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cc: JBS JAF KP

October 21, 1996

Dr. Alicia Munnell, Member
Council of Economic Advisers
Executive Office of the President
17th Street and Pennsylvania Ave., N.W.
Washington, DC 20500

Dear Alicia,

I very much appreciated the opportunity to brief you and your colleagues on modeling the impact of climate change policies last Thursday. I hope that you enjoyed it as much as I did. I enclose a survey paper that I published in 1993 with Peter Wilcoxen, one of my Harvard students now at the University of Texas, Austin. This summarizes the different approaches that I described and presents a number of illustrations of the application of our model.

All of the applications presented in our survey are to energy and environmental issues. For example, we did a very detailed study of the impact of higher energy prices in the 1970's. We have also estimated the cost of environmental regulations based on command and control, as well as the market-based regulations adopted in the Clean Air Act Amendments of 1990. Finally, we have studied carbon taxes from a number of different points of view.

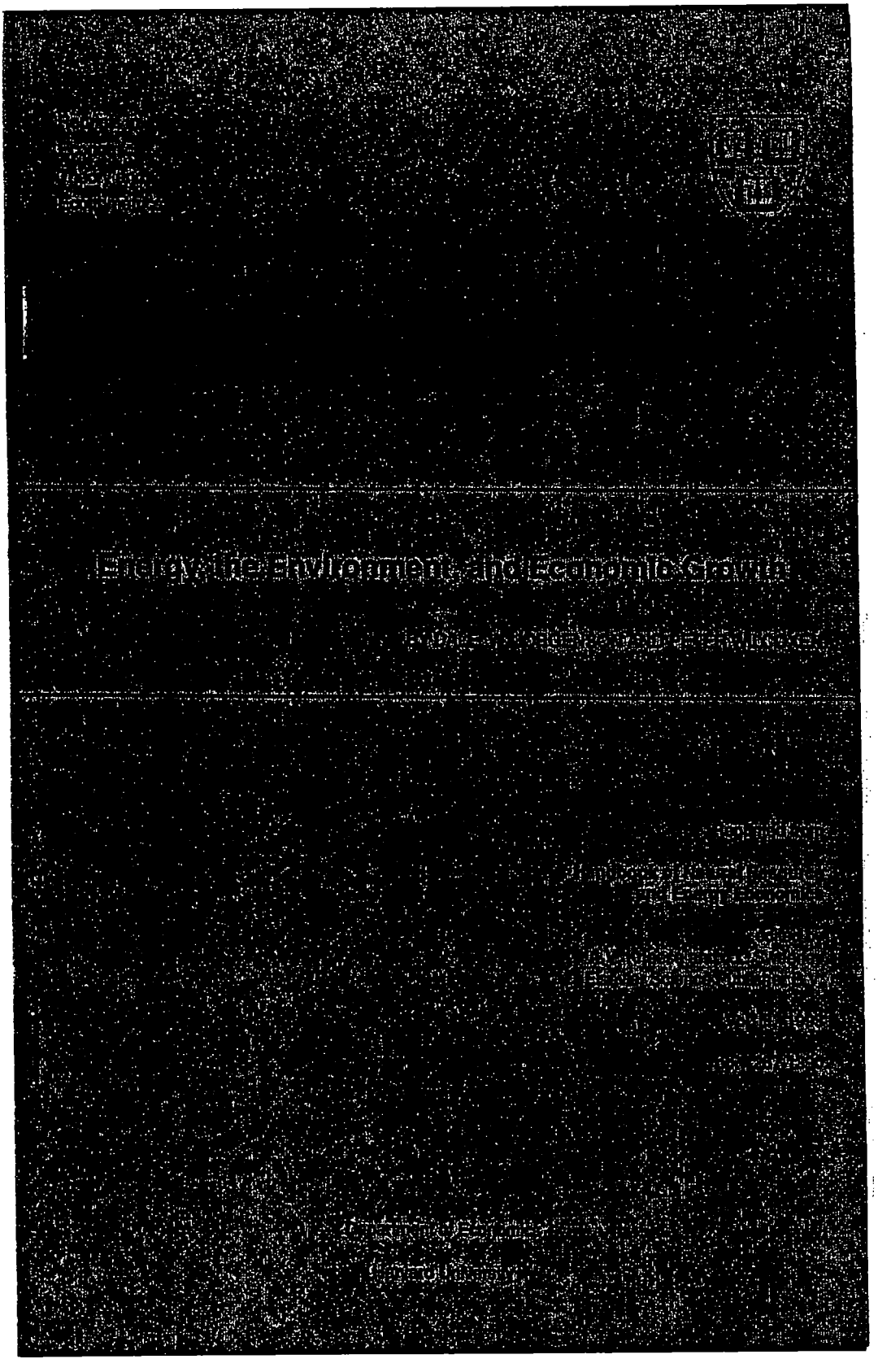
More recently, Wilcoxen and have been analyzing the impact of fundamental tax reforms. I presented some testimony on a National Retail Sales Tax to the Committee on Ways and Means in March. I am now working on the impact of an income-base value added tax for the Joint Committee on Taxation. I enclose a copy of my Ways and Means testimony, which has now been published by the Committee.

With best regards,

Yours sincerely,

Dale W. Jorgenson

I have the original.
L-sa



For release on delivery:

10:00 a.m., Wednesday, March 27, 1996.

THE ECONOMIC IMPACT OF TAXING CONSUMPTION

by

Dale W. Jorgenson

Harvard University

This statement was prepared for presentation at the Hearings on Replacing the Federal Income Tax, before the Committee on Ways and Means, U.S. House of Representatives, 104th Congress, Second Session.

THE ECONOMIC IMPACT OF TAXING CONSUMPTION

by

Dale W. Jorgenson

INTRODUCTION AND SUMMARY

In this testimony I consider the economic impact of substituting a tax on consumption for corporate and individual income taxes at federal, state, and local levels, beginning January 1, 1996. I limit my analysis to a revenue neutral tax substitution–one that would leave government revenues unchanged. Finally, I focus on the impact of fundamental tax reform on economic growth, leaving progressivity of the resulting combination of taxes and government expenditures to be determined by adjustment of expenditures. I have summarized my conclusions in a series of eight charts appended to the text of this prepared statement. These were generated by simulating future U.S. economic growth with and without the change in tax policy. Further details are provided in an Appendix to this statement.

1. The revenue neutral substitution of a consumption tax for existing income taxes at both federal and state and local levels would have an immediate and powerful impact on the level of economic activity. The first chart shows that U.S. gross domestic product (GDP) would increase initially by about thirteen percent; this increase would gradually decline to around nine percent.

2. The imposition of a consumption tax would produce in a sharply higher tax rate on consumer goods and services. The second chart shows that the consumption tax rate required for replacing existing revenues from individual and corporate income taxes at both federal and state and local levels would be around fifteen

percent. This would gradually rise over time, ultimately reaching twenty-one percent.

3. As a consequence of the total transformation of the tax system, individuals would sharply curtail consumption of both goods and leisure. This would produce a dramatic jump in saving and a substantial rise in labor supply. These increases would subside only very gradually over time.

4. Taxation of consumption would induce a radical shift away from consumption toward investment. The third chart shows that real investment would leap upward by eighty percent! The fourth chart shows that real consumption would initially decline by around five percent, but consumption would grow rapidly and overtake the level under the income tax within two years.

5. Since producers would no longer pay taxes on profits or other forms of income from capital and workers would no longer pay taxes on wages, prices received by producers, shown in the fifth chart, would fall by an average of twenty percent. The sixth chart shows that industry outputs would rise by an average of twenty percent with substantial relative gains for investment goods producers.

6. In the long run producers' prices, shown in the seventh chart, would fall by more than twenty-five percent relative to prices under an income tax. The shift toward investment and away from consumption would redistribute economic activity among industries. The eighth chart shows that output would increase in all industries, but the rise in production of investment goods would be greatest.

IMPLEMENTATION OF A CONSUMPTION TAX

In *Hearings on Replacing the Federal Income Tax,* held by the Committee on Ways and Means last June, testimony focused on alternative methods for implementing a consumption-base value added tax. This is economic jargon for a consumption tax, where value added is the sum of capital and labor incomes and subtracting investment from value added would produce a consumption tax base. An alternative and equivalent definition of this tax base is the difference between business receipts and purchases from other businesses, including investment goods. A third definition of the tax base is the total of retail sales to consumers.

The three principal methods for implementation of a value added tax correspond to the three definitions of consumption as the tax base:

1. The invoice and credit method. Business invoices would include a credit against tax liabilities for value added taxes paid on goods and services received. This method is used in Canada and Europe. In Canada and many other countries the value added tax replaced an earlier and more complex system of retail and wholesale sales taxes. From the point of view of tax administration the invoice and credit method has the advantage that both purchases and sales generate records of the tax credits. The invoice and credit method would require substantial modification of collection procedures, but decades of experience have ironed out many of the bugs.[1]

2. The subtraction method. Business purchases from other businesses, including investment goods, would be subtracted from business receipts, including proceeds from the sale of assets. This could be implemented within the framework of the existing tax system by integrating individual and corporate income taxes, as proposed by

1. The advantages and disadvantages of the invoice and credit method for implementing the value added tax are discussed by the U.S. Treasury (1984).

the U.S. Treasury (1992), and treating all businesses as partnerships or "sub-chapter S" corporations. The second step would be to allow expensing of investment in the year it is undertaken. Enforcement problems could be reduced by drastically simplifying the tax rules,[2] but the principal method of enforcement, auditing of taxpayer records by the Internal Revenue Service, would remain.

3. National retail sales tax. Like existing state sales taxes, a national retail sales tax would be collected by retail establishments, including service providers and developers for residential real estate for sale to owner-occupiers. This would also require a new system for tax administration, possibly sub-contracting the actual collection to existing state agencies. The Internal Revenue Service could be reduced to an agency that would sub-contract collections. Alternatively, the IRS could be abolished and a new agency created for this purpose.[3] Enforcement procedures could be limited to those used by the states.

All three alternative methods for implementing a consumption tax could be based on the same definition of the tax base. This greatly simplifies the tax economist's task, since the economic impact would be the same for all three approaches. This leaves important issues to be resolved by other tax professionals, including, especially, tax lawyers who would write the legislation and the implementing regulations and tax accountants who would translate the laws and regulations into accounting practice and advise economic decision-makers about their implications.

---

2. A subtraction method value added tax has been proposed by Ranking Minority Member Sam Gibbons of the Committee on Ways and Ways. If no business receipts were excluded and no deductions and tax credits were permitted, the tax return could be reduced to the now familiar postcard size, as in the Flat Tax proposal of Majority Leader Dick Armey and Senator Richard Shelby (1995). Economists will recognize the Flat Tax proposal as a variant of the consumption-base value added tax proposed by Robert Hall and Alvin Rabushka (1995).
3. A national retail sales tax has been proposed by Chairman Bill Archer of the Committee on Ways and Means and Senator Richard Lugar.

From the economic point of view the definition of consumption is straightforward; a useful and commonly accepted point of departure is Personal Consumption Expenditures (PCE) as defined in the U.S. national income and product accounts. However, the taxation of services poses important administrative problems reviewed in a U.S. Treasury (1984) monograph on the value added tax. First, PCE includes the rental equivalent value of the services of owner-occupied housing, but does not include the services of consumers' durables. Both are substantial in magnitude, but could be taxed by the "prepayment method" described by the Hon. David Bradford (1986). In this approach taxes on services would be prepaid by including investment rather than consumption in the tax base.

The prepayment of taxes on services of owner-occupied housing would remove an important political obstacle to substitution of a consumption tax for existing income taxes. At the time the substitution takes place all owner-occupiers would be treated as having prepaid all future taxes on the services of their dwellings. This is equivalent to excluding not only mortgage interest from the tax base, but also returns to equity, which might be taxed upon the sale of residence with no corresponding purchase of residential property of equal or greater value. Of course, this presumes that home owners would refinance to take advantage of the altered tax treatment of mortgage lenders.

It is essential to include housing and consumers' durables in the tax base in order to reap the substantial economic benefits of putting household and business capital onto the same footing.[4] This raises politically sensitive issues and it is important to be clear about the implications of prepayment as the debate proceeds. Under the prepayment method purchases of consumers' durables by households for their own use would be subject to tax. These would include automobiles, appliances,

4. See, for example, my testimony before the Committee on Ways and Means of June 6, 1995.

home furnishings, and so on. In addition, new construction of owner-occupied housing would be subject to tax, as would sales of existing renter-occupied housing to owner-occupiers. Together with the exclusion of the rental values of existing owner-occupied housing, this would maintain the asset values for housing.

Other purchases of services that would be especially problematical under a consumption tax include services provided by nonprofit institutions, such as schools and colleges, hospitals, and religious and eleemosynary institutions. The traditional, tax-favored status of these forms of consumption would be defended tenaciously by recipients of the services and even more tenaciously by the providers. The argument can be made that educational services represent investment in human capital rather than consumption.

Finally, any definition of a consumption tax base will have to distinguish between consumption for personal and business purposes. On-going disputes over home offices, business-provided automobiles, equipment, and clothing, and business-related lodging, entertainment and meals would continue to plague tax officials, the entertainment and hospitality industries, and holders of expense accounts. In short, substitution of a consumption tax for the federal income tax system would not eliminate all the practical issues that arise from the necessity of distinguishing between business and personal activities in defining consumption. However, these issues are common to both income and consumption taxes.

CONCLUSION

Under any one of the three approaches to implementation of a value added tax, substitution of a consumption tax for existing individual and corporate income taxes would be the most drastic change in federal tax policy since the introduction of the income tax in 1913. It is not surprising that the economic impact summarized above

would be truly staggering in magnitude. It is easy to foresee that as Americans become more fully apprised of the manifold ramifications of fundamental tax reform that Gucci Gulch[5] will be transformed into the political equivalent of the Grand Canyon.

The coming debate over tax reform is a both a challenge and an opportunity for economists. It is a challenge because the impact of fundamental tax reform would involve almost every aspect of economic life. Economists who have spent their lives pre-occupied by the latest debating points in journals read only by other economists will suddenly find that the fine points that dominate scholarly discussions will be subjected to the refiner's fire of public scrutiny.

The debate will be an opportunity for economists because economic research has generated a wealth of information about the impacts of tax policy. Provided that the economic debate can be properly focused, economists and policy makers will learn a great deal about the U.S. economy and its potential for achieving a higher level of performance. I am personally very gratified that the Joint Committee on Taxation under the leadership of Chief of Staff Kenneth Kies has taken the initiative in channeling the professional discussion. In my remaining testimony I will outline my own recommendations for the initial ground rules.

The first issue in the debate will be the economic impact of the federal deficit. Nearly two decades of economic disputation over this issue has failed to produce any resolution. No doubt the dispute will continue well into the next century and preoccupy the next generation of fiscal economists, as it has the previous generation. An effective rhetorical device for insulating the discussion of fundamental tax reform from the budget debate is to limit consideration to revenue neutral proposals. This

5. Few readers of this testimony will be unaware of this colloquial expression for the corridor outside the hearing room of the Committee on Ways and Means. The expression appeared in the title of the definitive account of the Tax Reform Act of 1986 by Jeffrey H. Birnbaum and Alan S. Murray (1987).

device was critical to the eventual enactment of the Tax Reform Act of 1986 and is, I believe, essential to progress in fundamental tax reform.

The second issue to be debated is fiscal federalism or the role of state and local governments. Since state and local income taxes usually employ the same tax bases as the corresponding federal taxes, it is reasonable to assume that substitution of consumption for income taxes at the federal level would be followed by similar substitutions at the state and local level. Since an important advantage of a fundamental tax reform is the possibility, at least at the outset, of radically simplifying tax rules, it does not make much sense to assume that existing rules would continue to govern state and local taxes, even if the federal income tax were abolished.

The third issue that will surface in the tax reform debate is progressivity of the tax system. Fiscal economists of varying persuasions can agree that progressivity or the lack of it can be used to characterize all of government activity, not only taxes but also expenditures. I believe that a case can be made that policies to achieve progressivity can and should be limited to the expenditure side of the government budget. This initial policy stance would immeasurably simplify the debate over the economic impact of fundamental tax reform.

The central issue in evaluating the economic impact of fundamental tax reform is its impact on economic growth. A serious barrier to focusing attention on growth is that the main apparatus for policy evaluation employed by both the Congress and the Administration consists of distributional tables for policy impacts. So far as I am aware, the methodology I have employed in preparing this testimony–comparing time paths of U.S. economic growth with and without a change in tax policy–has never been used by either the Joint Tax Committee or the Office of Tax Analysis of the U.S. Treasury. Public discussion of tax reform will be crippled until this analytical gap is overcome.

APPENDIX

The simulations of U.S. economic growth summarized in the charts appended to this testimony are based on an intertemporal equilibrium model of the U.S. economy that I have constructed with Peter J. Wilcoxen. The details of the model and more than a dozen applications are summarized in our survey paper, "Energy, the Environment, and Economic Growth," published in 1993. The model has been continuously revised and updated since it was first published in 1990 and Version Nine is now available. This new version of the model incorporates the detailed representation of the U.S. tax structure I have published with Kun-Young Yun in our 1991 book, TAX REFORM AND THE COST OF CAPITAL.

