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The Kyoto Protocol and U.S. Agriculture

by Terry Francl, Richard Nadler, and Joseph Bast*

Farmers have a major stake in the debate taking place over global warming. Approximately one-fifth of greenhouse gas emissions in the U.S. come from agricultural activity. Agriculture, as it is practiced in the U.S., is surprisingly energy intensive. As a result, proposals to tax fossil fuels or cap carbon dioxide emissions would raise the cost of many farm inputs, from fertilizer and other chemicals to fuel and motor oil.

The Kyoto Protocol, all by itself, could cost the average farmer between one-quarter and nearly one-half of his or her annual income.

This study is written for farmers and the businesses and institutions that benefit from their association with farmers. It identifies and quantifies what is at stake in the debate over global warming. It urges the agricultural community to participate in the public debate over the latest global warming treaty—the Kyoto Protocol—or else find itself unfairly burdened by higher energy costs and faced with unfair competition from farmers in developing countries.

How much is at stake? We estimate that compliance with the Protocol would increase U.S. farm production expenses between $10 and $20 billion per year and decrease farm income by 24 to 48 percent. The Kyoto Protocol, all by itself, could cost the average farmer between one-quarter and one-half of his or her annual income.

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In Part 1 of this report we describe the Kyoto Protocol and the events that led to its endorsement by the Clinton Administration. In Part 2, we examine in considerable detail the likely impact of the Protocol on U.S. agriculture. We walk the reader through the steps of our analysis to show we are presenting objective, solid evidence, not just opinion or alarmist speculation.

People in the agricultural community can make a unique contribution to the public debate by describing the *positive* effects that rising carbon dioxide levels have on plant growth.

In Part 3, we describe a positive approach to the global warming issue. We believe people in the agricultural community can make a unique contribution to the public debate by describing the *positive* effects that rising carbon dioxide (CO_2) levels have on plant growth, and putting forward "win-win" activities that reduce CO_2 emissions while also benefitting farmers and consumers. Part 4 consists of a brief summary and conclusion.

We hope this report will encourage journalists to study the global warming issue more closely and give other readers a source of reliable information on one of the most important issues of the day. Most of all, we hope farmers and their natural allies will use it to defend their farms, their homes, and their way of life.

PART 1

The Kyoto Protocol

Events Leading to the Kyoto Meeting

In 1992, representatives of the U.S. and 160 other nations met in Rio de Janeiro to negotiate and eventually endorse the United Nations Framework Convention on Global Climate Change, more popularly known as the Rio Treaty. That treaty endorsed voluntary, nonbinding measures "to achieve . . . stabilization of greenhouse gas concentrations . . . at a level that would prevent dangerous anthropogenic interference with the climate system"[1] and pledged to reduce emissions of greenhouse gases to 1990 levels by the year 2000.

In 1995, representatives of the Parties to the Rio Treaty met in Berlin. Discouraged by evidence indicating that few nations would reach their targets by 2000, they decided to pursue a new strategy: amend the original treaty to place mandatory, legally binding greenhouse emission caps on participating nations. Representatives of developing countries refused to allow negotiations to move forward unless they were exempted from the caps. Representatives of developed countries (including then-Undersecretary of State Timothy Wirth) agreed to their demands.

The bipartisan Byrd-Hagel Resolution (S.R. 98) required our negotiators to pursue options that would not seriously harm the U.S. economy.

On July 25, 1997, the U.S. Senate put the Clinton-Gore Administration on notice that it expected U.S. negotiators to uphold American interests in any agreement to limit greenhouse gas emissions. The bipartisan Byrd-Hagel Resolution (S.R. 98) required our negotiators to pursue options that would not seriously harm the U.S. economy. It also demanded that developed and developing nations be required to adopt "new specified scheduled commitments to limit or reduce greenhouse gas emissions . . . within the same compliance period" as developed nations. The resolution passed the Senate by a 95-0 vote.

On December 1, 1997, the Parties to the Rio Treaty met in Kyoto, Japan, to complete negotiations for a protocol, or amendment, to the treaty. At first, the U.S. negotiating team's positions were consistent with the Senate resolution. U.S. negotiators were prepared to commit the nation to cutting its greenhouse gas emissions to 1990 levels by 2010 in return for a meaningful commitment by developing nations to also control their emissions.

A week after the bargaining began, it appeared as though negotiators would once again deadlock. Spokespersons for developing nations flatly refused to apply even voluntary emission caps to their own economies, while demanding that developed nations cut their emissions more

[1]United Nations Framework Convention on Climate Change, Article 2.

deeply than was called for by the Rio Treaty. They rejected international emission trading and joint implementation,[2] saying such programs "exploit" poorer countries by allowing polluters in developed countries to take credit for investments in developing countries that would have been made anyway.

Gore directed the U.S. team to adopt a flexible" posture to ensure a deal. The result was a Protocol that, if adopted, would severely damage U.S. interests.

European countries also backed larger reductions in emissions than what U.S. negotiators wanted due to circumstances that make it easier for them to reduce emissions,[3] to appease Green political movements at home, and perhaps because they were secretly counting on the U.S. delegation to veto such unrealistic targets. Regarding the third motive, they overestimated the resolve of the Clinton-Gore Administration.

Vice President Al Gore traveled to Kyoto to personally break the deadlock. Gore "came to Kyoto wanting a deal very badly," said Rep. F. James Sensenbrenner (R-Wisconsin), "and America got a very bad deal."[4] Gore directed the U.S. team to adopt a "flexible" posture to ensure a deal. The result was a Protocol that, if adopted, would severely damage U.S. interests.

What the Protocol Says

The Kyoto Protocol is just 24 pages in length and can be read on the Internet.[5] Its key provisions are the following:

- Developed countries are required to reduce their overall greenhouse gas emissions "by at least 5 percent below 1990 levels" by 2012,[6] with the U.S. required to reduce its emissions even further, to 7 percent below 1990 levels.[7]

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[2] International emission trading means allowing government and businesses in countries where it costs little to reduce emissions to do so in return for "credits" that could then be sold to countries where emission control costs are high. Joint implementation means giving companies or governments in one country credits for investing in emission reduction projects in another country.

[3] The reunification of Germany and a large-scale shift from coal to natural gas taking place in Britain are expected to reduce both countries' greenhouse gas emissions in coming years.

[4] Quoted in Angela Antonelli and Brett Schaefer, "From Fear to Folly: Why the Kyoto Agreement is 'A Very Bad Deal.'" *Backgrounder Update* No. 289, The Heritage Foundation, December 23, 1997.

