Cutting Carbon Emissions at a Profit: Opportunities for the U.S.

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Short Summary

This report identifies and corrects shortcomings in recent modeling studies on the economics of reducing greenhouse gas emissions in the U.S. The major assessments of the Kyoto Protocol — by the U.S. Energy Information Administration, the Clinton White House Council of Economic Advisers, the U.S. Department of Energy Inter-Laboratory Working Group, and the Stanford Energy Modeling Forum — are found to be seriously incomplete. Each study is shown to omit one or several of four major cost-reducing policy options, resulting in cost estimates that are far too pessimistic.

The present study is the first to integrate all cost-cutting policy options into a coherent least-cost policy framework. Three domestic policies — a national carbon cap and permit trading program, productivity-enhancing market reforms and technology programs, and recycling of permit auction revenues into economically advantageous tax cuts — are combined with international emission allowance trading.

In analyzing this integrated least-cost approach, the present study introduces no new models. It relies on established, peer-reviewed methodologies used in the major U.S. assessments to date.

This reassessment leads to the following principal findings:

1) The U.S. could meet the emission reduction targets set forth in the Kyoto Protocol by 2010 and exceed them by 2020 while increasing economic output from baseline growth projections.
2) In 2010, an integrated least-cost strategy would produce an annual net output gain of about $50-60 billion/yr or roughly 0.5 percent of GDP. By 2020, this gain grows to $120 billion/yr or 1 percent of GDP. On a cumulative net present value basis, the U.S. would gain $250 billion by 2010 and $600 billion by 2020.
3) Most of these economic gains can be achieved through a purely domestic no-regrets strategy. International trading adds some further benefits, but these are not decisive for a positive economic outcome.
4) A strong synergy exists between a national energy policy aimed at safeguarding the economy and a least-cost policy aimed at slowing climate change. By reducing consumption of oil and natural gas relative to rising business-as-usual trends, a climate policy would help protect the U.S. against energy price shocks.
5) Net economic benefits can be realized in the early years of implementation and continue to grow over time. As energy-using equipment and capital stocks turn over, market, organizational, and institutional reforms have the effect of speeding up and completing the penetration of currently available, highly cost-effective energy efficiency technologies that require little or no time-consuming research, demonstration, and commercialization.
6) Potential economic savings from energy productivity gains far exceed the costs of technology R&D programs. Together with expanded markets under a climate protection policy, these have the effect of accelerating cost reductions for renewable energy sources and other low-carbon technology options.
7) Postponing least-cost emissions reduction policies or relying on incomplete, one-sided policy strategies would result in lost opportunities for the U.S. economy of $50-150 billion/yr in 2010.
8) In the context of an integrated least-cost strategy, credits for carbon sinks and constraints on the use of the Kyoto flexibility mechanisms are of only minor economic significance.
9) An integrated least-cost approach would not only be more effectively in insulating U.S. industries from competitiveness problems than a global emissions trading approach applied in isolation; it would actually improve U.S. competitiveness. Productivity gains and tax shifts would reduce production costs and export prices in most industries below baseline levels rather than merely limiting increases in costs and prices.
10) The perception that emission reduction targets such as those of the Kyoto Protocol are unavoidably costly or unfair is the result of outdated modeling assessments. Integrated economic analysis such as that contained in this report is needed as an input for future climate negotiations.

"Economic studies have found that there are many potential policies to reduce greenhouse- gas emissions for which the total benefits outweigh the total costs. For the United States in particular, sound economic analysis shows that there are policy options that would slow climate change without harming American living standards, and these measures may in fact improve U.S. productivity in the longer run."

— From the Economists' Statement on Climate Change signed by over 2,500 economists including eight Nobel laureates in 1997.

Summary of domestic U.S. policies being modeled in the integrated CEF/Kyoto scenarios

The market reform and technology programs of the Clean Energy Futures scenario include the following:

1. Expanded voluntary labeling programs for buildings and end-use equipment.

2. Expansion of cost-benefit tested energy efficiency standards to more products and higher cost-effective levels.

3. Increased enforcement and more stringent cost-benefit tested building codes.

4. Tax credits for certain cost-effective energy efficiency investments that go beyond code requirements.

5. Doubled cost-shared federal R&D expenditures.

6. Utility demand-side management programs financed through public benefits wire charges.

7. Increased government procurement of energy efficiency and renewable energy technologies for government facilities.

8. Voluntary agreements with industrial sector associations to increase energy efficiency by one percent per year.

9. Expanded voluntary energy efficiency challenge programs for motors, compressed air, steam, and combined heat and power production.