Our model of U.S. economic growth is disaggregated to the thirty-five industries listed in the final four charts in my testimony. In addition, the model distinguishes among 1344 types of households, disaggregated by family size, age and gender of household head, region of residence, race, and urban versus rural location. The model is built around sub-models of investment and saving based on rational expectations. The price of investment goods in every period is based on expectations of future capital service prices and discount rates that are fulfilled by the solution of the model.

In order to analyze the economic impact of changes in tax policy, we simulate the growth of the U.S. economy with and without changes in these policies. The first and most difficult step is to generate a simulation based on current tax policy. We call this the *base case*. We then produce an alternative simulation based on a consumption tax. This represents the *alternative case*. Finally, we compare the base case with the alternative case in order to assess the effects of the substitution of a consumption tax for the existing income tax system.

The most difficult part of tax policy evaluation is to project U.S. economic growth under the existing tax system. For this purpose I have introduced the characteristic features of U.S. tax law into the cost of capital, distinguishing among assets employed in three different legal forms of organization–households and nonprofit institutions, noncorporate business, and corporations. Income from corporate business is subject to the corporate income tax, while distributions to households are subject to the individual income tax. Income from unincorporated businesses–partnerships and sole proprietorships–are taxed only at the individual level, while income from equity in household assets is not subject to the income tax.

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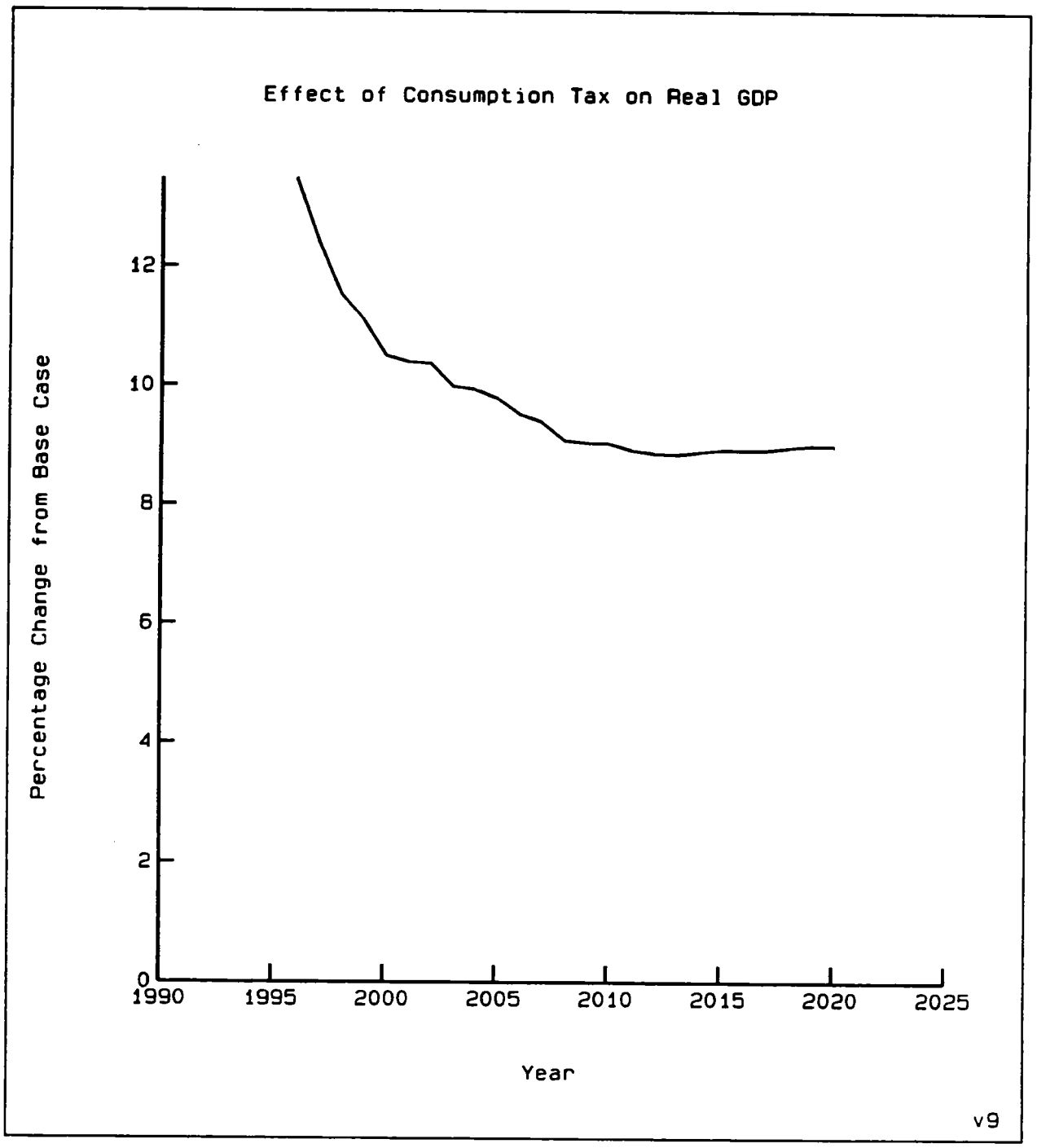
Effect of Consumption Tax on Real GDP
Percentage Change from Base Case
0
2
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12
1990
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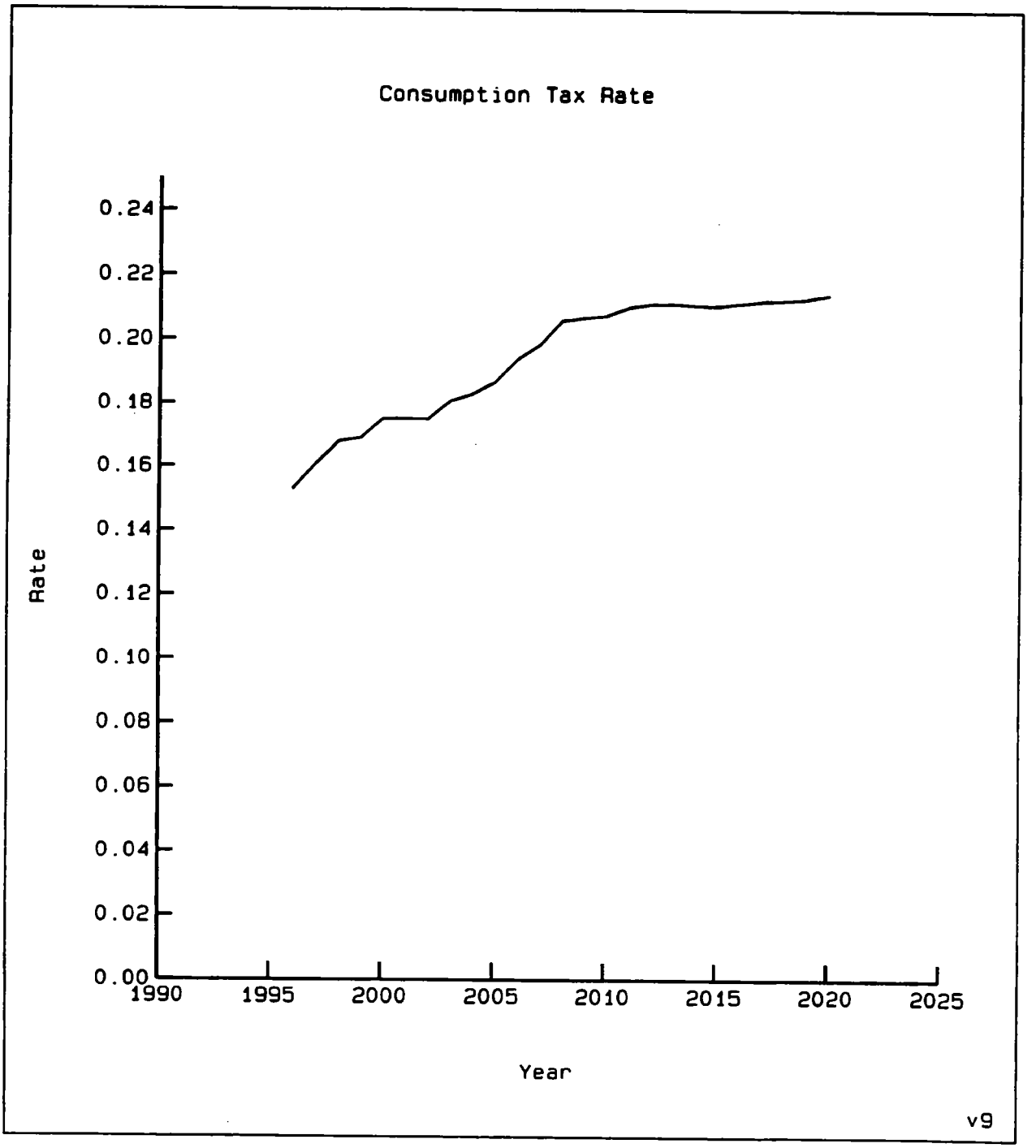
2025
Year
v9