[5] The full text of the Kyoto Protocol is available in Adobe Acrobat's portable document format (PDF) at www.unfcc.de.

[6] "Kyoto Protocol to the United Nations Framework Convention on Climate Change," Conference of the Parties, Third Session, Kyoto, Japan, December 1-10, 1997 (henceforth "Kyoto Protocol"), Article 3, §1.

[7] Ibid., Annex B.

- Developing nations that are major sources of greenhouse gases, such as China, India, and Mexico, are excused from having to comply with any emission requirements[8]—even one of their own choosing[9]—and are promised "the establishment of funding, insurance and transfer of technology mechanisms" to "minimize adverse social, environmental and economic impacts" that might result when *developed* countries reduce their emissions.[10]

> The Protocol requires the U.S. to reduce its greenhouse gas emissions to 7 percent below 1990 levels by the year 2012.

- Countries belonging to the European Union agreed to reduce their emissions by 8 percent, but are allowed to "jointly fulfil their commitments," with each country getting a new emission cap to be set out in a separate agreement.[11]

- A permanent international body, the Framework Convention on Climate Change Secretariat, is created,[12] served by a Subsidiary Body for Implementation and a Subsidiary Body for Scientific and Technological Advice. It is to receive from each participating nation an "annual inventory of anthropogenic emissions by sources and removals by sinks of greenhouse gases . . ."[13] and national "programmes containing measures to mitigate climate change and measures to facilitate adequate adaptation to climate change."[14]

- International emission trading appears in the Protocol but is restricted to buying and selling expensive credits among developed countries and "shall be supplemental to domestic actions for the purpose of meeting" a country's reduction requirements.[15] Joint implementation is allowed, but only for specific projects that are part of a "clean development mechanism"

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[8] The reduction requirements in Article 3, §1 apply only to countries listed in Annex B. No developing countries appear in that list.

[9] Language allowing countries not listed in Annex B to set voluntary goals and deadlines was stricken from the treaty on the last day of negotiations. See Peter G. Sparber and Peter E. O'Rourke, "Understanding the Kyoto Protocol," *Briefly*, National Legal Center for the Public Interest, April 1998, page 10.

[10] Kyoto Protocol, Article 3, §14. See also Articles 10 and 11.

[11] Ibid., Article 4, §1.

[12] Ibid., Articles 13-15.

[13] Ibid., Article 7, § 1.

[14] Ibid., Article 10.

[15] Ibid., Article 6, §1 and Article 16 bis.

outlined in Article 12. Since the Kyoto meeting, spokespersons for developing nations have disparaged both emission trading and joint implementation, suggesting they could be phased out or never developed.[16]

Developing Nations Are Not Required to Limit Emissions

> In 2015, developing nations are expected to be generating 20 percent more carbon dioxide than industrialized nations produce now.

The decision to excuse developing nations from any responsibility to reduce their emissions cripples the Kyoto Protocol. Developing countries accounted for 36 percent of the world's 6 billion tons of carbon dioxide emissions in 1990; by 2015, their share is expected to rise to 57 percent of 8.453 billion tons.[17] In 2015, when the treaty targets are implemented, developing nations will be generating 20 percent more carbon dioxide than industrialized nations produce now.[18]

Major developing countries are unlikely to join the Kyoto emission-control regime at a later date. "China and India refused to approve the treaty," write Angela Antonelli and Brett Schaefer, "unless a provision allowing developing countries *voluntarily* to reduce emissions was stricken. Developing countries will not agree to participate—even voluntarily—in measures that result in lower economic growth."[19]

"We have a much higher and urgent priority," explained Indian Ambassador Naresh Chandra, "and that is eradication of poverty, and improving the level of living of our people. That is a much greater urgent necessity than the long-term aim of controlling greenhouse gas emissions."[20]

China, whose emissions will exceed those of the United States in 15 years, has demanded a *fifty-year moratorium* on any restrictions imposed on its own emissions.[21] Dr. Henry R. Linden, Director of the Department of Chemical and Environmental Engineering at the Illinois Institute of Technology, says "likely increases in CO_2 emissions by such large developing nations as the Peoples Republic of China (PRC) and India will overwhelm any conceivable cutbacks the

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[16] John J. Fialka, "Global-Warming Pact Negotiation May Phase Out Emissions Trading," *The Wall Street Journal,* March 17, 1998.

[17] Energy Information Administration, *International Energy Outlook 1997*.

[18] Ibid.

[19] Angela Antonelli and Brett Schaefer, supra note 4.

[20] Margaret Warner interview with Ambassador Naresh Chandra, NewsHour Transcript, December 9, 1997.

[21] Ibid.

industrialized world could make."[22] Linden notes that China plans to increase its annual coal production from 1.2 billion tons to 2 billion tons by 2010.

The United Mine Workers of America, recognizing the threat to its members posed by a treaty that exempts developing nations, released a statement in February 1997 that reads in part:

> We believe the parties to the Rio Treaty made a fundamental error when they agreed to negotiate legally binding carbon restrictions on the United States and other industrialized countries while simultaneously agreeing to exempt high growth developing countries like China, Mexico, Brazil, and Korea from any new carbon reduction commitments. The exclusion of new commitments by developing nations . . . will create a powerful incentive for transnational corporations to export jobs, capital, and pollution, and will do little or nothing to stabilize atmospheric concentrations of carbon. . . .

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The United Mine Worker's final point, that the Kyoto agreement will do little to stabilize CO_2 concentrations in the atmosphere, is widely acknowledged by both proponents and opponents of the treaty. According to Jerry Mahlman, a climatologist at Princeton University, reducing emissions enough to prevent global climate change "might take another thirty Kyotos over the next century."[23]

Implementation without Senate Approval?

The Kyoto Protocol becomes effective when 55 parties to the original Rio Treaty sign it, including developed countries accounting for at least 55 percent of the total CO_2 emissions reported by developed countries in 1990.[24] The Protocol becomes legally binding on the U.S. only when two-thirds of the U.S. Senate approves it. The U.S. accounts for approximately 35 percent of CO_2 emissions from developed nations.

Since it so clearly fails to meet the requirements set forth by the Senate in S.R. 98, the treaty's chief negotiator admitted it might be "years" before the Administration submits the treaty

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[22] Dr. Henry Linden, "A Dissenting View on Global Climate Change," *The Electricity Journal*, July 1993, page 63.

[23] Quoted in David Malokoff, "Climate Change: Thirty Kyotos Needed to Control Warming," *Science*, December 19, 1997.

