 2.2 to 4.3 Tg per year, with a central estimate of about 3.0 Tg per year (USEPA, 1993). These emissions estimates are based on analyses of the activities in each of the major stages of the natural gas system: production; processing; transmission; storage; and distribution. Over 80 percent of the emissions originate in the production, transmission, and distribution stages.

Methane emissions from the U.S. natural gas industry are expected to increase over the coming decade as gas consumption and system throughput increase. Emissions will not increase proportionately with consumption, however, as total emissions depend partly on the size of the system infrastructure and not solely on system throughput. While gas consumption is estimated to increase between 20 and 30 percent above 1990 levels by 2000, emissions are estimated to increase by only 11 to 18 percent.

Based on the eight technologies reviewed in this analysis, it is technically feasible to reduce methane emissions from the natural gas system by about 33 percent. Five of the eight technologies are estimated to be profitable: the value of the gas emissions avoided exceeds the costs of implementing the technology. Using these five technologies, methane emissions from natural gas systems can be reduced profitably by about 25 percent. This estimate is sensitive to the estimated baseline emissions rates.



It is technically feasible to reduce methane emissions from the natural gas system by about 33 percent. Methane emissions can be reduced profitably by about 25 percent.

The main barriers to realizing these emissions reductions are informational and regulatory. Information regarding the profitability of the options for reducing emissions must be disseminated. In some cases the technologies are relatively new, and their operating characteristics and costs are not widely known. Rate regulations also pose a barrier because in some cases companies are able to recover the cost of lost gas from customers, so that the incentive for avoiding emissions is substantially reduced.

While methane emissions can be reduced profitably, it must be recognized that the U.S. natural gas industry is a world leader in the development and application of new technologies and practices designed to enhance public safety, increase system efficiency and reliability, and reduce costs of operation. The U.S. natural gas industry is currently one of the most efficient systems in the world, particularly in terms of methane emitted per quantity of gas produced or marketed. It is within this context of excellence that this analysis identifies and evaluates options for reducing emissions from the U.S. natural gas system.

2.1.1 Profitable Emissions Reductions

Through the more widespread use of a variety of technologies and practices, which are currently available and which have been shown to be cost-effective in a number of settings, methane emissions from the U.S. natural gas system can be reduced from 1990 levels. It is estimated that it is technically feasible to reduce methane emissions by about 1.1 Tg and 1.2 Tg in 2000 and 2010 respectively. Emissions reductions of about 0.8 Tg and 0.9 Tg can be achieved profitably in these two years. The profitable emissions reductions are about 25 percent of baseline emissions in 2000 and 2010 (see Exhibit 2-1).

These emission reductions would make a sizable contribution toward reducing annual emissions of greenhouse gases in the United States. For example, in terms of global warming potential, the profitable emission reductions that could be achieved by the year 2000

Exhibit 2-1

Methane Emissions and Potential Reductions By Stage of the Natural Gas Industry

Stage	1990	2000			2010		
	Emissions (Tg/yr) ^a	Emissions (Tg/yr) ^a	Potential Reductions (Tg/yr)		Emissions (Tg/yr) ^a	Potential Reduction (Tg/yr)	
			Technically Feasible	Profitable		Technically Feasible	Profitable
Production ^b	1.06	1.30	0.55	0.36	1.33	0.57	0.37
Processing ^c	0.09	0.10	0.00	0.00	0.10	0.00	0.00
Storage ^c	0.02	0.02	0.00	0.00	0.03	0.00	0.00
Transmission ^d	1.04	1.10	0.38	0.36	1.15	0.39	0.37
Distribution ^e	0.33	0.35	0.10	0.10	0.37	0.11	0.11
Compressor Engine Exhaust ^f	0.41	0.51	0.07	0.00	0.52	0.13	0.00
Total	2.97 (2.18-4.26)^g	3.38 (2.43-5.00)	1.10 (0.78-1.60)	0.82 (0.26-1.20)	3.50 (2.45-5.38)	1.20 (0.83-1.83)	0.86 (0.26-1.34)

a Base case emissions scenario from USEPA (1993).

b Emissions reduction technologies analyzed are: directed inspection and maintenance programs at well sites; replacement of "high-bleed" pneumatic devices; and installation of flash tank separators of glycol dehydrators.

c No emissions reduction techniques were analyzed for this stage.

d Emissions reduction technologies analyzed are: directed inspection and maintenance programs at compressor stations; replacement of "high-bleed" pneumatic devices; and recovery of gas prior to pipeline repair.

e Emissions reduction technology analyzed is directed inspection and maintenance programs at gate stations.