Consumption Tax Rate
Rate
0.24
0.22
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
1990
1995
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Year
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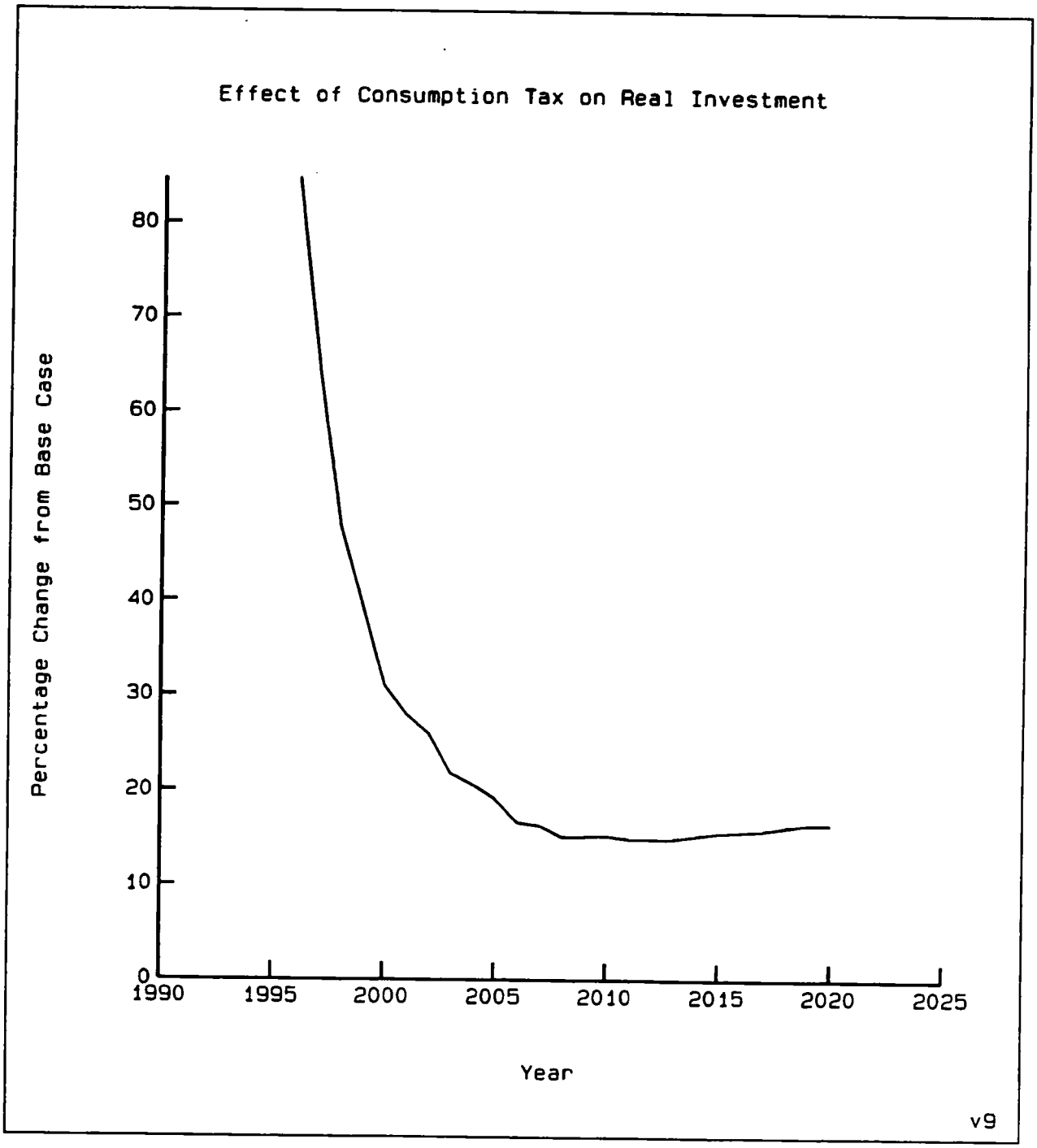
Effect of Consumption Tax on Real Investment
Percentage Change from Base Case
80
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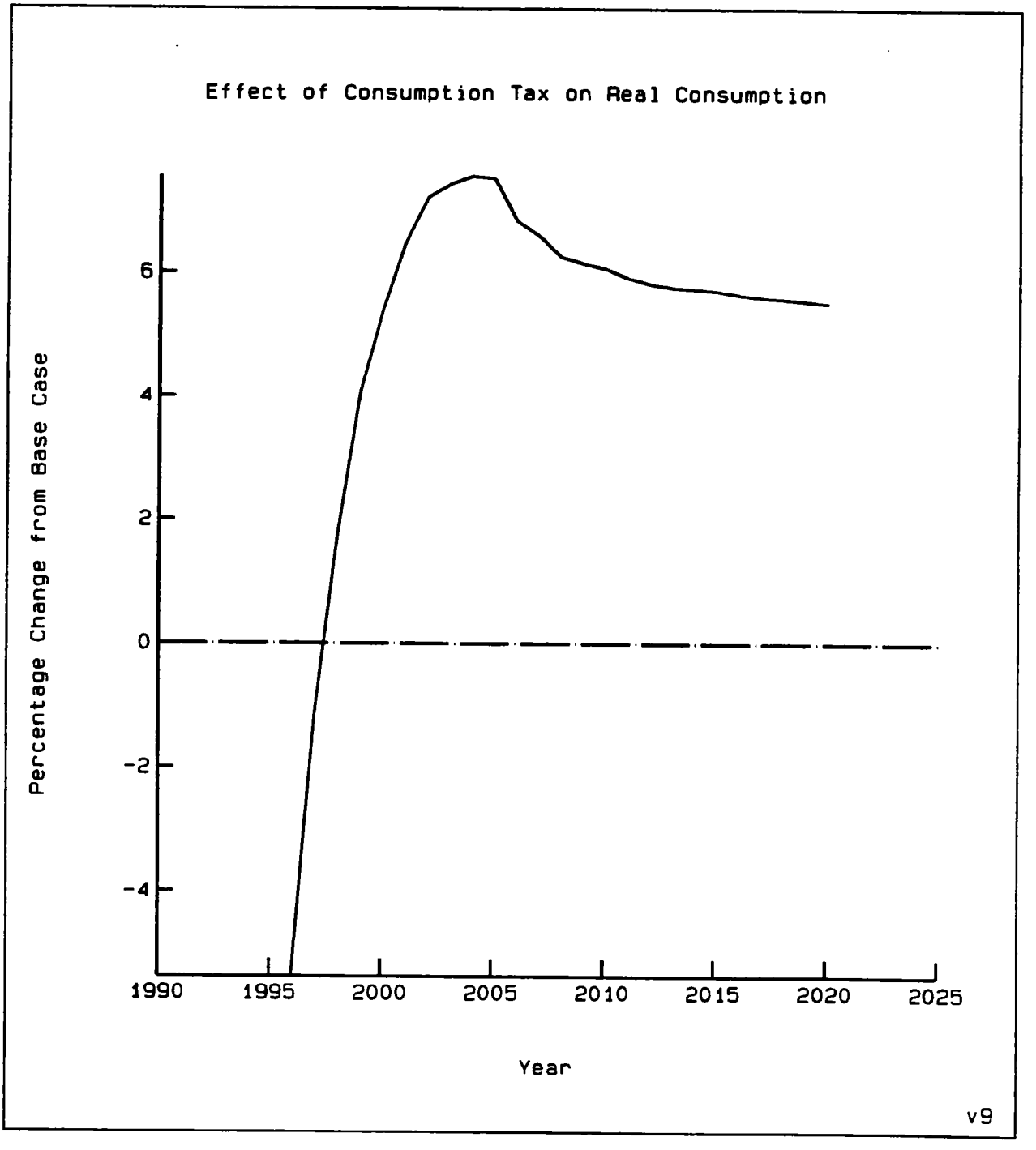
Effect of Consumption Tax on Real Consumption
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6
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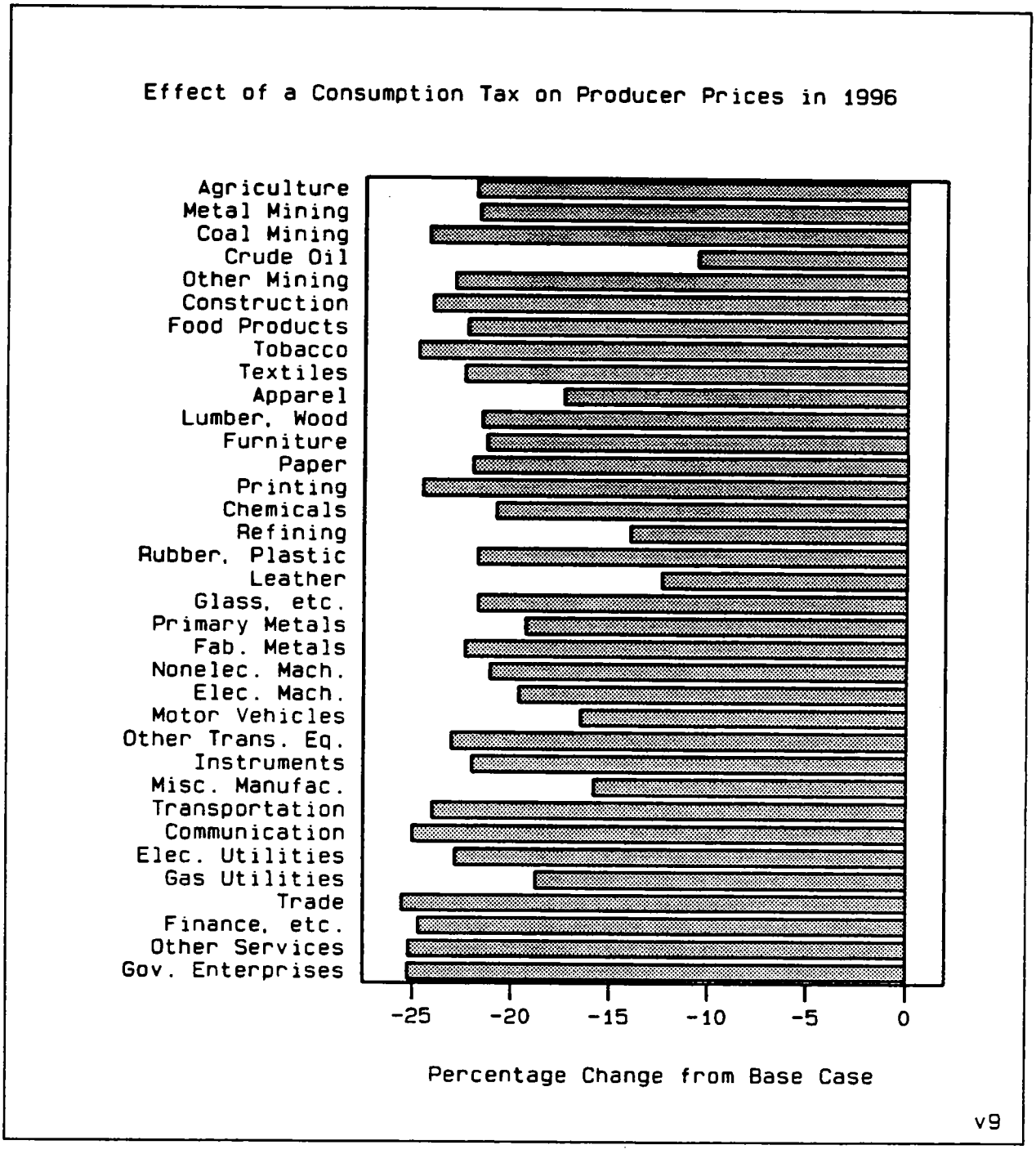
Effect of a Consumption Tax on Producer Prices in 1996
Agriculture
Metal Mining
Coal Mining
Crude Oil
Other Mining
Construction
Food Products
Tobacco
Textiles
Apparel
Lumber, Wood
Furniture
Paper
Printing
Chemicals
Refining
Rubber, Plastic
Leather
Glass, etc.
Primary Metals
Fab. Metals
Nonelec. Mach.
Elec. Mach.
Motor Vehicles
Other Trans. Eq.
Instruments
Misc. Manufac.
Transportation
Communication
Elec. Utilities
Gas Utilities
Trade
Finance, etc.
Other Services
Gov. Enterprises
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-20
-15
-10
-5
0
Percentage Change from Base Case
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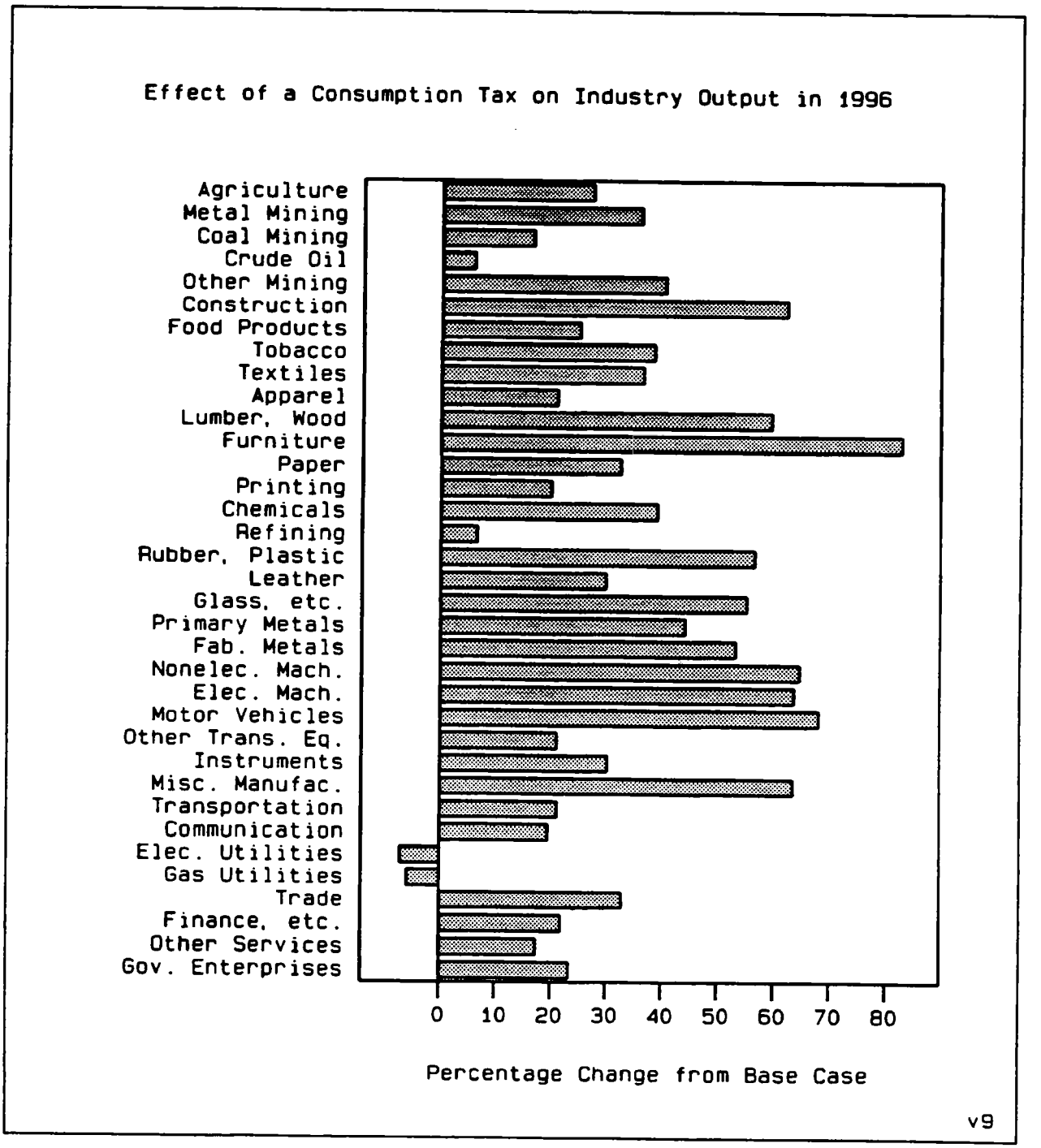
Effect of a Consumption Tax on Industry Output in 1996
Agriculture
Metal Mining
Coal Mining
Crude Oil
Other Mining
Construction
Food Products
Tobacco
Textiles
Apparel
Lumber, Wood
Furniture
Paper
Printing
Chemicals
Refining
Rubber, Plastic
Leather
Glass, etc.
Primary Metals
Fab. Metals
Nonelec. Mach.
Elec. Mach.
Motor Vehicles
Other Trans. Eq.
Instruments
Misc. Manufac.
Transportation
Communication
Elec. Utilities
Gas Utilities
Trade
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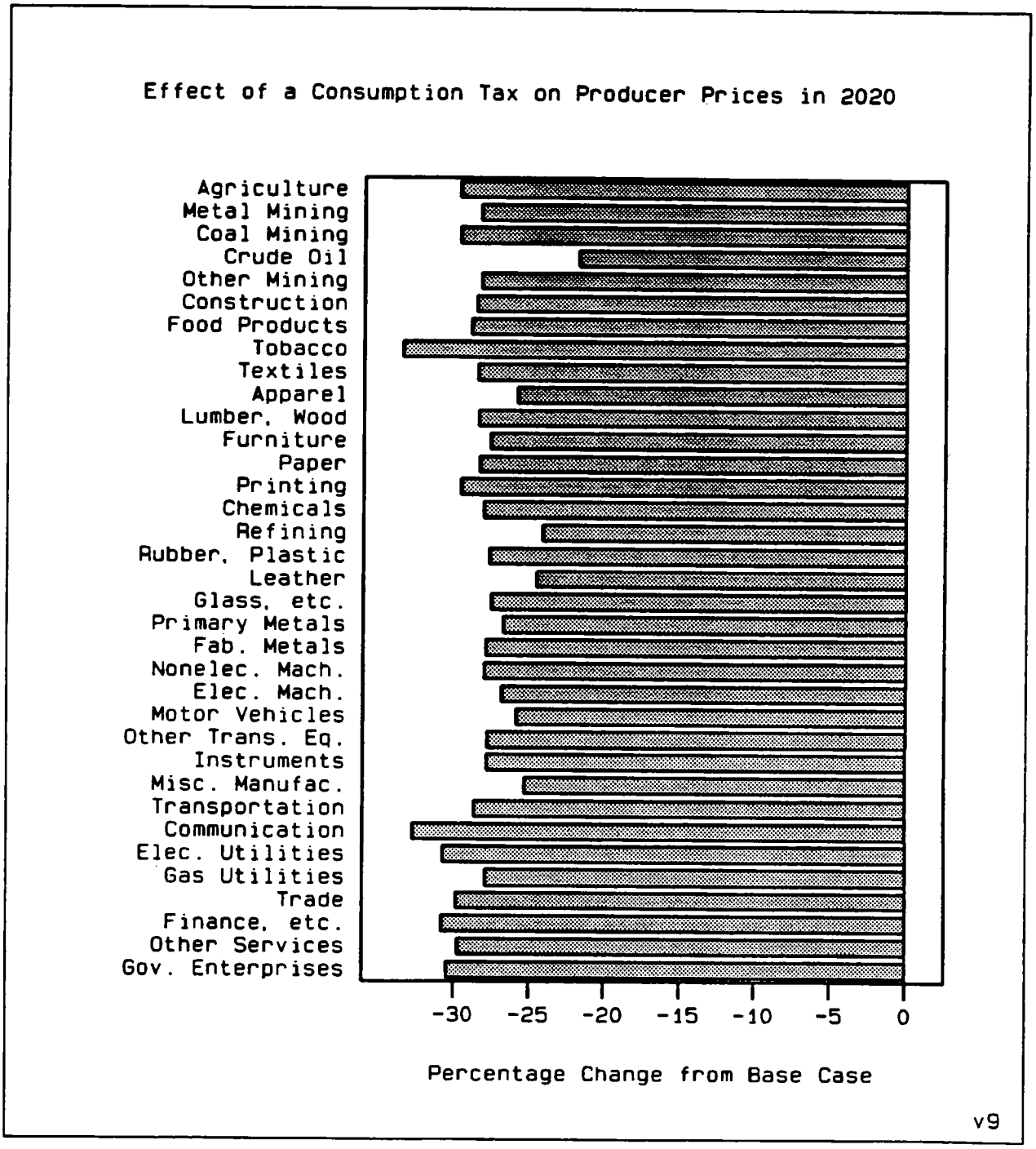
Percentage Change from Base Case
v9


Effect of a Consumption Tax on Producer Prices in 2020
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Coal Mining
Crude Oil
Other Mining
Construction
Food Products
Tobacco
Textiles
Apparel
Lumber, Wood
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Paper
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Refining
Rubber, Plastic
Leather
Glass, etc.
Primary Metals
Fab. Metals
Nonelec. Mach.
Elec. Mach.
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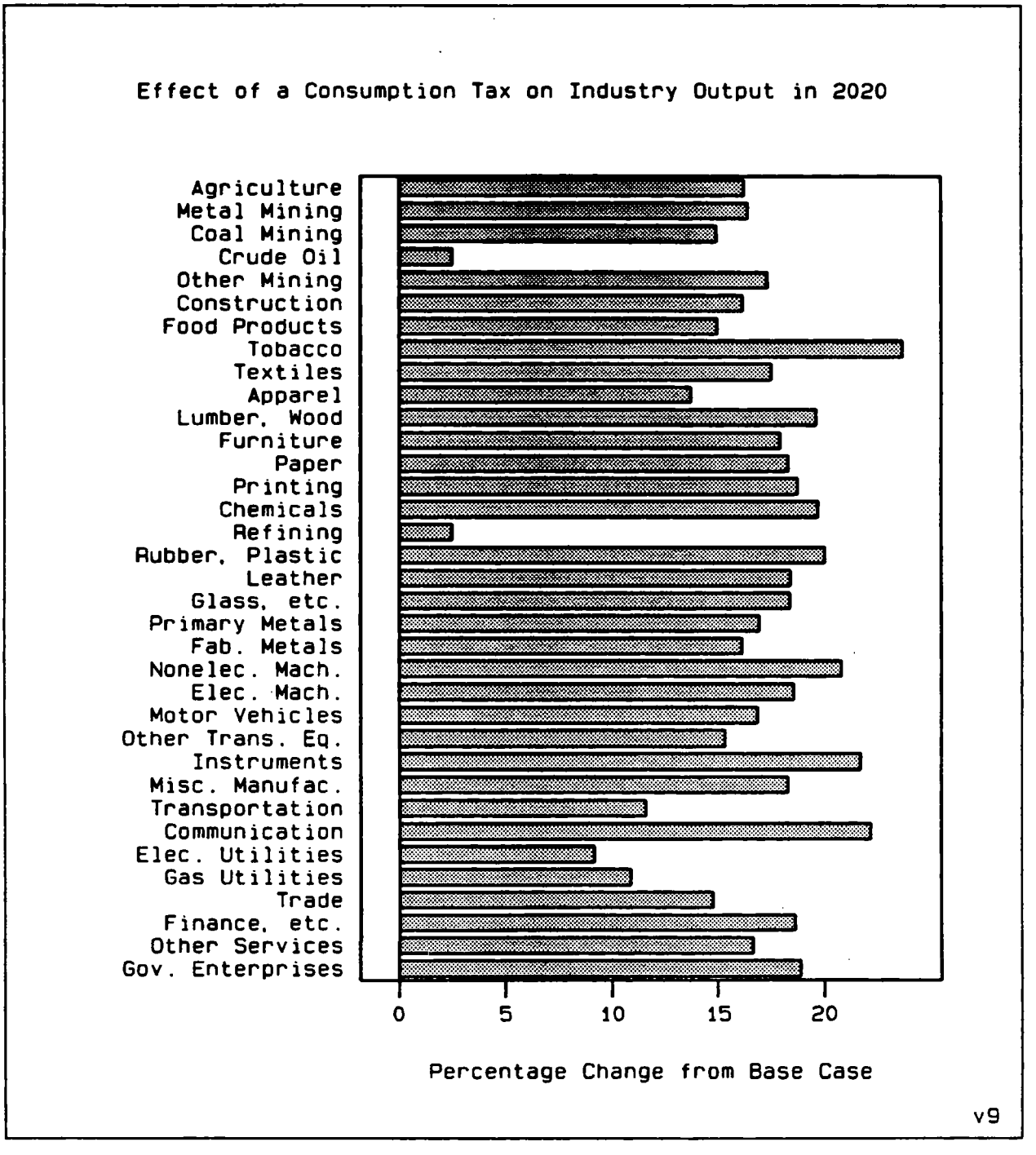
Effect of a Consumption Tax on Industry Output in 2020
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Lumber, Wood
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Percentage Change from Base Case
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Thurs, 10/17/96, 11pm re: Climate change

MEMORANDUM

COUNCIL OF ECONOMIC ADVISERS

Oct 17, 1996

TO: JOE STIGLITZ, ALICIA MUNNELL, JEFF FRANKEL

FROM: RAY PRINCE

SUBJECT: Jorgenson model

Attached are pages from three papers where the results from Jorgenson's model have been reported. The first table shows that the Jorgenson model (DGEM) estimates of the carbon tax needed to meet any given emissions target are lower than most. (For example, $25-30 for stabilizing at 1990 levels by 2010 compared to an average of $75-100).