10. Expanded technical assistance through labeling and diagnostic services programs.

11. Cost-benefit tested elevation of energy efficiency standards for electric motors.

12. Tax rebates and other incentives for business energy managers and expanded Clean Air Partnership program.

13. Extended tax credits, grants, and improved grid access for cost-effective Combined Heat and Power generation (CHP).

14. R&D program on cross-cutting industrial efficiency technologies and industries of the future efforts.

15. Doubling of cost-shared federal R&D expenditure for advanced vehicle efficiency technologies.

16. Tax credits for purchases of energy efficient vehicles.

17. Improved air traffic management.

18. Government vehicle fleet program promoting alternative fuels and cost-saving energy efficiency.

19. Voluntary agreements to improve the fuel economy of autos and light trucks.

20. Pay at the pump automobile insurance.

The assumptions on policy effectiveness in the CEF study are conservative when compared to other analyses. Only a fraction of annual investments in end-use technologies is shifted to best cost-effective levels of energy efficiency. This conservatism is reflected in the fact that market reforms in the CEF 'Advanced' scenario contribute only about a third of the Kyoto emission reduction target in 2010 and only about half in 2020. Other studies using the same modeling approach find that market reforms and technology programs could achieve most or all of the U.S. Kyoto target while still following normal capital stock turnover cycles and while also reducing energy bills.

For more information and to download a full version of this report, please visit the IPSEP web site at http://www.ipsep.org and click on "Latest Report," or go directly to http://www.ipsep.org/latestpubs.html.

Table ES.1: Policy Analysis Gaps in U.S. Assessments of the Kyoto Protocol

	Scope of policy analysis		
	Market reforms, technology programs	Tax shift reforms	International allowance trading
1998 Energy Information Administration			
Domestic	No	No	
Annex I trading	No	No	**(Limited)**
Global trading + sinks	No	No	**(Limited)**
Domestic plus weak double dividend	No	**(Limited)**	
Annex I trading plus weak double dividend	No	**(Limited)**	**(Limited)**
Global trading plus weak double dividend	No	**(Limited)**	**(Limited)**
1999 Energy Modeling Forum-16			
No trading	No	No	
Annex I trading	No	No	**YES**
Global Trading	No	No	**YES**
1998 White House/Council of Economic Advisors			
"Domestic Only" policy case	No	No	
Annex I trading	No	No	**YES**
Best case trading	No	No	**YES**
1997 Interlaboratory Working Group (IWG)			
Non-price policies, moderate	**YES**	No	No
Non-price policies, strong	**YES**	No	No
Same plus $50/tC tax	**YES**	No	No
2000 Clean Energy Futures study (IWG)			
Moderate scenario, no C charge	**YES**	No	No
Advanced scenario, no C charge	**YES**	No	No
Advanced scenario including $50/tC charge	**YES**	No	No

Figure ES.1:
Conceptual framework for modeling greenhouse gas mitigation policies

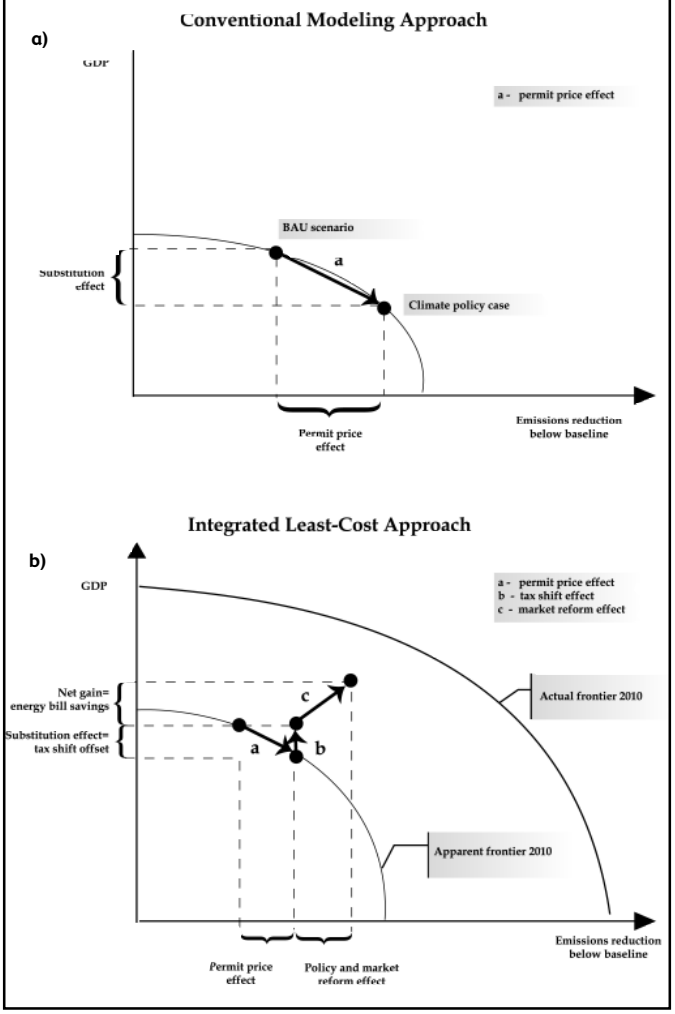

Figure ES.6: Economic Impact in 2010 –
U.S. Kyoto target, domestic permit trading versus global trading versus integrated least-cost strategy