[24] Kyoto Protocol, Article 24.

to the Senate.[25] The Clinton Administration has said it will try to persuade developing countries to voluntarily limit their emissions, but experts experienced in international negotiations think this unlikely. Economist Jim Johnston, who helped negotiate the Law of the Sea Treaty, says "the U.S. concessions at both Berlin in 1995 and Kyoto in 1997, after piously posturing against them before these meetings took place, only whets the appetite for more demands."[26]

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Frustrated by the Senate, the Clinton Administration is searching for ways to implement the Kyoto Protocol without Senate approval. It is considering altering government procurement policies, funding researchers and organizations wedded to the global warming issue, and influencing environmental education programs in the nation's schools. The Administration is also reportedly studying whether the Clean Air Act and other existing statutes give it authority to regulate carbon dioxide and other greenhouse gases as pollutants.[27]

On March 2, 1998, Rep. David McIntosh (R-Indiana), chairman of the House Government Reform and Oversight Subcommittee on Regulatory Affairs, called for hearings on whether the Administration is using "regulatory efforts to foist this treaty on the American people." "I will not allow the administration to circumvent the Senate through back-door regulations that hurt the economy and threaten jobs," said McIntosh.[28]

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[25] Stuart E. Eizenstat, "Global Warming Pact: Let's Clear the Air," *The Wall Street Journal*, March 5, 1998.

[26] Jim Johnston, "Emissions Trading: Getting It Wrong Again," *Intellectual Ammunition*, February/March 1998, page 16.

[27] "Administration Tries 'End-Run' on Kyoto," *Environment News*, April 1998, page 9.

[28] Ibid.

PART 2

Impact of the Kyoto Protocol on U.S. Agriculture

What would happen to American farmers and ranchers if the Kyoto Protocol were adopted as written? Since farm income is affected by trends in other parts of the economy, we start by reviewing other studies of the impact of the Treaty on the entire U.S. economy.

Effects of the Kyoto Protocol on the National Economy

WEFA Inc., a leading economic forecasting and modeling firm, has estimated the effects of reducing and stabilizing carbon dioxide (CO_2) emissions from the U.S. energy sector to 93 percent of their 1990 level by 2010.[29] Adjusting for projected U.S. population growth, steady improvements in energy efficiency, and the retirement of nuclear plants, WEFA estimates that the Kyoto Protocol would require a 37 percent reduction in emissions from business-as-usual baseline projections by the year 2010 and 57 percent by the year 2020.[30]

The WEFA analysis does not take into account the cost of reducing greenhouse gases other than CO_2, a cost that "may exceed the cost of reducing carbon through the energy sector."[31] WEFA does not attempt to estimate the cost savings that would result from an international emission trading system—correctly, we think—given the small odds that an effective program will emerge. However, WEFA does assume that an *intra*national trading program will be created for energy users in the U.S., and that this program will lead to use of the least-cost measures of reducing CO_2 emissions. This somewhat unrealistic assumption, WEFA admits, means its results "measure the *minimum* economic impact of imposing a carbon emission abatement policy."[32] (Emphasis in the original.)

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[29] WEFA, *Global Warming: The High Cost of the Kyoto Protocol. National and State Impacts* (Eddystone, PA: 1998). The energy sector accounts for roughly 85 percent of CO_2 emissions in the U.S.

[30] Ibid., page 15.

[31] Ibid., page 12.

[32] Ibid., page 13.

WEFA makes the following predictions:

- Consumers would see price increases in excess of 55 percent for electricity and 70 percent for home heating oil by 2010.
- Commercial establishments would see electricity price increases of 60 percent.
- Gross Domestic Product (GDP) would fall by $300 billion annually (in 1992 dollars), over 3 percent of baseline GDP projections.
- The number of jobs in the U.S. in 2010 would be 2,400,000 below baseline projections.

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- Average annual household income would fall nearly $2,700.
- Real wages in the manufacturing sector would fall 2.1 percent below baseline in 2010.

We hope the reader will agree that these are enormous costs that would require painful sacrifices by millions of consumers and workers. Since it is common for estimates of this kind to be dismissed by critics as being exaggerated, the reader should note that the following assumptions made by WEFA mean its estimates are almost certainly *unrealistically low*:

1.) The cost of reducing only CO_2 emissions, not other greenhouse gases, is considered.

2.) The cost to only the energy sector of the U.S. economy, not other sectors, is considered.

3.) Use of the least-cost methods of reducing emissions is assumed, even though complying with environmental regulations in the past has routinely cost between twice and ten times as much as least-cost methods.[33]

4.) WEFA's "business as usual" scenario assumes that energy efficiency improves at double the actual rate of the past ten years.[34]

5.) Population growth in the U.S. between 1990 and 2010, estimated by WEFA at about 50 million people, could reduce the area of forests that act as natural "sinks" for CO_2,

[33] T.H. Tietenberg, *Emissions Trading: An Exercise in Reforming Pollution Policy* (Washington, DC: Resources for the Future, 1985).

[34] WEFA Inc., supra note 29, page 15.

thereby requiring greater reductions in emissions to meet the overall reduction requirement.[35]

In May 1998, Pittsburgh-based CONSAD Research Corporation released the results of its analysis of the Kyoto agreement, using an economic modeling system developed by Regional Economic Models Inc. (REMI).[36] It estimates that the treaty will destroy 3,100,000 U.S. jobs in 2010, and Gross Domestic Product will fall by at least $177 billion and perhaps by as much as $318 billion by 2012.

Other researchers and commentators have reached similar conclusions.[37] Media attention to these careful studies has been minimal; when they *are* reported, reporters often give equal weight to sweeping denials by environmental activists. Consequently, most people are "against global warming" but unaware of the costs of policies being advanced in the name of stopping it.

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Effects of the Kyoto Protocol on U.S. Agriculture

Estimating the Increase in Energy Costs

The steep reduction in emissions called for by the Kyoto Protocol would require new taxes on fossil fuels or the auctioning of emission permits to energy consumers. Either would discourage energy consumption and promote the adoption of energy-efficient or alternative-energy technologies. In either case, consumers will face higher energy costs and higher prices for goods and services that require energy inputs during their production or delivery to market.

In 1995, DRI/McGraw-Hill estimated that the equivalent of a 60 cents per gallon tax on gasoline would be required to reduce emissions to their 1990 levels by the year 2010.[38] This is

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[35] Ibid., page 11. This points to a major potential difficulty faced by those attempting to enforce Kyoto's greenhouse gas budgets.