The other pages demonstrate that despite the lower tax, the story that comes from Jorgensen's model is compatible with the story from other models: that the cost of climate change policies could be much lower if revenues from a tax are used to reduce corporate income taxes or provide an investment tax credit. I do not know if he has analyzed a scenario where permits are distributed by some allocation formula, but others who have tell a similar story, i.e. the costs are lower if the permits are given to companies.

These results from Jorgensen's and other models represent a potential dilemma since there exists a fairly strong sentiment in some quarters to recycle any revenues toward consumers. So far, the arguments made to support a distribution toward consumers are based on a very limited static welfare analysis plus an assumption that rates of diffusion will increase.

In any case, two questions that would be helpful to rais with Jorgenson are (1) why his estimates of the carbon tax needed to attain a given target are generally below those of most other models, and (2) to what extent he thinks the impacts of reducing corporation taxes versus deficit reduction or reducing personal income tax rely on an assumption of perfect capital mobility.

c: M. Mazur

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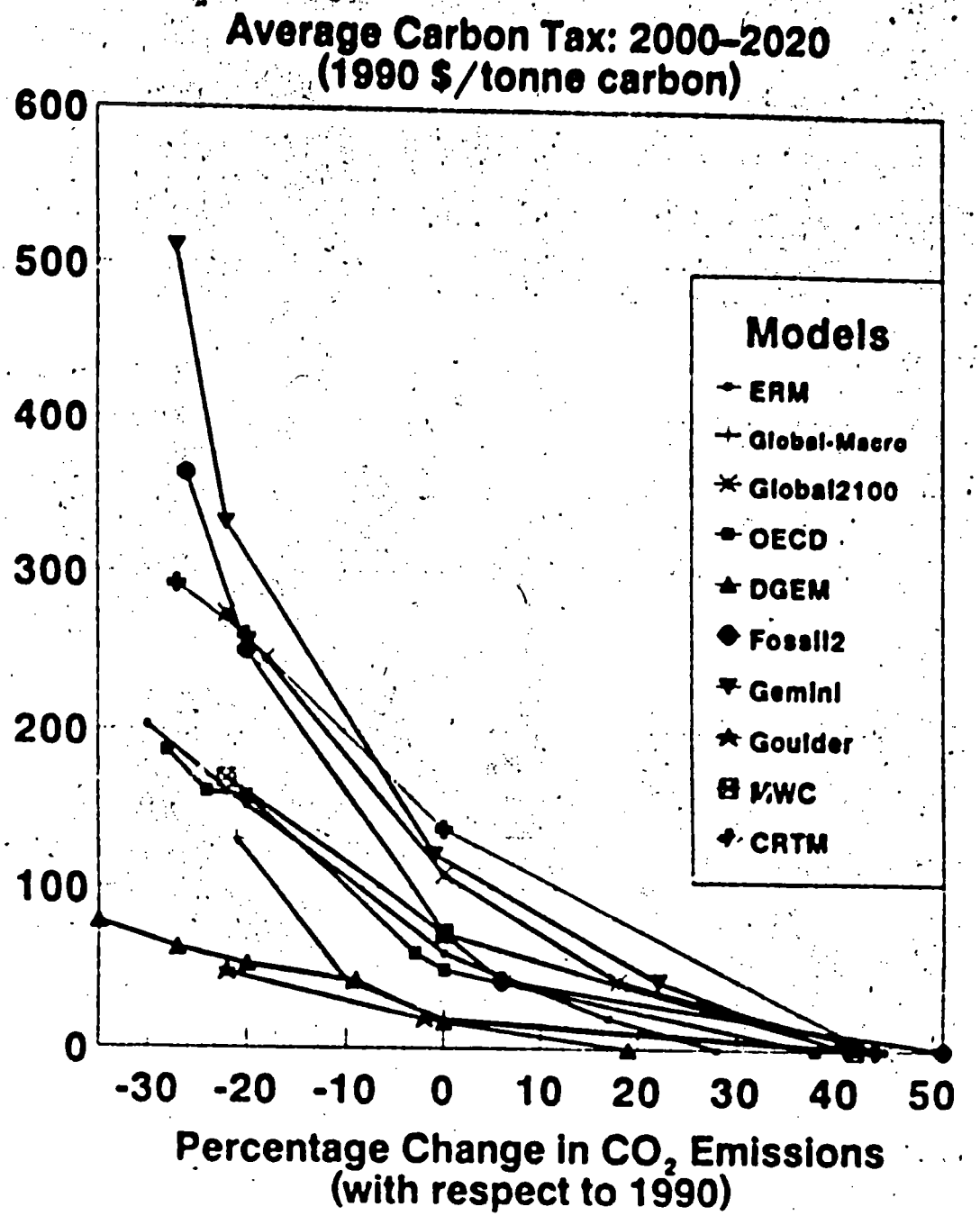

FIGURE 1. CARBON TAXES REQUIRED TO ACHIEVE CARBON-EMISSION REDUCTIONS IN THE UNITED STATES IN 2020

ENERGY EXTERNALITIES, SOCIAL COST PRICING AND TAX RECYCLING

Prepared by:

Dale W. Jorgenson
Richard J. Goettle and Daniel E. Gaynor
Peter J. Wilcoxen and Daniel T. Slesnick

Prepared for presentation at:

The Climate Change Analysis Workshop
Hosted by the U.S. Departments of
Agriculture, Commerce, Energy and State
and the U.S. Environmental Protection Agency
The Springfield Hilton
Springfield, Virginia

6-7 June 1996

1. Introduction

This analysis examines the environmental and economic consequences of using the U.S. tax system to internalize the externalities associated with energy production and use. The methodology employs the Jorgenson-Wilcoxen-Slesnick (JWS) inter-temporal general equilibrium model. For energy externalities, damage estimates are developed from published sources. The effects of these are measured by comparing simulations of the economy over the interval, 1995-2100. In these simulations, selected tax and tariff rates are varied and the resultant solution paths are compared to those from a base or reference case.

The tax changes considered herein necessarily entail increased government revenues, the disposition of which is of central importance to the adjustments that follow such actions. Five revenue recycling alternatives are examined. The first involves reducing the *average* tax rate on labor income. This represents a vertical shift in the labor-income-tax schedule or, equivalently, a reduction in the "zero" bracket rate on labor income. Its use essentially replaces a lump-sum tax with increased taxes on energy. The second alternative reduces the *marginal* tax rate on labor income. The third alternative proportionally lowers sales tax rates on all non-energy purchases. The fourth and fifth alternatives focus on capital formation by proportionally reducing all tax rates on capital income in the one case and all property tax rates in the other. These last four options replace one set of distorting taxes with another.

The remainder of this paper is organized as follows. Section 2 documents the externality assumptions and the resulting energy taxes and tariffs adopted for analysis. Sections 3, 4 and 5 present the major findings for the environment, the economy, and household and social equity, respectively.

Table 12
Selected Macroeconomic Results

Average percent change from base, 1995-2100

Combined High	Tax Option	Real GDP	Consumption	Investment
	Property	-0.34	+0.08	+4.38
	Capital	-0.67	-0.17	+3.67
	Average Labor	-7.23	-5.25	-9.68
	Non-energy Sales	-3.01	-2.33	-4.79
	Marginal Labor	-0.41	+0.00	-3.58

Combined Alternate High	Tax Option	Real GDP	Consumption	Investment
	Property	+0.07	+0.45	+4.67
	Capital	-0.24	+0.21	+3.99
	Average Labor	-6.30	-4.47	-8.45
	Non-energy Sales	-2.49	-1.78	-3.90
	Marginal Labor	-0.06	+0.33	-2.80

Combined Medium	Tax Option	Real GDP	Consumption	Investment
	Property	+0.31	+0.66	+3.91
	Capital	+0.06	+0.48	+3.36
	Average Labor	-4.97	-3.38	-7.08
	Non-energy Sales	-1.83	-1.17	-3.30
	Marginal Labor	+0.10	+0.52	-2.46

Combined Low	Tax Option	Real GDP	Consumption	Investment
	Property	+0.30	+0.39	+1.20
	Capital	+0.24	+0.35	+1.08
	Average Labor	-1.00	-0.60	-1.52
	Non-energy Sales	-0.21	-0.05	-0.56
	Marginal Labor	+0.22	+0.34	-0.38

Table 14
Selected Industry Output Effects

Percent change from base, end-point average 1995&2100

Combined High	Property Tax	Capital Tax	Average Labor Tax	Non-energy Sales Tax	Marginal Labor Tax
Agriculture	7.6	7.5	5.3	16.5	10.4
Metal mining	-6.6	-7.0	-15.3	-1.1	-10.1
Coal mining	-88.8	-88.9	-89.4	-89.2	-88.8
Oil, gas	-26.3	-26.4	-28.1	-26.8	-25.6
Non-fuel mining	-7.0	-7.3	-14.2	-4.6	-8.4
Construction	-0.4	-0.9	-11.0	-4.5	-3.4
Food	13.7	13.7	14.4	24.5	20.3
Tobacco	14.2	14.1	11.8	21.6	16.6
Textiles	-5.1	-5.3	-8.8	4.6	-2.4
Apparel	-12.0	-11.9	-8.5	-3.5	-2.6
Lumber	-30.2	-30.5	-37.6	-32.5	-32.2
Furn, fixtures	-9.5	-10.1	-21.7	-15.5	-14.8
Paper	-6.2	-6.3	-9.0	1.2	-2.7
Print, publish	1.5	1.4	-1.0	8.1	6.5
Chemicals	-11.7	-11.9	-14.8	-5.2	-9.0
Petroleum	-42.5	-42.6	-43.9	-43.3	-42.2
Rubber, plastics	-7.0	-7.3	-13.5	-0.5	-5.5
Leather	-12.1	-12.0	-10.2	-4.4	-2.6
Stone, clay, glass	-7.4	-7.8	-16.2	-7.2	-9.0
Primary metals	-4.3	-4.7	-12.7	2.0	-5.6
Fabricated metals	2.8	2.5	-5.8	5.5	2.2
Non-elec mach	0.6	0.1	-10.5	0.8	-2.4
Electric equip	1.9	1.4	-8.8	0.5	-0.4
Motor vehicles	2.7	2.1	-10.4	0.7	-3.1
Other trans eqp	-1.6	-1.9	-7.9	1.6	0.9
Instruments	3.1	2.6	-7.3	1.2	0.8
Misc mfg	-1.6	-1.8	-8.3	-1.3	-1.2
Transportation	-4.7	-4.8	-7.7	-1.1	-1.9
Communications	5.7	5.5	0.6	8.0	7.0
Electric services	-52.8	-52.8	-54.3	-53.6	-52.1
Gas services	-45.0	-45.1	-46.8	-45.4	-45.1
Trade	1.7	1.6	-1.9	2.9	4.6
F, I, RE	3.5	3.4	0.7	6.9	7.8
Services	1.2	1.2	1.2	6.6	9.4
Gov't enterprises	-1.2	-1.4	-3.9	3.7	2.9

The Efficiency Value of Carbon Tax Revenues

By Robert Shackleton, Michael Shelby, Alex Cristofaro, Roger Brinner, Joyce Yanchar, Lawrence Goulder, Dale Jorgenson, Peter Wilcoxen, Peter Pauly and Robert Kaufmann

CARBON TAX $15 IN 1990
RISING TO $39.80 IN 2010

Draft November 5, 1992

Comments welcome. Please send comments to

Robert Shackleton
U.S. Environmental Protection Agency
PM-221, Room 3220-I
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Washington, D.C. 20460
Tel. (202) 260-8958
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Moreover, in the macro models, the same mechanisms yield the greatest gains in terms consumption. In the general equilibrium models, however, the results are somewhat m ambiguous. In the Goulder model, the consumption loss over the period 1990-2010 is minimi through personal income and payroll tax cuts; while in the Jorgenson-Wilcoxen mo consumption rises more if carbon taxes are recycled through labor tax cuts.

GNP Loss, 1990-2010
(Percentage of discounted constant price GNP)

	DRI	LINK	J/W	Goulder
Lump Sum Tax Cuts	-0.58%	-0.46%	-0.62%	-0.24%
Revenue Raising (Deficit Reduction)	-0.40%	-1.02%		-0.24%
Personal Income Tax Cuts	-0.56%	-0.53%	-0.16%	-0.16%
Corporate Income Tax Cuts	0.40%	-0.11%	0.60%	-0.17%
Payroll Tax Cuts				-0.18%
(Employee Only)	-0.58%	-0.53%		
(Employer Only)	0.19%	-0.25%		
Investment Tax Credit	1.55%	1.67%		0.00%

Consumption Loss, 1990-2010
(Percentage of discounted constant price consumption)

	DRI	LINK	J/W	Goulder
Lump Sum Tax Cuts	-0.39%	-0.46%	-0.32%	-0.18%
Revenue Raising	-0.75%	-0.87%		-0.18%
Personal Income Tax Cuts	-0.39%	-0.51%	0.29%	-0.12%
Corporate Income Tax Cuts	-0.16%	-0.10%	0.17%	-0.17%
Payroll Tax Cuts				-0.10%
(Employee Only)	-0.39%	-0.51%		
(Employer Only)	0.17%	-0.25%		
Investment Tax Credit	0.40%	1.41%		-0.16%

Welfare Loss

	J/W Welfare	J/W Social Welfare[20]	Goulder Welfare
Lump Sum Tax Cuts	-0.83%	-0.94 to -0.70%	-0.44%
Revenue Raising			-0.44%
Personal Income Tax Cuts	1.01%	0.48 to 0.33%	-0.39%
Corporate Income Tax Cuts	0.19%	-0.06 to -0.08%	-0.36%
Payroll Tax Cuts			-0.39%
Investment Tax Credit			-0.27%

The welfare changes shown in the last table are more ambiguous. The results from Goulder model are similar to those from the macro models: the welfare losses associated w carbon tax clearly are minimized through an investment tax cut. However, the results from Jorgenson-Wilcoxen model imply that the welfare loss is minimized (or rather, the welfare ga maximized) through labor tax cuts. The results differ mainly because of the difference in consu

model. In terms of foregone GNP, the cost varies from about 1.0% of the discounted stream of GNP to -1.7% of GNP. That is, at worst the carbon tax lowers GNP by 1.0% percent, and in the best case GNP is raised by 1.6%. In terms of foregone consumption, the cost varies from about 0.9% of the discounted stream of GNP to -1.4% of GNP. With only two exceptions, the consumption cost of a particular option is lower than the GNP cost.

GNP Cost per Metric Tonne of Carbon, 1990-2010
(Constant 1990 dollars)

	DRI	LINK	J/W	Goulder
Lump Sum Tax Cuts	750.53	1,527.11	191.72	51.41
Revenue Raising	502.64	1,590.78		51.41
Personal Income Tax Cuts	730.64	1,622.97	50.30	35.05
Corporate Income Tax Cuts	-600.72	479.00	-191.75	35.99
Payroll Tax Cuts				38.30
(Employee Only)	762.78	1,622.97		
(Employer Only)	-326.11	1,138.22		
Investment Tax Credit	-3,395.61	-400,816.58		-0.75

Consumption Cost per Metric Tonne of Carbon, 1990-2010
(Constant 1990 dollars)

	DRI	LINK	J/W	Goulder
Lump Sum Tax Cuts	236.51	1,050.80	57.63	21.18
Revenue Raising	437.96	946.87		21.18
Personal Income Tax Cuts	236.73	1,089.59	-52.52	14.14
Corporate Income Tax Cuts	114.77	314.17	-32.25	19.97
Payroll Tax Cuts				11.47
(Employee Only)	237.68	1,089.59		
(Employer Only)	-137.06	788.57		
Investment Tax Credit	-415.71	-234,658.85		19.15

Furthermore, in three of the models some of the scenarios yield a gain in GNP ove baseline along with a reduction in carbon emissions. This implies a negative cost to reducin emissions. In some cases, such as the investment tax credit scenario in the LINK model, the GNI and consumption gains are large relative to the cut in emissions, implying a very large negativ cost for a small reduction in emissions.[21] Even where emissions are cut at the cost of a clear los of GNP, the appropriate measure of costs is not clear cut because both GNP and emissions follov

[21] In preliminary scenarios with one of the models, both GNP and emissions rose; this would imply a positive cost for reducing emissions, but th measure would be meaningless since emissions would not be reduced at all. For a complete description of the social welfare function used in this stud see Jorgenson, Slesnick and Wilcoxen (1992).

Climate Change

Questions that one might wish to be able to ask of a model.

Do you measure effects on GDP alone, or can you also address effects on non-market goods (leisure and environment)?

What does your model predict is the effect of a sudden unexpected quadrupling of oil prices, as occurred in 1973-74?

Can you analyze the effect of a formula that committed a country to a path of emissions targets that were contingent on, say, its future GDP and the level of global GHG concentration?

Can one distinguish the effects of command-and-control approaches from market-based approaches? At a more detailed level, can one distinguish, say, a comprehensive carbon tax plan from a plan that taxes only fuel and issues tradable permits for power plants (coal)?

Is sequestration (oceans and trees) included?

Is there an allowance for elasticities that are much higher in the long run than in the short run, as the nature of capital responds gradually over time to relative prices (putty-clay) and as technology responds gradually as well?

Is there an allowance for an aggregate capital stock that adjusts gradually over time to such factors as the user cost of capital (especially interest rates)?