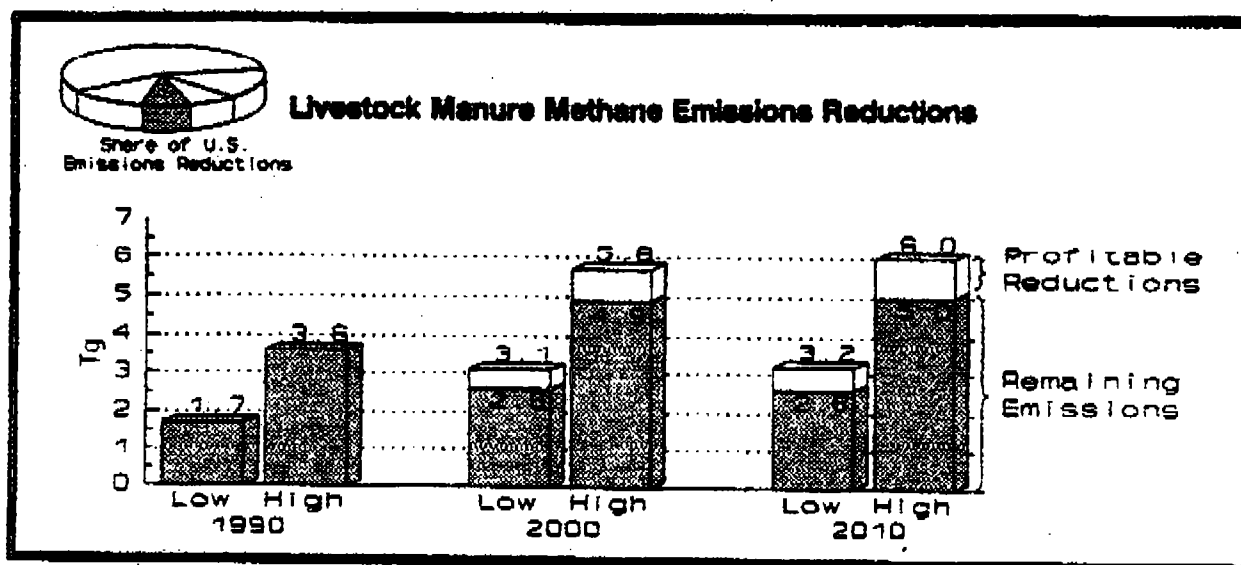
f Emissions reduction technology analyzed is using turbines instead of reciprocating engines for some transmission system compressors.

g Range based on the Low and High Emissions Scenarios.

Totals may not add due to the rounding.

CHAPTER 6

OPPORTUNITIES TO REDUCE METHANE EMISSIONS FROM LIVESTOCK MANURE



Livestock Manure Methane Emissions (Tg)			
Year	Baseline Emissions ^a	Technically Feasible Emission Reductions	Profitable Emission Reductions
1990	1.7 - 3.6		
2000	3.1 - 5.6	1.7 - 4.4	0.5 - 0.8
2010	3.2 - 6.0	1.7 - 4.7	0.6 - 1.0

^a Source: USEPA (1993). Emissions scenario reflects continuation of the trend toward increased use of liquid-based manure management systems in the future.

6.1 SUMMARY

Methane is produced during the anaerobic decomposition¹ of the organic material in livestock and poultry manure. In 1990 livestock and poultry manure in the U.S. emitted between 1.7 and 3.6 Tg of methane to the atmosphere, with a central estimate of 2.3 Tg (USEPA 1993). Liquid based livestock manure systems such as anaerobic lagoons produce about 80 percent of the total. If, as expected, the use of liquid manure management systems increases, then methane emissions from livestock and poultry manure could increase significantly in the next decade.