[36] CONSAD Research Corporation, *The Kyoto Protocol: A Flawed Treaty Impacts America. Sectoral and Regional Economic Impact Analysis*, May 1998.

[37] Lawrence M. Horwitz, *The Impact of Carbon Dioxide Emission Reductions on Living Standards and Lifestyles*, DRI/McGraw-Hill, September 1995; Paul M. Bernstein, W. David Montgomery, and Thomas F. Rutherford, *World Economic Impacts of U.S. Commitments to Medium Term Carbon Emissions Limits*, Charles River Associates, January 1997.

[38] Lawrence M. Horwitz, supra note 37.

consistent with WEFA's more recent analysis, which estimated the equivalent of a 68 cent per gallon tax would be needed to reduce emissions to 7 percent below 1990 levels by 2010.[39]

The Clinton Administration claims a tax hike equivalent to just 25 cents per gallon of gasoline would be sufficient to reduce energy consumption to 1990 levels.[40] The administration's methodology assumes a highly efficient international emission trading regime and an economic boost from shifting taxes away from capital.[41] Both assumptions have been criticized and rejected by independent researchers.[42]

Energy accounts for half or more of the underlying cash production costs for nearly all of a farm's manufactured inputs.

To produce the most conservative estimate of the cost of the Kyoto Protocol to U.S. agriculture, we will use the Clinton Administration's estimate of 25 cents per gallon of gasoline as a low estimate, and 50 cents per gallon as a high estimate. The reader should note that both estimates are below what leading economic forecasters say is necessary to reduce carbon emissions to 7 percent below 1990 levels.

Energy Inputs in U.S. Agriculture

Agricultural production in the U.S. is energy-intensive. Fuel and oil costs account for only about 30 percent of a typical farm's total energy bill, while the remaining 70 percent lies hidden in the prices of manufactured inputs, such as fertilizer and pesticides. For example, natural gas typically accounts for 75 percent of the cash cost of manufacturing anhydrous ammonia, a basic feedstock for all nitrogen fertilizer products. Energy accounts for half or more of the underlying cash production costs for nearly all of a farm's manufactured inputs.

The fact that the Kyoto Protocol could require farmers to pay higher prices for the oil and natural gas used as feedstock for other products, rather than burned to generate heat and

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[39] WEFA Inc., supra note 29, page 20. WEFA, DRI/McGraw-Hill, and CONSAD Research Corporation have all adopted the convention of expressing the cost of complying with the Protocol in terms of a hypothetical tax per gallon of gasoline, even though the actual policies being modeled are much more complex. This methodology allows for an apples-to-apples comparison of different studies.

[40] See John J. Fialka, "Clinton Economist Defends Curbing Global Warming," *The Wall Street Journal*, March 5, 1998.

[41] "Economic Effects of Global Climate Change Policies: Results of the Research Efforts of the Interagency Analytical Team," various drafts in May and June 1997.

[42] See Ian Parry, "Revenue Recycling and the Costs of Reducing Carbon Emissions," *Climate Issues Brief No. 2*, Resources for the Future, June 1997; James Johnston, "Whom the Gods Would Destroy," *Regulation*, Winter 1998, pages 7-8.

mechanical energy, means farmers would be forced to bear an excess burden even though they are not emitting CO_2. By definition, this means energy taxes are an inefficient way to reduce carbon emissions.[43] Energy taxes may even have effects that are opposite those intended, by leading farmers to substitute carbon-emitting processes (such as placing larger areas under cultivation) for energy-intensive but non-emitting products (such as herbicides and fertilizer).[44]

Incidence of Higher Energy Costs

In public finance literature, taxes are commonly divided into two types: *direct* and *indirect*. A direct tax is expected to be paid entirely or in large part by the individual or business entity that makes the payment: income taxes and property taxes are two examples of direct taxes. Indirect taxes, by contrast, are meant to be passed along to the ultimate consumer of a product or service. In economic jargon, this is called "shifting the incidence" of the tax. A sales tax is generally viewed as a typical indirect tax. Energy taxes are expected to act as an indirect tax, changing the behavior of consumers in order to encourage less energy consumption.

Though energy taxes are intended to be passed along to consumers, there are two reasons why farmers are less able to do so than most other industries. First, farm production is heavily influenced by the availability of farm land, an immobile resource the supply of which is relatively fixed and long-lived. When commodity prices are low, many farmers are able to borrow against the asset value of their land to continue planting and tending to crops in hopes that prices will rise by harvest time. This means an increase in the cost of an input, such as energy, does not, at least in the short term, reduce the amount of food produced. Consequently, competition among farmers will keep food prices low, and the higher energy prices will be paid directly by farmers, rather than passed along to consumers.[45]

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[43] "Whenever a tax induces some people to change their behavior—that is, whenever it 'distorts' their choices—the tax has an excess burden. This means that the revenue collected by the tax systematically understates the true burden of the tax. . . . In comparing two taxes that raise the same total revenue, the one that produces less excess burden is the more efficient." William J. Baumol and Alan S. Blinder, *Economics: Principles and Policy* (New York, NY: Harcourt Brace Jovanovich Inc., 1979), page 634.

[44] Farming is not the only industry that uses fossil fuels as a feedstock rather than for combustion. Most notably, the plastics and pharmaceutical industries use natural gas and other fossil fuels as feedstocks. Raising the prices of these products relative to less energy-intensive substitutes could also lead to greater net carbon emissions and other unintended consequences.

[45] For discussions of tax shifting under a sales tax, see Adam Gifford Jr. and Gary J. Santoni, *Public Economics: Politicians, Property Rights, and Exchange* (Hinsdale, IL: The Dryden Press, 1978), pages 230-249. For the role played by land in determining tax incidence, see that source, pages 262-263; also David D. Friedman, *Price Theory* (Cincinnati, OH: South-Western Publishing Co., 1986), pages 330-333.

The second reason farmers are unable to shift the incidence of higher energy costs is the presence of effective competitors located in countries that won't face higher energy prices. Mexico, China, Argentina, and Brazil, all major livestock and agricultural producers, would not be bound by the terms of the Kyoto Protocol, and would quickly step up their exports to take advantage of their new cost advantage.

Many countries not bound by the Kyoto Protocol are eager to establish a foothold in the huge U.S. marketplace for agricultural products.