Can one explicitly distinguish the effects of tax receipts that are fully "recycled" (refunded) in a lump-sum manner (and thus are equivalent to auctioned permits), vs. refunded through various kinds of taxes, vs. used for deficit reduction?

Is there explicit modeling of other countries, including distinctions along the lines of energy-importing vs. energy-exporting countries, cold-climate vs. warm-climate, developed vs. less-developed, and signatories vs. non-signatories?

Do you take into account international trading of emission permits?

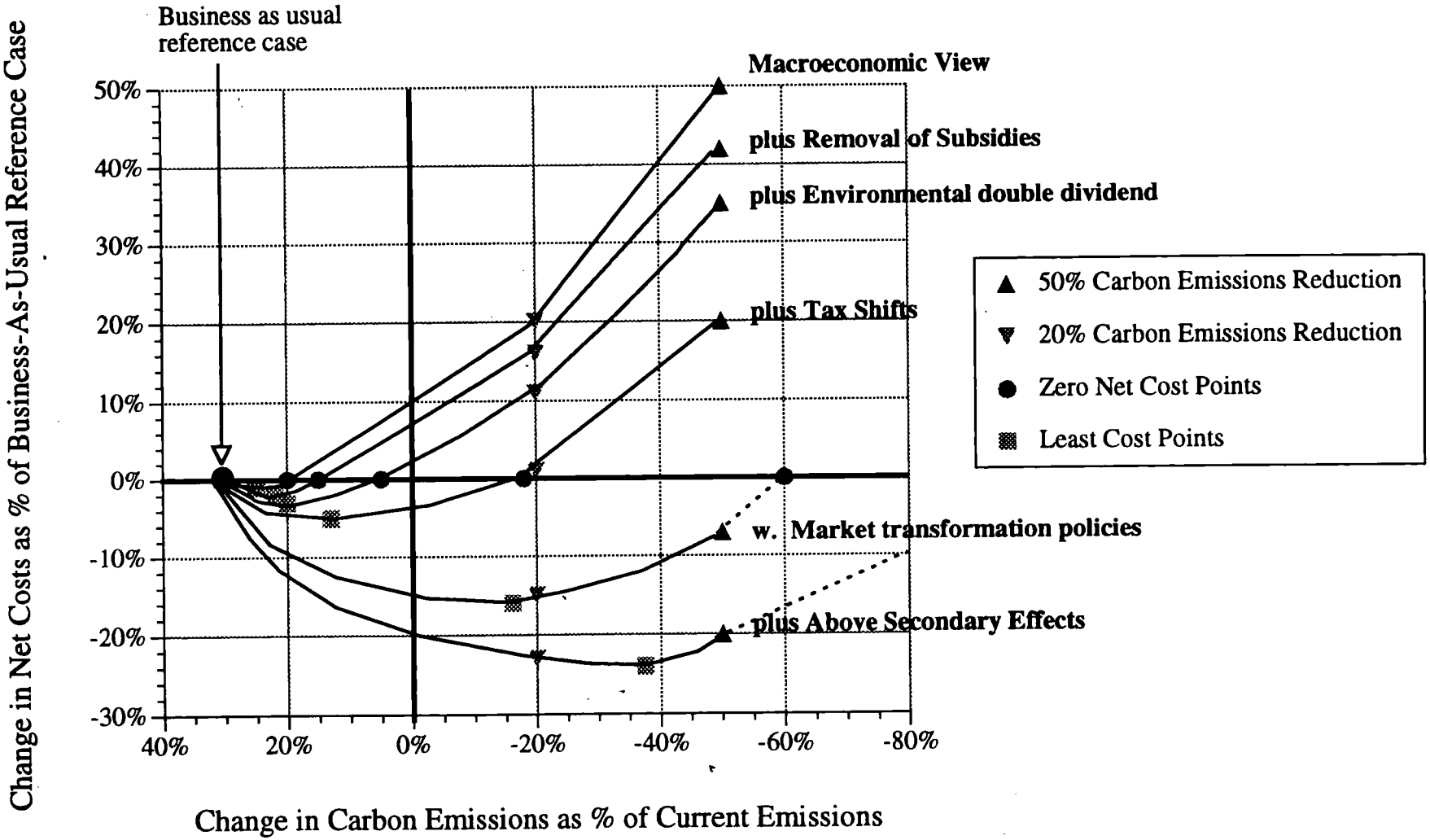
Do you take into account migration of high-polluting industries from signatory countries (to a binding treaty) to non-signatories ("leakages")?

Do you take into account other, non-global, benefits of curbing vehicle traffic and emissions (other kinds of pollution, time lost in traffic congestion, traffic accidents, need to fight Middle Eastern wars...)?

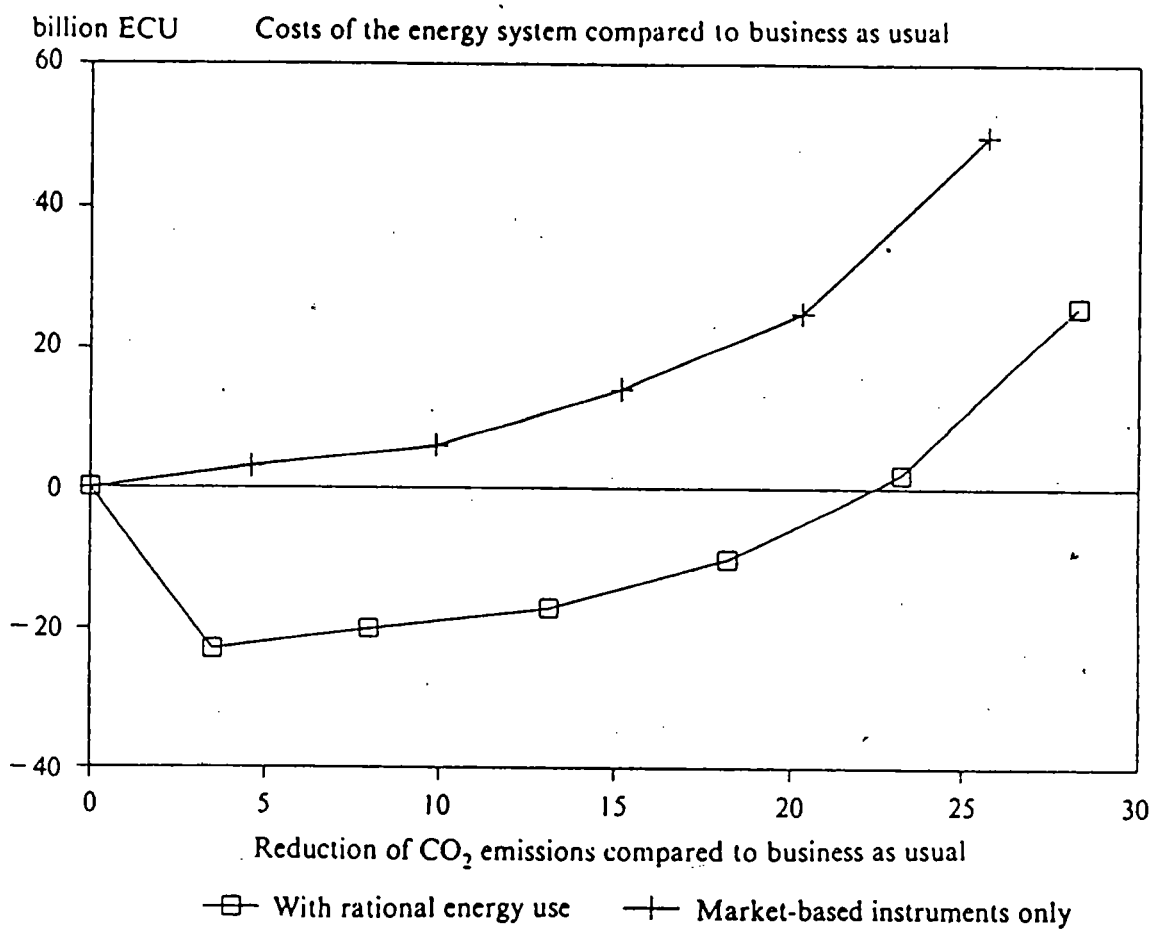
****

How long does it take to run the model?
How easy is it to modify?
Does it already exist in-house somewhere in the U.S. government?
Is there a lot in the model that is not relevant to any of the above questions (or to others like them)?

Figure I: Cost of Carbon Reductions Under Target-Based Policies, Stylized illustration for a 30-40 year time horizon



The Costs of Emission Reduction with and without Cost-effective Efficiency improvements: Germany 2010



Source: Coherence 1991 / CEC 1992

THREE REBUTTABLE PRESUMPTIONS

1) The energy efficiency gap CANNOT be explained by losses of consumer surplus. With few exceptions, energy efficient products are amenity-neutral or increase utility. Market transformation pograms tend to accelerate the development of energy-efficient technologies of better design.

2) The energy efficiency gap is mainly an ECONOMIC efficiency gap. It is caused by transaction costs, information problems, and other features of end-use markets that represent market failures in the standard economic sense.

3) Proven, well-designed regulatory and incentive policies can COST-EFFECTIVELY reduce or eliminate high transaction costs and market problems. Even after carefully accounting for all indirect policy costs, significant net benefits remain.

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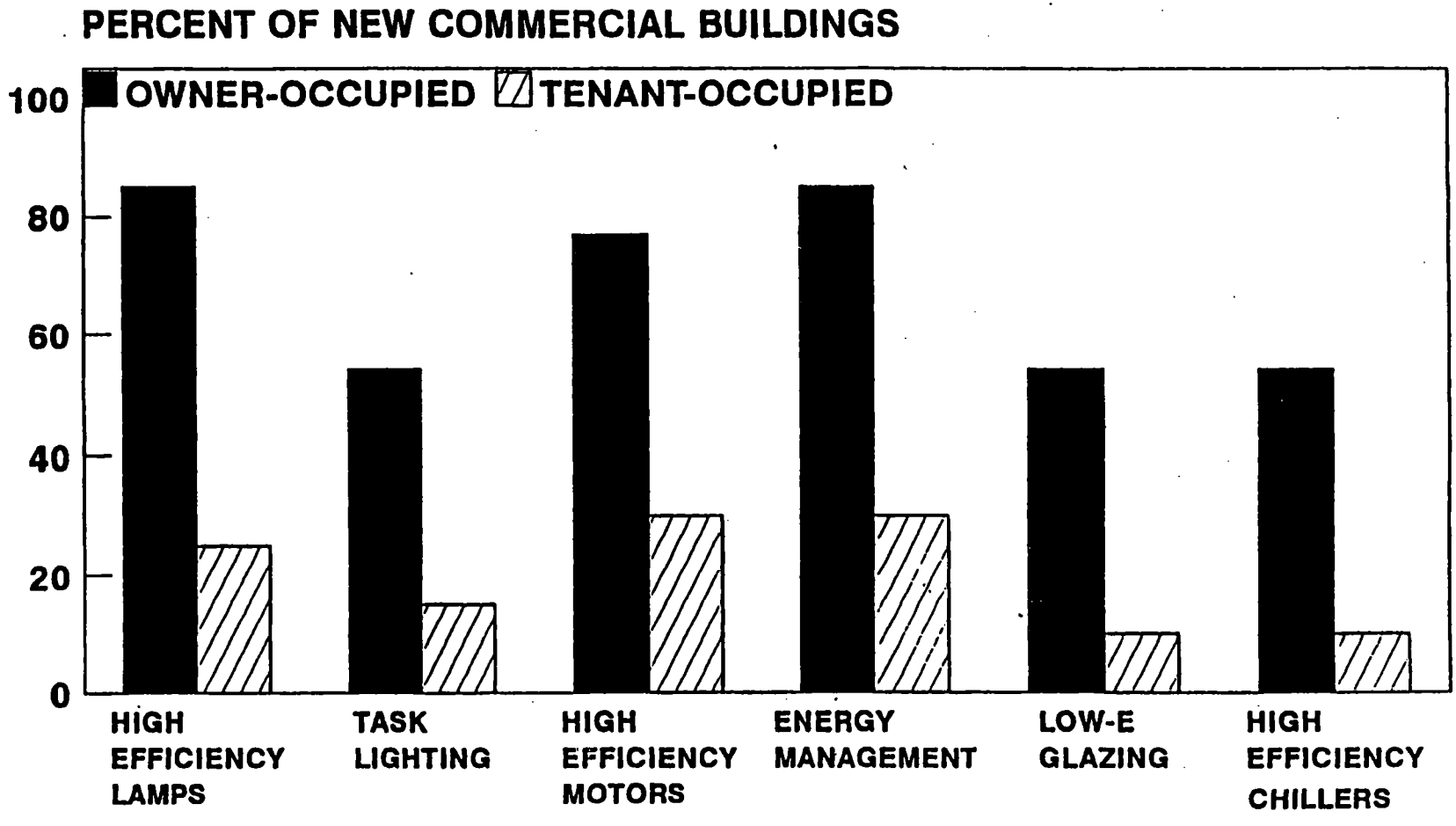


Fig. 2.4 Percentages of new commercial buildings in Washington, D.C. with various energy-efficiency measures, by building occupancy (Hines 1990).

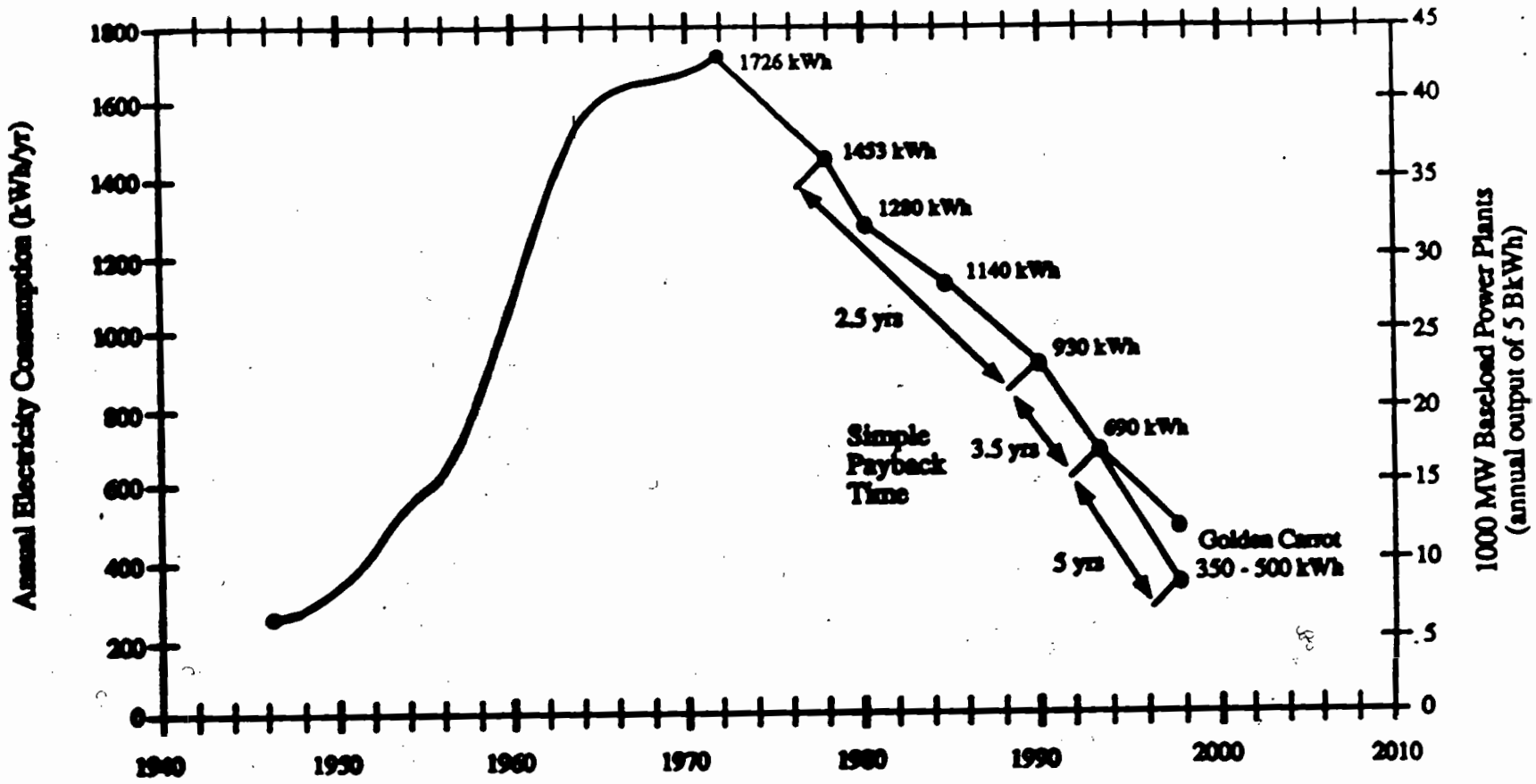
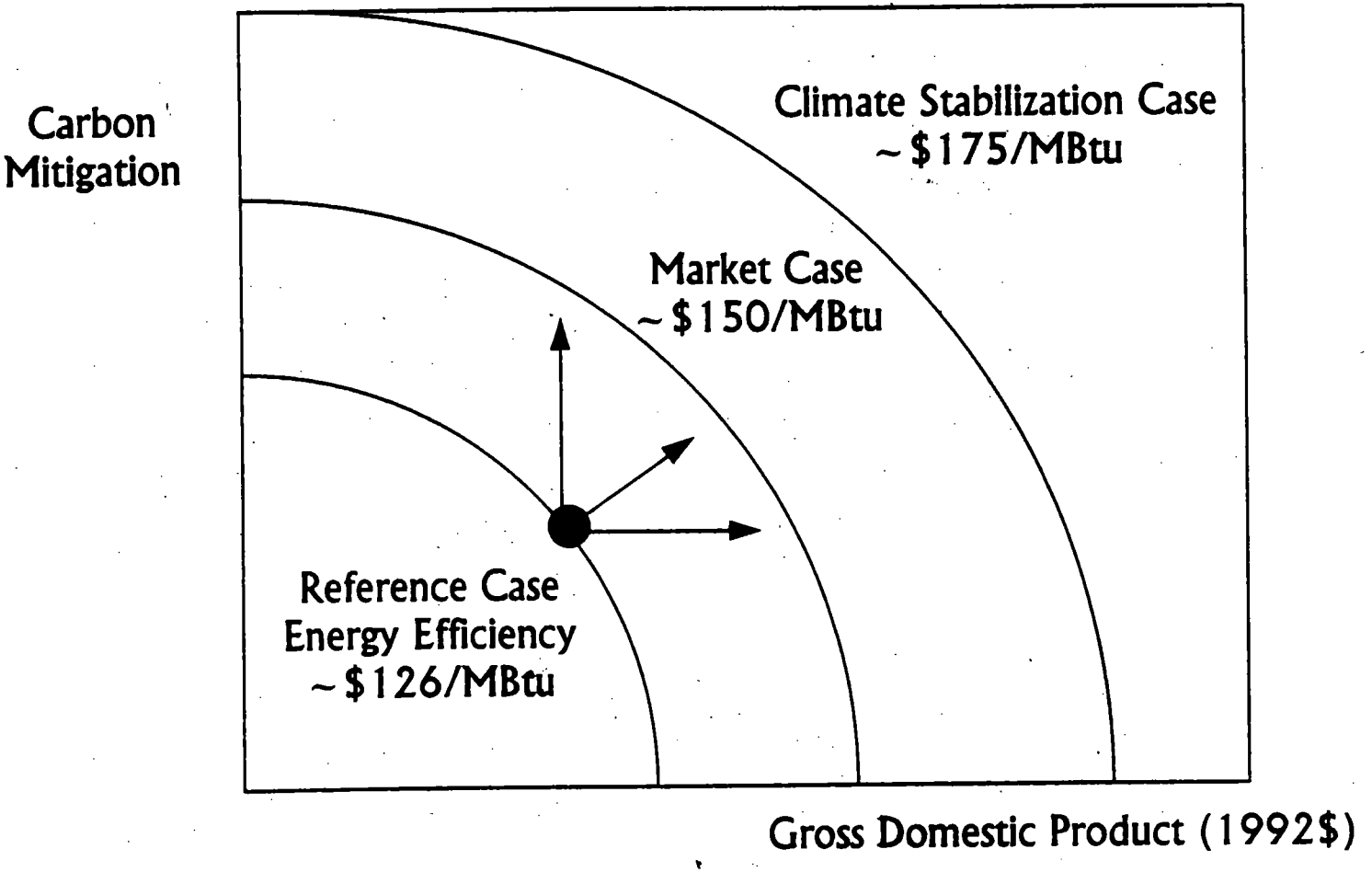