¹ Anaerobic decomposition (fermentation) of animal waste is a micro-biological process that occurs in an oxygen free environment.

Post-it® brand fax transmittal memo 7871		# of pages 3
To Cindy Jacobs	From J. WOODBURY	
Co. EPA	Co.	
Dept.	Phone #	
Fax # (202) 233-7569	Fax # 05424-117-00	

July 1, 1993

MEMORANDUM

TO: Cindy Jacobs
FROM: Jonathan Woodbury
RE: Range of Methane Reduction Values for Livestock Manure

Per our phone conversation today I have summarized below the method for determining the reasonable "high" and "low" values for profitable methane mitigation from livestock manure. I will describe the steps for 2000, the same steps would apply for the 2010 estimates.

1. Identify the range of profitable emission reductions. For 2000, the range of profitable emissions reduction is 0.5 - 0.8 Tg/yr.

This range is based on the "Increased use of liquid manure and increased animals on large farms" scenario in Exhibit 6-33 of the manure opportunities chapter. The factor driving the uncertainty range is the uncertainty over the amount of manure managed as a liquid by dairies before they installed the recovery system. The low value in the range assumes that 15% of dairy manure is currently managed as a liquid and the high value assumes that 50% is currently managed as a liquid.

2. Identify the emissions that are consistent with the estimated profitable emissions reductions of 0.5 - 0.8 Tg/yr. The emission estimates from the Emissions Report that are consistent with these reductions are the "increased use of liquid system" scenario averaged across the FAPRI and EPA production scenarios (Exhibit 6-15, bottom half of the Manure Emissions Report). The emission estimates are 4.38 Tg/yr +/- 26 percent.

This range is based on uncertainty in the underlying MCFs (methane conversion factors). The central estimate is the average of the two "lows" and two "highs" in Exhibit 6-15 of the Manure Emissions Report. The percentage range is based the average of the two lows with the central estimate and the average of the two highs with the central estimate.

3. Apply this percentage range to the profitable methane mitigation values in Step 1.

Low: $0.5 - (0.5 * 0.26) = 0.37 \text{ Tg}$ This low very unlikely

High: $0.8 + (0.8 * 0.26) = 1.01 \text{ Tg}$

4. This is all very clear, right...?

use range of 0.5 - 1.01 Tg
or

3.0 - 6.0 MMTCF

Exhibit 6-33				
Emissions Reduction Potential for 2000 and 2010				
Extend Current Practices				
Percentage Change in Production ^a		Estimated Methane Mitigated (mt/yr)		
Year	Dairy	Swine	Dairy	Swine
1990	—	—	35,488 - 132,419	173,056
2000	12%	10%	39,750 - 148,300	190,360
2010	25%	10%	44,350 - 165,500	190,360
Increased Use of Liquid Manure Management Systems				
Percentage Increase in Emissions ^b		Estimated Methane Mitigated (mt/yr)		
Year	Dairy	Swine	Dairy	Swine
1990	—	—	35,488 - 132,419	173,056
2000	75%	65%	62,100 - 231,700	320,160
2010	90%	85%	67,400 - 251,600	320,160
Increase in Percentage of Animals on Large Farms				
Percentage Increase in Profitable Farms ^c		Estimated Methane Mitigated ^d (mt/yr)		
Year	Dairy	Swine	Dairy	Swine
1990	—	—	35,488 - 132,419	173,056
2000	67%	15%	103,700 - 387,000	368,185
2010	100%	45%	134,850 - 503,000	464,230
a Based on future scenarios of milk and pork production presented in USEPA (1993). b Includes effects of both the increase in production and the increase in the use of liquid manure management systems. c Does not include the effects of the increases in production and the use of liquid manure management systems. d Mitigation estimates reflect the impacts of increased concentration of animals in large farms as well as increases in production and the use of liquid manure management systems.				

6.6 BARRIERS

As discussed above, profitable opportunities exist for reducing methane emissions from livestock manure. Proven technologies are available to recover and utilize the methane to meet on-farm energy needs. Over twenty livestock operations across the country are successfully utilizing these technologies today.

Page 6-25