The gradual global diffusion of agricultural technologies, such as high-yield hybrid plants and new pesticides, has enabled more countries to become net food exporters. Many of those countries are eager to establish a foothold in the huge U.S. marketplace. If the Kyoto Protocol slows economic growth in the U.S. as much as other experts predict, growth in demand for food in the U.S. will also be slow and consumers will be sensitive to price hikes.

Greenhouse Gases Other than CO_2

Our analysis, like those conducted by WEFA Inc. and others, examines only the impact of higher energy prices caused by efforts to reduce CO_2 emissions. But the Kyoto Protocol calls on nations to control greenhouse gases other than CO_2. Of importance to the agricultural sector are nitrous oxide and methane.

Half of man-made nitrous oxide emissions are thought to come from the application of nitrogen-based fertilizers to farmlands, and approximately one-third of methane emissions are traced to bovine flatulence and manure management.[46] According to the Intergovernmental Panel on Climate Change, stabilizing current atmospheric concentrations of nitrous oxide and methane would require global emission reductions of 8 percent and more than 50 percent, respectively.[47]

On November 8, 1996, representatives from 18 farm and ranching trade groups and associations signed a letter to President Clinton expressing their "deep concern and surprise" that the Administration was excluding agricultural groups from treaty negotiations. They expressed concern over nine specific policies that the Administration was said to be considering as means to reduce greenhouse gas emissions:

- Stricter fuel economy requirements
- Reduction or phase out of the use of diesel fuel
- Limitations on production per acre for some crops

[46] WEFA Inc., supra note 29, page 16.

[47] IPCC, *Climate Change 1995, The Science of Climate Change* (New York, NY: Cambridge University Press, 1996), page 4.

- Requirements for "plowless" soil preparation
- Mandatory fallowing of crop land
- Limits and restrictions on livestock production to reduce methane emissions
- Restrictions on the use of fertilizer
- Restrictions on timber harvesting
- Restrictions on processing, manufacturing, and transporting food products

Only the first two policies in this list specifically target CO_2 emissions and are therefore the subject of the present study. Until the Administration makes known its plans for acting on the other seven policies, it may be pointless to attempt to calculate their cost. The reader should note that the cost of reducing nitrous oxide and methane emissions could be substantial, and would be in addition to the costs estimated below.

Impact of the Kyoto Protocol on Individual Farmers

We have calculated the average expected cost increase per acre or per hundredweight, and the likely effect on the average farmer's net profit of the energy price increases that would be required by the Kyoto Protocol. We then estimated the likely effects of energy taxes on agriculture as a whole industry. The first analysis is a "micro" analysis, while the second is a "macro" analysis.

We have calculated the likely effect on the average farmer's net profit of the energy price increases that would be required by the Kyoto Protocol.

Six representative commodities were chosen for the micro analysis. Four are field crops: wheat, soybeans, corn, and cotton. Two are livestock-related: hogs and milk. By looking at the different commodities, the range of effects can be measured. Some commodity production is very energy intensive, while other commodities are less affected by changes in energy prices. For example, corn and cotton crops use a lot of nitrogen fertilizer and pesticides, products that are very sensitive to changes in energy prices. Wheat and soybean production, on the other hand, is less energy intensive and thus less sensitive to changes in energy costs.

The impact of higher energy prices—increases equivalent to 25 cents or 50 cents per gallon of gasoline—on agricultural inputs is calculated first. Since some inputs are more energy intensive than others, an increase in energy prices raises the price of some inputs more than others. Using farm production cost data from the *ERS Farm Business Economics Report, 1994*, ECI-1995, we were able to produce the estimates shown in Table 1.

Table 1 Effect of Energy Taxes on Cost of Agricultural Inputs (percent increase in cost/unit of output)		
	25¢ / gallon tax	50¢ / gallon tax
Fuel and electricity prices	25%	50%
Pesticides/chemicals	20%	40%
Fertilizer—corn/cotton	20%	40%
Fertilizer—wheat/soybeans	15%	30%
Custom operations/hauling	15%	30%
Other expenses	5%	10%

Table 2 on the following page shows the impact of higher energy prices on the six representative commodities. The baseline year once again is 1994. In the case of corn, we see that the average variable cash expense in 1994 was $147.08 per acre. A 25 cents-per-gallon tax on gasoline (or an equivalent energy price increase) raises the cost per acre to $169.92. A 50 cents-per-gallon tax raises the cost to $193.65.

A 25 cents-per-gallon tax on gasoline would reduce U.S. farmers' net profit to $76.70 per acre, and a 50 cents-per-gallon tax would lower net profit to $52.50.

Table 2 also shows the effects of higher energy prices on farmer net profits.[48] Looking once more at corn production, we see average profit per acre in 1994 was $99.11. Adoption of a 25 cents-per-gallon tax on gasoline would reduce net profit to $76.70 per acre, and a 50 cents-per-gallon tax would lower net profit to $52.50.

Although the percentage change in costs and profits for the six agricultural products is also reported in Table 2, we report them separately in Table 3. These are the most important numbers in this report. Additional detail from our analysis appears in Tables 5 and 6 in the Appendix.

[48] Net profit is defined as the value of production less cash expense. This calculation does not include adjustments for changes in land values, debt, or interest, which we assume in the short term are not affected by higher energy prices.

Table 2 Impact of Higher Energy Costs on Agriculture (dollars per acre/hundredweight)						
	Base	**Low**	**High**	**Base**	**Low**	**High**
	Corn			**Cotton**		
Variable cash expenses	147.08	169.92	193.65	276.95	312.17	347.38
Change		15.5%	31.7%		12.7%	25.4%
Net profit	99.11	76.70	52.50	143.36	108.14	72.93
Change		-23.0%	-47.0%		-24.6%	-49.1%
	Soybeans			**Wheat**		
Variable cash expenses	75.76	86.11	96.45	54.58	61.87	69.15
Change		13.7%	27.3%		13.4%	26.7%
Net profit	100.91	90.56	80.22	25.48	18.19	10.91
Change		-10.0%	-20.5%		-28.6%	-57.2%
	Hogs			**Milk**		
Variable cash expenses	38.44	40.32	42.41	11.35	11.78	12.20
Change		4.9%	10.3%		3.8%	7.5%
Net profit	4.70	2.82	0.73	1.60	1.17	0.75
Change		-40.0%	-84.5%		-26.9%	-53.1%

Table 3 Effect of Kyoto Protocol on Individual Farmer's Costs and Net Profit				
Commodity	**Effect on Costs**		**Effect on Profits**	
	25¢ per gallon tax	50¢ per gallon tax	25¢ per gallon tax	50¢ per gallon tax
Corn	15.53%	31.66%	-23.05%	-46.99%
Soybeans	13.66%	27.31%	-10.26%	-20.50%
Cotton	12.72%	25.43%	-24.57%	-49.13%
Wheat	13.36%	26.69%	-28.61%	-57.18%
Hogs	4.89%	10.33%	-40.00%	-84.47%
Milk	3.79%	7.49%	-26.88%	-53.13%

The average farmer would see his or her operating expenses increase by between 3.79 percent (for milk) to 15.53 percent (for corn) if gasoline taxes are raised by 25 cents per gallon. A 50-cents-per-gallon price increase would increase expenses by between 7.49 percent (again for milk) and 31.66 percent (again for corn).