Figure 1. Average U.S. New Refrigerator Annual Electricity Use (1947-1998). Annual refrigerator electricity consumption grew dramatically from 1947 to 1972 due in part to growth in interior volume size, thinner insulation, reduced motor and heat exchanger efficiencies, and added features such as automatic defrost. The sudden drop by 1978 was in response to the upcoming California refrigerator standards that were followed by the 1990 U.S. standards. The U.S. Golden Carrot program for refrigerators could reduce annual consumption to between 350 and 500 kWh, beating the 1993 national standards by more than 30%.

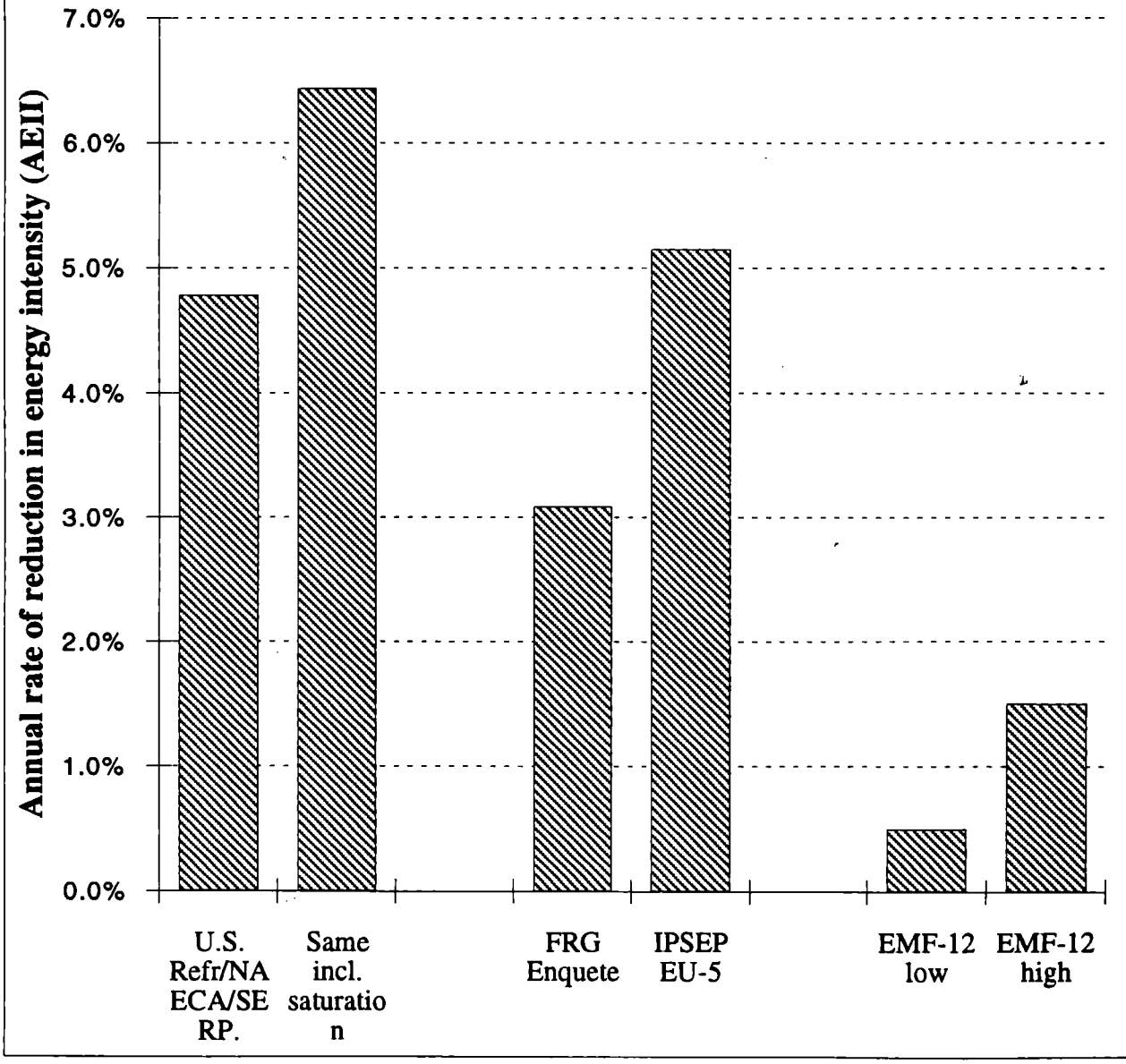
Sources: Data for 1947 and growth trend for 1947-1972: D. Goldstein, NRDC. Data for 1972-1988: American Home Appliance Manufacturers. From 1977 to 1987, changes required an additional retail cost of $100 for annual savings of $40, with a 2.5 year payback. Data for 1990-1993 based on LBL estimates. From 1990 to 1993, the estimated additional retail cost is $66 for annual savings of $19, with a 3.5 year payback. Estimate for 1998 is based on the Golden Carrot program requirements. Baseload power plants calculated at 5 BkWh sold annually from a 1000 MW plant.

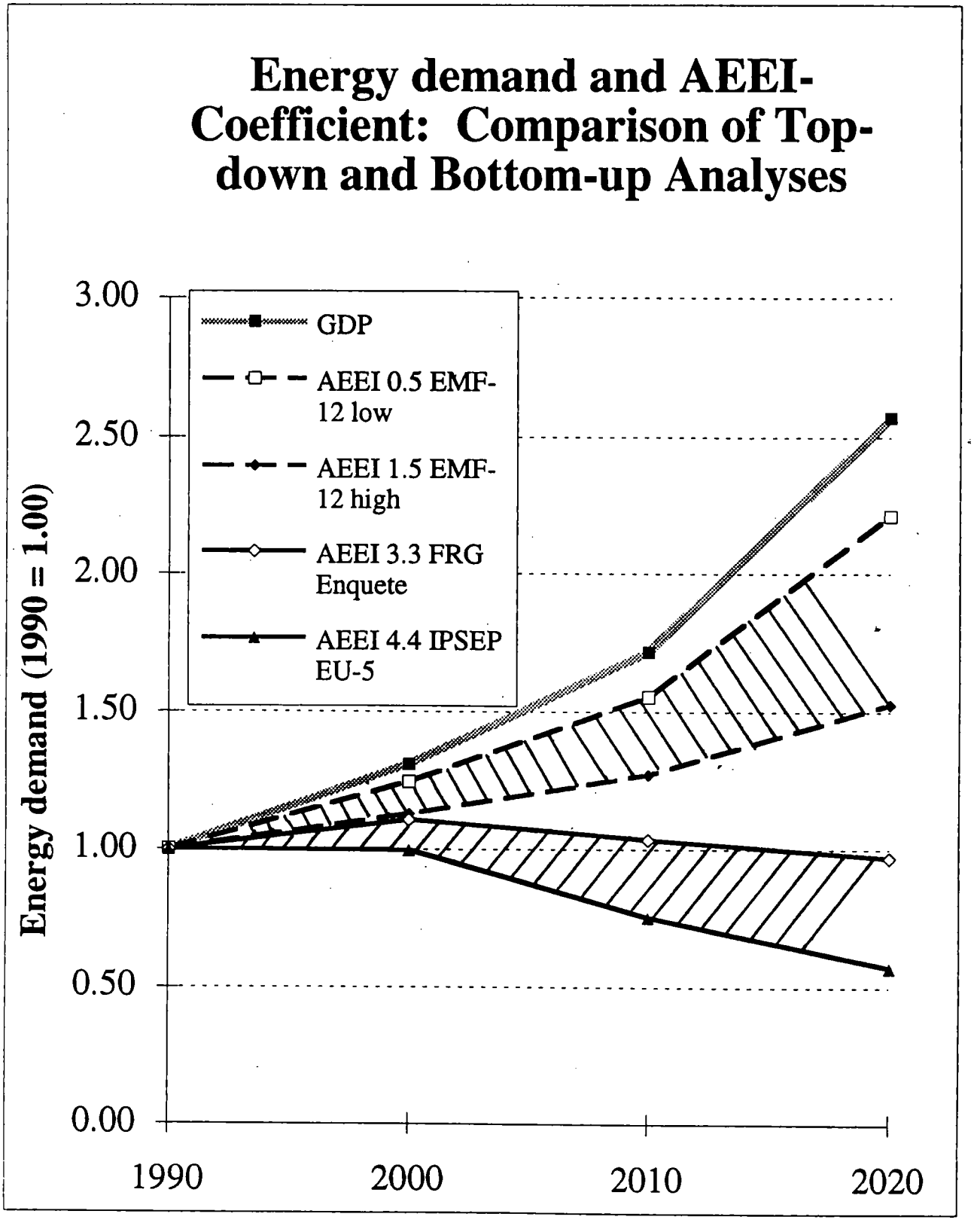
Exploring the Year 2010 Industrial Sector Energy Efficiency Gap in the United States



Source: S. Laitner, EPA, 1996; based upon AEC-I

Comparison of average energy intensity improvement in newly sold U.S. refrigerators (1972-1998), and in the economy at large as found feasible in bottom-up and top-down studies of mitigation costs (1990-2020)




Energy demand and AEEI-Coefficient: Comparison of Top-down and Bottom-up Analyses
Energy demand (1990 = 1.00)
3.00
2.50
2.00
1.50
1.00
0.50
0.00
1990
2000
2010
2020
GDP
AEEI 0.5 EMF-12 low
AEEI 1.5 EMF-12 high
AEEI 3.3 FRG Enquete
AEEI 4.4 IPSEP EU-5

Thurs, 10/1/96 cc: Alicia Tinnney
4pm Ray Prince
Jeff Frankel

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FAX COVER SHEET

Fax to: Michele Jolin

Date: 10/1/96

Fax Number: 202 395-6958

From: Doug Kendall

Pages Incl. Cover: 5

Comments:

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October 1, 1996

Ms. Michele Jolin
Chief of Staff
Counsel of Economic Advisors
OEB Room 314
Washington, D.C. 20500

Dear Michele:

Per your request, I have enclosed a brief biography of Dale Jorgenson and Florentin Krause, the two economists that we would like Mr. Stiglitz to meet with concerning the economics of climate change mitigation. As you will see from his biography, Dr. Jorgenson is the Chairman of Harvard's Department of Economics and a co-author of a macroeconomic model that I understand to be under consideration by the Interagency Task Force. Dr. Krause is a Staff Scientist at the Lawrence Berkeley Laboratory, the Director of the International Project for Sustainable Energy Paths and one of the lead authors of the IPCC Working Group III report on the economics of mitigating climate change.

I greatly appreaciate your help in setting up the meeting. I will speak with you soon.

Sincerely yours

Doug Kendall

Enclosures

Alice - This has been scheduled for 4PM on Oct. 17. Would you please pass this info on to Rey Prince and Alicia? Thanks - M

BIOGRAPHY: DALE W. JORGENSON

Dale W. Jorgenson is currently Chairman of the Department of Economics and Frederic Eaton Abbe Professor of Economics at Harvard University. He has been a Professor in the Department of Economics at Harvard since 1969 and Director of the Program on Technology and Economic Policy at the Kennedy School of Government since 1984. Jorgenson received his Ph.D. degree in economics from Harvard in 1959 and his B.A. in economics from Reed College in Portland, Oregon, in 1955.

Jorgenson was elected to membership in the National Academy of Sciences in 1978 and the American Academy of Arts and Sciences in 1969. He was elected to be a Foreign Member of the Royal Swedish Academy of Sciences in 1989. He was elected to Fellowship in the American Association for the Advancement of Science in 1982, the American Statistical Association in 1965, and the Econometric Society in 1964. He served as President of the Econometric Society in 1987. He was awarded honorary doctorates by Uppsala University and the University of Oslo in 1991.

Jorgenson received the prestigious John Bates Clark Medal of the American Economic Association in 1971. This Medal is awarded every two years to an economist under forty for excellence in economic research. The citation for this award reads in part:

> Dale Jorgenson has left his mark with great distinction on pure economic theory (with, for example, his work on the growth of a dual economy); and equally on statistical method (with, for example, his development of estimation methods for rational distributed lags). But he is preeminently a master of the territory between economics and statistics, where both have to be applied to the study of concrete problems. His prolonged exploration of the determinants of investment spending, whatever its ultimate lessons, will certainly long stand as one of the finest examples in the marriage of theory and practice in economics.

Jorgenson is the author and co-author of more than two hundred journal articles, contributions to books, and books in economics. His most recent books, POSTWAR U.S. ECONOMIC GROWTH and INTERNATIONAL COMPARISONS OF ECONOMIC GROWTH, were published by The MIT Press in 1995. He is the Managing Editor of the monograph series, CONTRIBUTIONS TO ECONOMIC ANALYSIS, published by the North-Holland Publishing Company in Amsterdam.

Prior to Jorgenson's appointment at Harvard he was Professor of Economics at the University of California, Berkeley, where he taught from 1959 to 1969. He has been Visiting Professor of Economics at Stanford University and the Hebrew University of Jerusalem and Visiting Professor of Statistics at Oxford University. He has also served as Ford Foundation Research Professor of Economics at the University of Chicago.

An important feature of Jorgenson's research program has been collaboration with students in economics at Berkeley and Harvard, mainly through the supervision of doctoral research. Collaboration has often been an outgrowth of a student's doctoral dissertation and has lead to subsequent joint publications. Thirty-eight economists have collaborated with Jorgenson on published research. Many of his former students are now professors at leading academic institutions in the United States and abroad.

Jorgenson was born in Bozeman, Montana, in 1933 and attended public schools in Helena, Montana. He is married to Linda Ann Mabus Jorgenson, who is an attorney in Cambridge, Massachusetts. Professor and Mrs. Jorgenson reside in Cambridge with their children, Kari, age 20, and Eric, age 22. Kari is a student at Harvard College and Eric is a recent graduate of Duke University.

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El Cerrito, CA 94530
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e-mail: ipsep@igc.apc.org

May 1996

BRIEF CURRICULUM VITAE

Dr. Florentin Krause is the Director of the International Project for Sustainable Energy Paths (IPSEP), a private energy policy research group located in El Cerrito, California. A native of Germany, Mr. Krause received his Ph. D. from the University of California in Berkeley and has been serving as a staff energy analyst at the Energy and Environment Division of Lawrence Berkeley National Laboratory. In 1981, Dr. Krause co-authored with Amory Lovins the first prevention-oriented energy policy book on global warming. Subsequently, the Dutch government commissioned him to carry out a major bottom-up analysis on the economics of mitigating carbon emissions in Western Europe. He is the lead author of a number of books on alternative energy futures and energy policies, and has published many dozens of technical reports and papers in his field. Several of his publications have been translated into foreign languages including German, French, Italian, Spanish, Russian, Polish, and Czech.

During 1994-1995, he served as a lead author of the scientific assessment report (Working Group III) by the Intergovernmental Panel on Climate Change (IPCC) of the UN. In other activities, he has written and testified on the economics and environmental implications of alternative energy strategies and policy options for a number of national and international organizations. They include the UN Intergovernmental Negotiating Committee (INC), the Organization for Economic Cooperation and Development (OECD), the Commission of the European Communities (CEC), the UN Economic Commission for Europe, the Joint Economic Committee of the U.S. Senate, the National Association of Regulatory Utility Commissioners (NARUC), and the Special Commissions on Climate Change of the German and Dutch parliaments.

Phil Clapp

Here are thoughts on agenda for the Seasons retreat and people who've been invited

Cheers,
Kenneth

Institute of Noetic Sciences

Memorandum

To: **Katie McGinty, Harriett Crosby, Dave Sluyter, Phil Clapp, Fr. Drew Christiansen**

Fr: **Tom Hurley**
Dt: **10-16-96**

Re: **Thoughts on the November 23–26 meeting at Fetzer Institute**

Harriett asked me to draft a few thoughts that could help us craft an agenda for the meeting at the Fetzer Institute in late November. Please take what follows as a starting point for our mutual consideration and conversation rather than as a definitive statement. We'll want to talk together about our aims and expectations and then create an agenda that reflects our emerging common perception of what is both desirable and likely to be possible.

It may help to review what is already in place. The conference will take place at Seasons, the retreat center of the Fetzer Institute in Kalamazoo, Michigan. Our session will begin on Saturday evening, November 23, and will end at noon on Tuesday, November 26. This gives us two full days plus an opening evening and closing morning session — eight sessions in all, if we have morning, afternoon, and evening sessions on Sunday and Monday. Our group will number approximately two dozen. (Seasons can accommodate exactly 24 individuals, but there may be one or more Fetzer Institute representatives who stay offsite.) What we know about invited participants as of Tuesday, October 15 is indicated on the attached sheets. We should have a definite confirmation (or regrets) from everyone by Thursday or Friday. If there are any openings still available, we can approach alternate invitees at that time.

The title for the conference is "Deepening Our Vision: Transformative Leadership in a Culture in Transition". To help us explore this theme, we have sought participants who represent a wide range of fields, who are holistically oriented, and who are able to engage open-mindedly in dialogue and deep collaborative inquiry without rigid attachment to their perspectives or prescriptions. We are generally agreed that the purpose of the meeting is to develop deeper, more empowering perspectives on the changes taking place in our culture and to better understand how to serve the emergence of a world that reflects our deepest values and vision. In particular, we seek to foster a systemic understanding of the ways that more holistic worldviews and values are reshaping our institutions, organizations, and daily lives — and to envision further what kinds of leadership, principles, and practices can help promote the evolution of a more sustainable, just, and life-affirming society.

There are a couple basic questions we need answer collectively if we are to be unified in our intention and approach.

One question has to do with the extent to which we view this meeting as an opportunity for deeper personal reflection and self-revelation on the part of participants — exploring, perhaps, what calls people to their work, what sustains them, or what transformative leadership in the deepest sense means to them. I don't see this as a significant part of our time together, at least not to the point of

being a major portion of our agenda, but I do think we want people to engage the conversation — and one another — from that more essential place in themselves that is the source of their deepest values, vision, and sense of vocation. We do not want participants rehashing well-worn positions or insisting rigidly on particular ideologies or programs. Put another way, participants' abilities to listen will be as important as their abilities to speak.

We will want participants to be working on their own personal "learning edge" in this retreat, sharing not only what they know but what they don't know, what they're seeking to understand or integrate. We'll want participants to talk about "the questions they are living into" in their work, since those are the questions around which the most creative energy, passion, and potential insight will exist. In this arena of our lives and work, the "personal" and "professional" necessarily merge and some risk-taking may be required for open, rich communication and a truly generative inquiry. Our task will be to create a context in which this occurs easily, naturally, comfortably, and meaningfully — which is to say, in a way that furthers the inquiry we'll be gathered to engage. I'm confident we can do this, particularly if we are essentially in agreement about our intention in this regard and can model the kind of participation we seek.

Am I on the right track here, or do you have a different perspective?

A second question is perhaps more knotty in some ways. Already in our conversations about this retreat there is a creative tension emerging between some people's interest in the deepening of what I'll call "whole system perspectives" (having to do with values, vision, emerging worldviews, cultural change processes, and so on) and other people's practical interest in "what we can actually do" about concrete issues and steps of action. I understand and am sympathetic to those who want to contrast these two approaches (and then argue primarily for one or the other), but in relation to our territory of concern I think the distinction is potentially misleading if drawn too sharply. There is clearly an integral relationship between "vision" and "action" that we want to respect and that can be the source of creative insight if explored skillfully. In fact, it may be precisely the exploration of that relationship in the light of emerging holistic perspectives and creative cultural change processes that uniquely defines our particular focus in the retreat.

There are several dimensions to this issue and I won't try to develop them all here; we can identify and talk them through in our conference call, if necessary. They are important and it is essential that we be as clear as possible about our fundamental intent and orientation. For now, I'll simply reiterate that I think our conversation can, will, and must encompass the full creative circle that unifies "vision" and "action". Rather than frame this as a dialectic, however, I propose that our emphasis be on what is emerging in the culture with respect to what is desirable (having to do with vision and values), what is possible (having to do with ways in which the culture is open or becoming open to change), and what is already taking place that reflects or supports our emerging values and vision (having to do with specific examples of social innovation and entrepreneurship).

One thread weaving this conversation together over the course of our three days would be our collective reflection on the nature of transformative leadership, as we explore what is called for from each of us as leaders interested in furthering the emergence of that which is positive and life-affirming. Are there other such threads that might be compelling or meaningful to our diverse group of participants?

Some specific questions we might ask each participant to address would be:

- What brought you here — what called you to this retreat?

  I see this as the question people respond to in introducing themselves on our opening night. It gets us beyond introductions that focus on "what roles I play and what I've accomplished", to

that deeper level of personal conviction and caring that grounds our sense of purpose in the world.

- If you look beneath the surface of social and political life, what do you see emerging in the culture / your community / your particular area of expertise or activity that is particularly hopeful or indicative of a new sense of cultural possibility? Do you discern a deeper pattern of cultural change taking place that holds within it a new, integrative vision of a positive, sustainable, life-affirming society?

I see a question like this as the one that gets us started on the morning of our first full day. It takes us immediately into the arena of "vision" but in a way, hopefully, that avoids the dangers of abstraction and links participants' emerging vision and sense of possibility to specific things taking place in the world. By sharing our observations and insights on this question, we will indeed "deepen our vision" collectively.

There are a variety of more specific questions that could then follow. I list several here as candidates simply to seed our discussion. They include:

- What are the specific features of the emerging, integrative vision or worldview that you see emerging in the culture?

- Where do you see it emerging most clearly or powerfully? What is present or emerging that seems at odds with this new sense of possibility and direction?

(We don't want to dwell on problems but neither do we want to talk preferred directions for change without being realistic about opposing forces in the world.)

- What do you see as the major emerging issues for us to address during the next (4? 8? 20?) years? What "hidden" issues or opportunities might prove particularly important?

- Given your vision and your sense of emerging issues, what do you see working in the world that is worthy of emulation or that could serve as a model for other communities or other sectors of society? What are the principles that inform what you see working, and how can they be applied more generally?

- Are there new theories, models, or concepts in different fields that help us understand what is emerging — or that can help guide our actions on behalf of a positive, sustainable, life-affirming future?

- What are our responsibilities as leaders in this context? How do we lead? What are the most important qualities for us to cultivate? What are the greatest challenges for you personally? What supports or nourishes you as a leader? What are your needs?

These are obviously "first draft" questions and need considerable refinement. I put them down here, rough as they are, to give you each something to respond to and to give us collectively a place to start our conversation. One or two may speak to you, or they may help you become aware of a better question that should lie at the heart of our inquiry. I'm not too attached to any specific questions at the moment, so I look forward to hearing what you think.

We will also want to talk about the format for the retreat. Fundamentally we want to foster deep dialogue (in a generic sense), the spirit of collaborative inquiry, and creative discovery in a context of trust and mutual respect. Conversation will be the basic vehicle for our work. To date we have not invited particular individuals to make presentations, although we could consider having a few resource people make very brief (5 minute) presentations to initiate different sessions. In general, I

think each session should be oriented around a specific question and that there should be a natural progression to the questions from the beginning of the retreat to the end. Our expectations should be modest, and we should not promise much in the way of outcomes (although we should certainly talk further about what outcomes might best serve our respective purposes). I've assumed that we did not want to tape the meeting — because of sensitivities on the part of some participants — but I'd like to address that question explicitly with you all and think about whether a report of some kind would be useful.

You may well have other questions and I look forward to taking them up with you when we talk by phone.

Deepening Our Vision:
Transformative Leadership in a Culture in Transition

Confirmed Participants of Fetzer Season's Retreat

Katie McGinty (CEQ)
Keith Laughlin
Winston Franklin (IONS)
Tom Hurley
Harriett Crosby
David Sluyter (Fetzer)
Father Drew Christiansen
Phil Clapp
Daniel Kemmis
Lester Brown
Charles Halperin
Helena Norberg Hodge
Paul Ray
Myron Kellner-Rogers
Abbott John Daido Loori (Sunday arrival)

2nd Tier-could be invited

Bruce Lindsay
Ron Klain
Martha Foley
Wayne Gilchrest
Lynn Rivers
Peter Meyers
David Orr
Bill Moyers
David Garrow
Fritjof Capra
Sam Johnson
CEO Mary Kay Cosmetics
John Vasconcellos

Invited but no response to date:

Maggie Williams
Paul Johnson
Bruce Reed
Greg Simon
Tim and Wren Wirth
David Bonior
Elizabeth Furse
Mathew Fox
Robert Coles
Dan Goleman
Joanna Macy
Peter Senge
Jim Garrison
Frances Moore Lappe
Arthur Zajonc (Fetzer)
Robert Lehman (Fetzer)
Willis Harman (Ions)
Cathy Sneed

Definite No

Robert Bellah
Paul Wellstone
John Porter
Robert Thurman
Sister Joan Chichester

United States Department of State
Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs
Washington, D.C. 20520

CLIMATE CHANGE MEETING PRINCIPALS ONLY
TUESDAY, OCTOBER 15 - 11:00 - 12:00n

NAME	FAX
Alicia Munell	395-6958
Rosina Bierbaum	456-6025
Elgie Holstein	456-2223
T.J. Glauthier	395-4639
Everett Ehrlich	482-0432
Jeffrey Honker	482-4636
Lois Schiffer	514-0557
Doug Hall	482-6318
Brooks Yeager	208-4561
David Shark	395-4579
Mark Chupka	586-0861
Charlie Rawls	720-5437
Dirk Forrister	586-9626
Mary Nichols	260-5155
David Gardiner	260-0275
Frank Kruesi	366-3997
Joshua Gotbaum	622-2633
Steve Seidel	456-6546
David Sandalow	456-2170
Pete Jordan	456-9500

Attached is the agenda paper for the climate change meeting that Eileen Claussen would like to have on Tuesday, October 15 from 11:00-12:00 in Room 7835, Department of State. Please call Ms. Wiggins at 647-1554 regarding your attendance.

Thank you.

Climate Change: Next Steps

I. Decision Process

- Interagency Working Group (IWG chair: Amb. Mark Hambley, technical level staff from agencies)
  Principal tasks: develop workplan, prepare analyses, develop/recommend policy options, staff U.S. delegation to Climate Convention and related negotiating sessions
- Claussen Group (chaired by A/S Eileen Claussen, A/S level from agencies)
  Principal tasks: manage process; take policy decisions on most issues
- Interagency Analysis Team (IAT chair: U/S Everett Ehrlich; technical staff from analytic agencies)
  Principal tasks: develop analytic toolbox to assess policy options; evaluate selected options
- Deputies Committee (co-chairs Katie McGinty and Dan Tarullo, U/S and Cabinet level)
  Principal tasks: approve/modify Claussen Group decisions as appropriate, make final major policy decisions

II. U.S. Framework

Announced in Geneva at second session of convention Conference of Parties (by Tim Wirth); includes:
- legally binding target and timetable (rejecting common/harmonized policies and measures)
- medium term emissions target (rejecting short term, i.e., 2005), and long term concentration goal
- flexibility (e.g., emissions trading and/or Joint Implementation (JI))
- requirement of a compliance regime
- inclusion of developing countries

III. Negotiating Timeline

<u>September/October:</u>
- Claussen Group Meeting: October 15. Review proposed submission to convention secretariat
- Submission to convention secretariat (due Oct. 15): propose elements of a protocol/legal instrument, to include: JI/trading, legally binding/compliance, non-Annex I involvement, targets (written by IWG, cleared by Claussen Group/Deputies)

<u>November</u>
- U.S. positions prepared by IWG, cleared by Claussen Group and Deputies. Position to be based on elaboration of October submission, to include:
  - emissions trading/JI (including underlying principles, but no operational details)
  - developing country commitments (developing countries must take part in agreement)
  - target design (with no numbers)
  - legally binding/compliance issues
- Claussen Group Meeting: November 24. Review U.S. positions prior to December AGBM; possible agreement on demarche to other countries

<u>December</u>
AGBM (Geneva):
- Concept for and structure of instrument to be tabled/discussed;
- Meeting output will likely take form of outline for agreement

<u>February/March 1997</u>
AGBM (Bonn):
- Initial tabling of language for agreement
- FCCC Secretariat to compile bracketed text based on December discussion and interim submissions
- U.S. will need actual draft agreement language (rather than concepts) on:
  - emissions trading/JI,

- developing country commitments,
- compliance issues.

- Given short time between conclusion of December session and February opening, little new work can be anticipated in U.S. on these beyond that developed or December; however, we may be able to announce completion of some IAT results with respect to targets at this session. (IWG to draft language, IAT to prepare analyses, Claussen Group to clear)

April/May

Submission of negotiating text to FCCC:

- Submission date not yet set; however, can be anticipated to be needed to insure compliance with 6-month rule;
- Expect Secretariat to compile as single "bracketed text" on basis of submissions; U.S. will need to insure that any options we are still considering be submitted and included in this text

May/June (?) 1997

AGBM (tentative; Bonn):

- Expect a session to be held late Spring/early Summer to insure compliance with 6 month rule
- Focus on discussion of/revision to bracketed text;
- All issues at play;
- Seek resolution of least contentious matters, possibly including final clauses

October (?) 1997

AGBM (tentative; Bonn)

- Expect to need at least one Fall session prior to Kyoto/COP-3; none now scheduled, and would require additional financial support
- Focus on further resolution of bracketed text for instrument, possibly including with respect to trading, compliance and institutional issues

December 1997

COP-3 (Kyoto):

- Likely to need high level bilateral discussions prior to session to resolve final disagreements such as targets, developing country activities, and possibly Rules o Procedure
- Expect both officials' and ministerial-level session at COP-3;
- Focus at former will be to resolve all brackets – but will likely leave some issues unresolved pending arrival of ministers
- Anticipate adoption, but no formal signing ceremony in Kyoto
- May also require "interim operating agreement"– to allow for additional technical details to be resolved (e.g., on trading).

IV. Other Meetings: Timeline

September/October:

- OECD Meetings (Paris, September 30-October 3): discussion of elements of protocol/legal instrument; possible EU focus on policies and measures; additional discussion of developing countries

November

- Annex I Countries of the Asia Pacific (ACAP: US, Canada, Australia, Japan and New Zealand) (Hawaii, October 31 - November 1): all issues related to December Ad Hoc Group on the Berlin Mandate (AGBM: negotiating body for next steps)
- Developing country contact group (Paris, tentative): issues related to technology, Global Environment Facility (GEF), Article 4.1

April/May

Second Climate Action Report due to FCCC (April)

- Will require announcement of anticipated shortfall in meeting 1990 ghg emission levels by 2000, as well as anticipated additional measures being taken to reduce emissions
- IWG to draft, Claussen Group/Deputies to clear; will require financial support from agencies to prepare and publish; will be circulated internationally at Spring/Summer AGBM

September/October

IPCC to begin Third Assessment Report

EXECUTIVE OFFICE OF THE PRESIDENT
OFFICE OF SCIENCE AND TECHNOLOGY POLICY
WASHINGTON, D.C. 20502

cc: Ray

September 24, 1996

MEMORANDUM FOR: William H. Maxwell, EPA

FROM: Rosina Bierbaum, Acting Associate Director, OSTP

SUBJECT: EPA's Interim Final Utility Report

OSTP thanks you for the opportunity to again review the draft Interim Final Report on Utility Hazardous Air Pollutant Emissions. We are encouraged by your responsiveness to many of the issues that were raised in our earlier review comments. We continue, however, to have serious concerns about the quality of the empirical evidence on mercury emissions as a basis for regulation. It is even more apparent at this time that many of the remaining issues in this draft report relate to sections of the mercury report that has been delayed pending SAB and stakeholder review. Specifically, the data on health risks is out of date, parameters in the fate and transport models are not supported by observations made outside the laboratory, and the costs of post-combustion control are predicated on engineering prototypes rather than actual plant experience.