The average farmer could see his net profits fall by about one-fourth if gasoline taxes were raised by 25 cents a gallon, and by more than half if taxes were raised by 50 cents a gallon.

Although in percentage terms the change in operating expenses is nearly the same for the four field crops, when viewed in dollar terms there is a much greater difference. Under the lower energy price scenario, total variable cash expenses for wheat increase by only $7.29 per acre, whereas expenses for cotton increase more than $35 per acre. A similar difference occurs when gasoline taxes are hiked by 50 cents.

Turning to net profit, the 25 cents-per-gallon tax would reduce net profits by at least 10.26 percent (for soybeans) or as much as 40 percent (for hogs). A 50 cents-per-gallon tax reduces net profits on soybean production by 20.50 percent and net profits on hogs by a dramatic 84.47 percent. Milk producers would also see their net profits fall by over half. These numbers reflect the fact that livestock feeders and dairy farmers operate on very thin margins. Relatively small changes in the cost of production can result in very significant changes in their profits.

It should be noted that in all cases the gross value of production or price received by farmers is based on the 1994 year. Commodity prices vary from year to year. For example, milk prices declined rather significantly in late 1996 and early 1997. In the case of milk, the higher variable cash expenses would have simply exacerbated the losses producers were already experiencing.

Looking at costs per acre and per hundredweight of hogs or milk produces a farmer's eye view of what would happen if the Kyoto Protocol were approved. The view is frightening.

The average farmer could see net profits fall by about one-fourth if gasoline taxes were raised by 25 cents a gallon, the *minimum* amount of increase required, according to the Clinton Administration, to meet the requirements of the Kyoto Protocol. If taxes were raised by 50 cents a gallon, as is more likely the case, then the average farmer loses half his net profits.

Impact of the Kyoto Protocol on the Agricultural Sector

Table 4, on the next page, presents the results of a "macro" analysis of the effects of higher energy taxes on the total agricultural sector. Whereas the previous analysis may be of most interest to individual farmers and ranchers, this "big picture" analysis should interest people in businesses that serve as suppliers to or buyers from farmers and ranchers. What would happen to *the size of your market* if the Kyoto Protocol were adopted?

The cells in the bottom right-hand corner of Table 4 show total U.S. farm production expenses would rise by over $10 billion if gasoline taxes were raised 25 cents a gallon, and by more than $20 billion if taxes were raised 50 cents a gallon. Those figures represent 5.8 percent and 11.7 percent, respectively, of total 1995 production expenses of $175.5 billion. If you are in a business that sells production inputs to farmers, those figures mean the buying power of your customers would shrink by either $10 billion or $20 billion as a result of the Kyoto Protocol.

The loss of net income to the agricultural community that would result from higher energy taxes also can be calculated. Annual U.S. net farm income averaged $42.7 billion over the 1991 to 1995 period. The increased expense of a 25 cents-per-gallon gasoline tax would equal 24 percent of net farm income, while a 50 cents-per-gallon tax would equal 48 percent of net farm income. Those figures are close to the estimates we obtained through the earlier micro analysis. If you are in a business that sells finished goods to farm families, your customers would have either three-fourths or just one-half as much to spend on your products as they would if the Kyoto Protocol were not implemented.

The increased expense of a 25 cents-per-gallon gasoline tax would equal 24 percent of net farm income, while a 50 cents-per-gallon tax would equal 48 percent of net farm income.

These figures reveal that higher energy taxes have the potential for causing a major economic downturn in the agricultural sector that could parallel the experience of the mid-1980s. Not only would net farm income fall in the short term, but a downturn in land prices would shrink asset values and, most likely, result in another mini-depression in the farm sector. Increased production costs would reduce farm profits and farm income, invariably slowing farm loan and mortgage repayments. Consequently, this scenario bodes poorly for lenders who extend credit to farmers.

Another outcome of either scenario would be the increased consolidation of agricultural production. Many small farmers, who typically have a higher average cost of production, would be forced to sell to large farmers. Young farmers just starting or those who have recently taken on increased debt to expand their operations could find themselves in an unprofitable situation that might force them to abandon agriculture. Not only would this hurt lenders, but it would also have an adverse economic impact on small towns and rural America in general.

Table 4 Total U.S. Farm Production Expenses (millions of dollars)					
	Base Year 1995	Estimated expenses with higher energy prices		Difference between base year and adjusted expenses	
		25¢ per gallon tax	50¢ per gallon tax	25¢ per gallon tax	50¢ per gallon tax
Feed purchased	$24,528	$26,000	$27,471	$1,472	$2,943
Livestock & poultry purchased	$12,557	$11,929	$11,301	($628)	($1,256)
Seed purchased	$5,463	$5,791	$6,119	$328	$656
Total farm-origin inputs	$42,548	$43,720	$44,891	$1,172	$2,343
Fertilizer & lime	$10,034	$11,790	$13,545	$1,756	$3,511
Fuels & Oils	$5,687	$7,109	$8,531	$1,422	$2,844
Pesticides	$7,719	$9,263	$10,807	$1,544	$3,088
Total manufactured inputs	$23,440	$28,162	$32,883	$4,722	$9,443
Total interest charges	$12,757	$13,395	$14,033	$638	$1,276
Other operating expenses	$59,964	$62,962	$65,960	$2,998	$5,996
Capital consumption	$19,107	$20,062	$21,018	$955	$1,911
Taxes	$6,891	$7,236	$7,580	$345	$689
Net rent to nonoperator landlords	$10,873	$10,295	$9,753	($578)	($1,120)
Other overhead expenses	$36,871	$37,593	$38,351	$722	$1,480
Total production expenses	**$175,580**	**$185,832**	**$196,118**	**$10,252**	**$20,538**
Percent change		5.8%	11.7%		

It should be noted that Table 4 shows two categories of expenses that are expected to *fall* if the Kyoto Protocol were put into effect. First is the livestock and poultry purchase category under farm-origin inputs. When farmers who feed livestock bid on the feeder animals—calves, piglets, or chicks—their bids are predicated on the potential profit of feeding that animal. When feed prices increase they compensate by lowering their bids for these young animals. While that reduces production expenses, it also is an overall negative to gross farm revenues. For the agricultural sector as a whole, it is a net loss.