Based on our concern that the Utility report not lead to regulatory determination without the benefit of the science base expected to be provided by the delayed mercury report, we urge that the Utility Report not be finalized until such time as the mercury report has been finalized in support of it. We continue to be concerned that the large uncertainties surrounding the mercury report and the lack of an assessment of non-inhalation risks for other pollutants (especially arsenic) prevent the report from achieving its goal to evaluate the potential health effects of utility emissions.

Detailed comments are attached.

Attachments

cc: J. H. Gibbons, OSTP
T. J. Glauthier, OMB
Sally Katzen, OIRA
Katie McGinty, CEQ
Alicia Munnell, CEA
Kevin Neyland, OMB

OSTP Comments and Review of the EPA Report *Study of Hazardous Air Pollutant Emissions from Electric Utility Steam Generating Units—Interim Final Report.*

In the current interim utility report EPA has done an adequate job of discussing limitations and uncertainties in the exposure models presented in this review draft.

The report claims that assessments of exposure and risks for mercury will be excluded from the utility report until after the mercury study is issued. In addition, the report notes that EPA has initiated a multipathway assessment for arsenic and is considering conducting similar assessments for other HAPs before issuing the final utility report. Consequently, conclusions of public health risks due to utility HAP emissions are not provided in the interim report. The interim report notes that a more complete assessment of exposures, hazards, and risks due to utility HAP emissions will be included in the final report along with EPA's determination of whether a regulation of HAP emissions from utilities is appropriate and necessary. This is a very reasonable approach and the additional assessments will be a valuable addition to the final report. We assume that these additional reviews and assessments will have a significant impact on the time frame for completion of the final utility report, and hence, on the timing of any regulatory action, and urge that the final report be allowed to reflect this additional information.

The interim report concludes that "emissions of mercury from utilities may contribute, to some degree, to the mercury levels in freshwater fish...." The report notes that mercury concentrations in fish are the result of both natural and anthropogenic activities and often show little correlation with proximity to mercury emission sources. In order to adequately address potential public health concerns of mercury emissions from utilities, it is imperative that the final report provide a better characterization of the relationship between emissions and mercury levels in fish. It would be extremely valuable if data were collected to validate predictions of the fate and transport modeling performed for this report.

The interim report acknowledges that EPA has little confidence in its conclusions of mercury deposition from utility air emissions because there are no measurement data to evaluate model predictions. In addition, no definitive conclusions are possible on the level of contribution of mercury emissions from utilities to mercury concentrations in fish. Does EPA plan to collect data around the emission sources modeled so that an assessment of model predictions can be included in the final report?

The overall quality of this report appears technically sound, and methodologies for the assessments are clearly explained. The reduced scope of this interim report is appropriate in light of the many concerns raised by reviewers of earlier versions regarding the inadequacy of data, lack of thoroughness of the data analysis, and incomplete studies in progress that could provide important information for this assessment. The interim final report, however, must more clearly state what will and will not be included in the final report.

Preface, pg. xiii, para. 2, lines 7-8; Executive Summary, pg. ES-1, para. 1, lines 10-11. Change "exposure to one HAP (radionuclides)" to "exposure to one class of HAP (radionuclides);" *or* "exposure to one HAP (radon);" however, the first suggestion is more accurate. The point is that radionuclides are more than one pollutant, as clearly shown , for example, in Table 9-2.

pg. ES-21, 1st para. This paragraph includes an ambitious list of EPA's plans for future studies of HAP emissions. Please convey the probability that these studies will be conducted, the Agency committment to these actions, and some indication of the timing associated with the expected products.

Executive Summary:

Table ES-1 should reflect that the values given are estimates derived from model projections based on a limited sample of specific boiler types and control scenarios, and the values should reflect the range of uncertainty resulting from the uncertainty analysis referred to in section ES.3.

Tables ES-2, ES-3, ES-4 -- again, reflect the uncertainty associated with the values in the table.

Table ES-5: Title should reflect "estimated" or "modeled" inhalation risks, indicate ranges of uncertainty in the risk numbers where appropriate, and indicate that "local" refers to within 50 km of a source, and that "regional" refers to beyond 50 km.

If possible, some indication of the area in the eastern U.S. that is beyond 50 km from any relevant source should be estimated as a means of putting these risk numbers in context.

Section ES-7.1: Specify the model used to derive predicted deposition of HAPs for the local analysis.

Section ES-7.1.2, paragraph 4: The way this statement is constructed implies greater importance to the "plausible link" than is supported by the report. The next sentence correctly states that there are many sources of mercury emissions, and that they are both anthropogenic and natural, but does not reflect that these sources are globally distributed, that the U.S. is not the major contributor to the global source term, nor that utility emissions are not the dominant factor in those total anthropogenic emissions. The last sentence of the paragraph is correct, but fails to reflect the true difficulty in establishing this "probable link".

Page ES-18, line 6: Include cost as a variable in the evaluation of potential control technologies.

pg. 1.6, 1st para. "The approach taken is to estimate the public health impacts associated with exposure to HAP emissions from utility units." Is this statement still valid in light of all the analyses that appear to be dropped from this report, e.g., non-inhalation exposures to arsenic, cadmium, dioxins, and lead not presented, absence of a multipathway assessment for HAPs other than arsenic, and removal of public health assessments for mercury?

Section 4.3.4: Suggest that this section include a brief definition of NOAEL and LOAEL, and the margins that EPA applies to them. Statements relative to RfC (paragraph 2, line 15, and p. 4-10, line 5) could be construed as contradictory, and are at a minimum, less than clear.

pg. 5-4, footnote b. Include the information on pg. 4-7, Table 4-1 as part of the footnote or refer the reader to Table 4-1. Otherwise, the reader may not be able to interpret the WOE.

Inhalation Risk Assessment

pg. 6-17. "It is assumed that HCl behaves similarly to hydrochloric acid." Not clear. Aren't hydrochloric acid and HCl synonymous? Please clarify.

Section 7.1.1.1: Retitle "Sources of Mercury", see earlier comment on global distribution.

Also relevant to this section is the choice of the term "pre-industrial"; smelting, and coal combustion as likely sources of mercury emissions were significant activities related to major population centers for hundreds of years in advance of the "industrial revolution". State more clearly how your pre-industrial base is defined.

Section 7.1.1.3: Delete "anthropogenic" from the last line of paragraph one; the statement is true for natural emissions of mercury, as well.

Section 7.2: Delete first sentence.

Table 7-2: Intended for the mercury study report, should not be in this report.

Tables 7-3, 7-4: Combine these two tables and add the data from the New Mexico site. Express data in common terms.

Page 7-18, first full paragraph: How were natural/recycled sources of mercury factored into this analysis?

Figures 7.2-7.5: Modify caption to reflect the source of these average projections as model projections from site-specific utility emissions data.

Table 7-9, -10,-11, and -12: It would be useful to include a footnote to define what is meant by tier 3 and 4 fish, and perhaps give some examples of species which fall in each trophic level.

Section 7.9 Earlier agreements from interagency review were to not include "conclusions" in the interim final utility report; however, pages 7-28 through 7-33 outline seven "conclusions" related to the long-range transport of mercury. Although the sections reflect a statement of the agency's confidence in each of these conclusions, their status as "conclusions suggests a greater level of certainty than the confidence disclaimer supports in most cases. These "conclusions" are in direct contradiction to the statement of the second paragraph of Section 7.16.2, "The EPA has decided not to include conclusions or policy statements regarding mercury emissions from utilities in the interim report...". Change "conclusions" to "preliminary observations".

Section 7.10, paragraph 3, last sentence: Given the importance of other anthropogenic sources, recycled anthropogenic emissions, and natural emissions, it should hardly be "interesting to note" that "some measurements of mercury concentrations in urban air exceed those predicted by the modeling of mercury emissions from utilities conducted for this report", it should be a foregone conclusion! This inability to attribute utility emissions to mercury concentrations observed in urban air is central to the argument against regulatory determination at this time.

Section 7.11: Retitle " Observations for Local Impact analysis.

Section 7.12: It is inappropriate to broadly distribute this report as advertised here given the major issues remaining unresolved, and in advance of the SAB review.

Delete Table 7-14.

Section 7-15: Indicate the U.S. percentage of total global emissions.

The assertions on page 7-42, para. 3, that "EPA cannot determine, at this time, whether the mercury contribution from utilities is significant" or "whether the mercury emissions from utilities are a concern for public health" are valid and appropriate, and underline the importance of an improved characterization of the relationship between mercury emissions and mercury levels in fish.

Qualitative Multipathway Assessment for Arsenic, Dioxins, Lead, and Cadmium

pg. 8-3, para. 1, last two lines. "Arsenic can accumulate in some fish and shellfish as 'fish arsenic,' which is not considered to be toxic." The use of 'fish arsenic' is inappropriate for a technical report. This sentence should be dropped.

Section 8.0: The authors may want to refer to a recent publication relevant to this assessment by the National Council on Radiation Protection and Measurements, "A Guide for Uncertainty Analysis in Dose and Risk Assessments Related to Environmental Contamination," NCRP Commentary No. 14, issued May 10, 1996. pp 54. The reference is provided for information only—no problem with the analysis provided.

pg. 9-2, para. 1. "Further reductions in radon concentrations reflect the natural decay that occurs during the gathering, processing, and distribution/storage of gas prior to consumption." Give the range of decay half-lives for radon isotopes to validate the statement and help the reader to follow the argument.

Section 10.0: Alternative Control Strategies for Hazardous Air Pollutant Emissions Reductions.

If we are concerned about the development of innovative control technologies, we must recognize that this report sends very mixed signals to both the technology developers and private sector capital markets that will be crucial to the commercialization of technologies needed to deal effectively with HAPs (and especially mercury).

The report admits that, "alternative control strategies may have significant cost, economic, technical, and research implications before they can be widely realized

by the utility industry." However, the development and commercialization of such technologies will not be undertaken by industry until many of the uncertainties, which remain unaddressed in this report, are resolved. Many of the control options presented in the report are at a prototype stage and may be 3-7 years from commercialization and diffusion. In the case of mercury controls, we will need a new generation of technologies, since technologies used to control other pollutants are not effective against Hg.

The report is unclear about the role of the federal government in the development of control options given the foreseeable uncertain climate for R&D and commercialization in the private sector. For instance, the air pollution control pilot of EPA's new Environmental Technology Verification Program could be focused on HAP control technologies to try to stimulate any existing prototype technologies to be tested and verified.

EDITORIAL COMMENTS:

Entire Report. "judgment" [correct] is misspelled as "judgement" [incorrect]

Executive Summary, pg. ES-1, para. 2. Grammar: Check verb tense in this paragraph, notably, present tense and future tense needed in some places instead of past tense.

pg. ES-20, ES.9.5. Insert "(PM)" after Particulate Matter.

pg. 6-2, para. 1, line 8. Change "surfuss" to "surface"??

pg. 7-1, para. 1, line 1. Delete "hyphen" from "naturally-occurring" Should be "naturally occurring" without the hyphen.

pg. 7-3, para. 1, line 1. "the exact fate [of?] mercury"

pg. 7-4, para. 4, line 6. Change comma to a period after "particles,"

pg. 7-7, para. 1, line 8 and pg. 7-8, para. 4, line 6. Change "suspended soil" to "suspended soil particles."

pg. 7-10, para. 1, line 2. Insertion needed "that result [from?] utility"

pg. 7-14, para. 3, last line. Change "deposit" to "deposited"

pg. 7-36, para. 1, third line. Delete "between" from "partitioning between of mercury between soil and water"

pg. 8-4, para. 1, line 9. Change spelling of "chloridibenzo-p-dioxin" [incorrect] to "chlorodibenzo-p-dioxin" [correct]

pg. 9-5, Table 9-2, third line of table. Change "Pa-234"to "Ra-234"?

pg. 9-7, para. 3, line 6. Change "percipitation" [incorrect] to "precipitation" [correct].

United States Department of State

Assistant Secretary of State for Oceans and International Environmental and Scientific Affairs

Washington, D.C. 20520

cc: RP

August 23, 1996

MEMORANDUM

TO: Climate Group

FR: Eileen B. Claussen Eileen

DA: August 23, 1996

RE: Talking Points

In speaking about the U.S. position on climate change over the coming weeks and months, it is particularly important that we use consistent language and deliver the same message.

Accordingly, I am circulating talking points which lay out the framework we proposed in Geneva, respond to some of the most common questions that have arisen, describe the Declaration adopted by the ministers, and outline future steps.

I hope that this will be helpful.

Climate Change Talking Points

The Framework Proposed by the U.S.

- At the Second Conference of the Parties to the Climate Convention, the U.S. proposed a new framework for negotiations on post-2000 emissions reductions – a framework designed to ensure that commitments are realistic and credible while at the same time preserving maximum flexibility to implement those commitments.

- The first and foremost reason for launching this new direction is the science of global warming, which now shows that human actions are influencing the climate system. Over 2,000 of the world's leading scientists reached this historic finding last December in the Second Assessment Report of the Intergovernmental Panel on Climate Change (IPCC). The IPCC Report also details the profound impacts global warming may have in store for our planet.

- Second, it is clear that the Convention's existing framework of non-binding emissions reduction goals is not working. Most developed countries, including the U.S., will not achieve the goal set for the year 2000 largely because the Convention creates little incentive to do so.

- Third, the U.S. found existing proposals from other countries basically unacceptable, because they call for mandatory harmonized policies and measures that would be detrimental to American competitiveness, because they would not be cost-effective, or because they contain emissions targets that are neither realistic nor achievable.

- The framework proposed by the U.S. was developed after an extensive public outreach effort, which included numerous meetings with a wide range of businesses, both large and small, and representing many sectors of the U.S. economy, as well as numerous non-governmental organizations. The U.S. framework was also carefully vetted within the federal government.

- It is important to understand both what our proposed framework includes and what it does not include:

  -- *First, it calls for a binding, medium-term emissions target, to be achieved flexibly, through approaches that take into account the strengths and circumstances of individual countries.* Only a binding target will create the incentive for countries to make the effort required and to ensure a level playing field. Still, the target must be realistic and achievable and allow for flexible mechanisms like emissions trading and joint implementation.

-- *Second, it calls for continued work on a longer-term goal (e.g. 50-100 years) regarding atmospheric concentrations of greenhouse gases.* It is these concentrations that are influencing the climate system and that must be kept to a safe level -- recognizing that scientific understanding and technology will improve over time. We need a clearer path for the future also because it allows the private sector to respond sensibly as it plans and makes investment decisions.

-- *Third, developing countries must engage in solving the problem of global warming.* The U.S. framework makes clear that we take this seriously and that we expect developing countries to join us in addressing this problem, recognizing the common but differentiated responsibilities and capabilities involved.

- Several other points have been the subject of some confusion and concern.

  -- *The U.S. framework did not identify any specific level or time frame for a binding emissions reduction target.* We believe strongly that we must complete our analysis and assessment first. Only with full understanding of the implications for our economy and for the environment will we be able to propose a target that is realistic, achievable, and consistent with the national interest and our national prosperity.

  -- *"Medium-term" in the context of a binding emissions target means something in the range of 2010-2020.* It does not mean 2005. We have not yet determined what form the target might take – for example, a rolling average versus a cumulative total.

  -- *The U.S. framework in no way repudiates the growing number of successful voluntary programs that U.S. industry has already launched to reduce emissions.* These programs are effective, and they will be critical to any U.S. effort to deal with climate change. In fact, we will insist that those who take early action receive credit toward future targets.

The Declaration From the Geneva Meeting

- The Declaration developed and endorsed by ministers in Geneva reflects the major components of the U.S. framework and will serve as a guide for the upcoming negotiations.

- Specifically, the Declaration affirms that recent scientific findings about global warming call for serious action, preserves flexibility for governments individually to choose appropriate policies and measures, calls for a legally-binding target, and reiterates the need to advance the commitments of developing countries.

Future Direction

- The Geneva meeting marks the beginning of a critical stage in confronting the threat of global warming, as we enter serious international negotiations on next steps for greenhouse gas emissions reductions.

- As we move to complete our analysis and assessment, we will continue to consult widely with industry, NGO's, and the Congress to ensure that our approach is both environmentally responsible and economically sound.

- Between now and the end of the year, we plan to focus on the following five areas: the type of medium-term target, an emissions trading/ joint implementation scheme, questions of compliance and enforcement, and options for advancing the commitments of developing countries.

- By the early months of next year, we plan to develop the specifics of a proposed medium-term emissions target and continue work toward a longer term atmospheric concentration goal.

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