The other expense expected to fall is net rent to non-operator landlords. This, too, has some rather ominous implications. Lower rents are a reflection of the higher cost of production, which means that farmers renting land will reduce their bid or the rental rate. (It may be a rather heroic assumption that this occurs in year one, but it will happen over time if higher expenses

reduce profits in successive years.) Associated with this reduction is the fact that land prices in general will also come under downward pressures. So this would also be viewed as a negative impact on assets and the farm sector financial balance sheet.

Indirect Impacts on Other Parts of the Economy

No single study can capture the ripple effect that a decline in farm income would have on other aspects of the agricultural and non-agricultural economy. However, a study prepared by Sparks Companies Inc. using data from Standard & Poor's DRI, released in October 1998, lists some of the probable consequences, based again on the emission-control regime that U.S. negotiators accepted in Kyoto.[49] Here is a brief summary of the study's findings:

- **Consumer food prices would rise**. A 2 percent decline in gross domestic product would result in a 0.7 percent decline in domestic demand for food. This would create a mild, short-term downward pressure on food prices, counterbalanced by the inflationary pressures of higher energy costs. On net, food consumption expenditures would rise 2.6 percent. This would have only minor effects on the average U.S. consumer, who typically spends about 11.9 percent of disposable income on food. However, 37.4 percent of U.S. households earn less than $20,000 in after-tax income and spend between 21 and 100 percent of their income on food. For those families, the Kyoto Protocol's impact could be severe and negative.

- **Public assistance costs would rise**. The U.S. Department of Agriculture spends more than $39 billion annually on six food assistance programs, most notably the Child Nutrition Programs and Food Stamps. The emission-control regime, by reducing employment, could add 500,000 people to the food stamp rolls and increase program costs by 5 percent, or $2 billion annually.

The emission-control regime, by reducing employment, could add 500,000 people to the food stamp rolls and increase program costs by 5 percent, or $2 billion annually.

- **Agricultural exports would fall.** By increasing the energy costs of farm production in America while leaving them unchanged in many countries that are emerging agricultural producers, the Kyoto Protocol would cause U.S. food exports to decline and U.S. food imports to increase. The rising cost of U.S. food abroad would also encourage developing nations to produce their own, immediately in fruits and vegetables, more gradually in major grain crops. The reduced efficiency of the world food system could add to a political backlash against free trade policies both at home and abroad.

- **Agricultural investment would fall.** The Kyoto Protocol would trigger a wave of farm consolidations, accompanied by a reduction of net farm investment. "The higher energy costs,

[49] Sparks Companies Inc., "United Nations Kyoto Protocol—Potential Impacts on U.S. Agriculture," October 1998.

together with the reduced domestic and export demand, could lead to a very severe decline in investment in agriculture, and a sharp increase in farm consolidation. Small farm numbers likely would decline much more rapidly than under baseline conditions, while investment in even larger commercial farms likely would stagnate or decline."[50]

Summary

This analysis suggests that higher energy prices would have a significant negative impact on the U.S. agricultural sector. Farmers stand to see their net profits fall by as much as 84 percent, and typically 50 percent, if gasoline taxes are raised by 50 cents per gallon. Even a 25 cents-per-gallon tax would likely lower net profits for hog producers by 40 percent and 25 percent for farmers raising field crops.

"Small farm numbers likely would decline much more rapidly than under baseline conditions, while investment in even larger commercial farms likely would stagnate or decline."
— Sparks Companies Inc.

Total annual U.S. farm production expenses would rise over $10 billion under the 25-cents-per-gallon scenario and by more than $20 billion under the 50-cents-per-gallon scenario. This would represent a 24 or 48 percent decrease in net farm income, respectively. Many farmers, especially those who are just getting started or who operate on small margins, would be unable to cope with these declines in income and would be forced off the land.

Farmers and their allies in the agricultural community have a big stake in how the debate over global warming ends. Millions of jobs and thousands of family farms hang in the balance. It is no exaggeration to say the Kyoto Protocol is the biggest single public policy threat to the agricultural community today. It will continue to be a threat so long as the Clinton-Gore Administration refuses to renegotiate either the targets or the exemption from such targets for developing nations.

[50] Ibid.

PART 3

The Agriculture Industry's Positive Message on Global Warming

The alternative to the Kyoto Protocol does not have to be a "do nothing" strategy. Farmers—who witness the beneficial effects of rising carbon dioxide ($CO_{2)}$ levels every day—are uniquely positioned to advocate affordable "win-win" activities while scientists continue their search for more reliable ways to predict future climate changes.

Farmers Hold the Key

Many farmers in the U.S., aware of the beneficial effects of higher levels of CO_2 on plants, pump the gas into their greenhouses or buy from nurseries that do. An extensive body of scientific literature has documented the positive effects of higher concentrations of CO_2 on plant growth.[51] By boosting photosynthesis and the efficiency with which plants use water, a doubling of CO_2 levels increases plant growth by about one-third. "Of over a thousand experiments, detailed in 324 peer-reviewed scientific reports, 93 percent reported an increase in plant productivity averaging 52 percent."[52]

Farmers, who specialize in promoting plant growth and turning plant tissue into consumer goods, could be said to be in the business of removing CO_2 from the air and sequestering it.

Dr. Sylvan Wittwer, a distinguished professor of horticulture at Michigan State University, writes that "the effects of an enriched CO_2 atmosphere on crop productivity, in large measure, are positive, leaving little doubt as to the benefits for global food security. . . . The rising level of atmospheric CO_2 is a universally free premium, gaining in magnitude with time, on which we can all reckon for the foreseeable future."[53]

Plants benefit from exposure to CO_2 because they absorb and store the gas in their tissues. This means farmers, who specialize in promoting plant growth and turning plant tissue into consumer goods, could be said to be in the business of removing CO_2 from the air and temporarily sequestering it.

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[51] For an extensive survey of this literature, see Dr. Sherwood Idso, *CO_2 and the Biosphere: The Incredible Legacy of the Industrial Revolution* (St. Paul, MN: Department of Soil, Water and Climate, University of Minnesota, October 1995).

[52] Dr. Sylvan Wittwer, *Food, Climate and Carbon Dioxide* (Boca Ratan, FL: CRC Press, 1995).

[53] Ibid., pages 189-190.

"The simplest way to remove carbon dioxide," says Dr. Gregory Benford, a physics professor at the University of California in Irvine, ". . . is to grow plants—preferably trees, since they tie up more of the gas in cellulose."[54] Land plants contain roughly three times as much CO_2 as the atmosphere. Slowing deforestation, promoting forest regeneration in the tropics, and planting tree plantations could sequester 12 to 15 percent of projected global CO_2 emissions between 1995 and 2050 at a cost as low as $2 per ton.[55] The cumulative cost over 55 years would be approximately $247 billion, a large sum but less than the *annual* loss of GDP to the U.S. alone that would result from attempting to reduce emissions by raising energy costs.[56]

"The simplest way to remove carbon dioxide . . . is to grow plants—preferably trees, since they tie up more of the gas in cellulose."
— Dr. Gregory Benford

Dr. Sherwood B. Idso, a research physicist for the U.S. Department of Agriculture, believes this solution may occur *spontaneously*. "[T]he rising CO_2 content of Earth's atmosphere would eventually stimulate the productivity of woody plants to such an extent that the increase in their growth rates would be great enough to reduce the rate at which the CO_2 content of the air was then rising, and ultimately lead to a stabilized CO_2 concentration considerably less than what is typically projected under most 'business as usual' scenarios."[57] Other researchers have confirmed that the rate of increase in atmospheric CO_2 concentrations slowed during the 1980s and 1990s.[58]

Plants absorb and hold carbon dioxide while they grow, but release it during the natural process of decay. Farmers prevent CO_2 from returning to the atmosphere when they harvest field crops and send them to processors to be turned into food products; harvest older trees before they die and replant sufficient quantities of new trees to provide a perpetual supply of wood fiber (sustained yield forest management); plant fast-growing trees in high densities and harvest them after a few short years for paper fiber; and collect straw left over from rice and other crops for use, once again, in papermaking. Each of these practices is already taking place, is profitable, and sequesters CO_2.

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[54] Dr. Gregory Benford, "Climate Controls," *Reason*, November 1997.

[55] IPCC, *Climate Change 1995, Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses* (New York, NY: Cambridge University Press, 1996), page 775.

[56] *Ibid.*

[57] Dr. Sherwood Idso, supra note 51, page 28.

[58] T.J. Conway, P.P Tans, L.S. Waterman, and K.W. Thoning, "Evidence for interannual variability of the carbon cycle from the National Oceanic and Atmospheric Administration/Climate Monitoring and Diagnostics Laboratory Global Air Sampling Network," *Journal of Geophysical Research*, Vol. 99, No. D11 (1994), pages 22, 831-832, 855. See also C.D. Keeling, "A study of the abundance and 13C/12C ratio of atmospheric carbon dioxide and oceanic carbon in relation to the global carbon cycle," in M.R. Riches, editor, *Global Climate Change Research: Summaries of Research in FY 1994* (Washington, DC: U.S. Department of Energy, 1994), pages 109-110.

Ways to Reduce Agricultural Emissions

Besides sequestering more carbon dioxide from the atmosphere, farmers can act voluntarily to limit their own greenhouse gas emissions. The agricultural techniques and technologies that would reduce emissions include practices many farmers already use routinely:[59]

- **Control soil erosion**. Erosion reduces biomass per acre and below-ground carbon sequestration. It also costs farmers money by removing land from productive use. U.S. farmers are making significant progress against soil erosion, reducing by 24 percent the amount of erosion per farm acre in the last 15 years.[60]

During the past ten years, farmers helped restore 690,000 acres of American wetlands.

- **Preserve natural wetlands**. Wetlands contain unusually high levels of carbon and retain it longer than most soils. While farmers in the U.S. have historically drained wetlands to plant field crops, they now are leading the nation in restoring wetlands for flood control, recreation, and wildlife habitat. During the past ten years, farmers helped restore 690,000 acres of American wetlands.[61]

- **Reforestation**. Trees and woody shrubs sequester CO_2 both above and below ground, and are particularly useful for improving the carbon content of depleted soils.

- **Conservation tillage.** Tillage for fallowing increases oxidation rates of organic carbon. Conservation tillage, by contrast, fixes more carbon in the soil than other method by retaining crop residues and minimizing oxidation. In 1997, American farmers cultivated more than half of the nation's 294.6 million acres of crop land with conservation-till or reduced-till techniques.[62]

- **Retain forest slash on site**. Rather than removing or burning leftover branches and other debris from logging activities, modern loggers leave this material behind. The retained water and nutrients reestablish carbon-fixing vegetation rapidly.

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[59] Council for Agriculture and Technology (CAST), *Preparing U.S. Agriculture for Global Climate Change*, Task Force Report No. 119, June 1992; IPCC, *Climate Change 1995: Impacts, Adaptations and Mitigation of Climate Change: Scientific-Technical Analyses*, pages 745-771.

[60] American Farm Bureau Federation, "Farm Facts: Cropland Erosion on the Decline," www.fb.com/today/farmfacts/ffacts10.html, citing Conservation Technology Information Center, National Crop Residue Management Survey.

[61] C.D. Kelly, "How Farmers Mark Earth Day," *Focus on Agriculture*, American Farm Bureau Federation, April 20, 1998. Available at www.fb.com/views/focus/fo98/fo0420.html.

[62] Ibid.

- **Mulching**. By decreasing extremes of soil surface temperature, mulching slows organic decomposition, retaining more carbon in the soil.

- **Leave crop residue**. Besides acting as mulch and reducing erosion, such residues are a direct carbon source for new plants.

- **Maintain/improve soil fertility.** Fertile soil, with appropriate levels of nitrogen, phosphorus, and potassium, sequesters more CO_2 than depleted soil.

Kyoto: Hurting Rather than Helping Farmers

U.S. farmers lead the world in the use of progressive agricultural practices that minimize erosion, enhance soil fertility, and in other ways sequester carbon while minimizing emissions. If left unhampered by energy taxes or burdensome regulations, they will make further progress in limiting unnecessary emissions, as it is in their long-term self-interest to do so.

By making U.S. farm products less competitive in domestic and international markets, the Kyoto Protocol is likely to reduce the amount of carbon dioxide sequestered by agricultural and forestry activities.

Adoption of the Kyoto Protocol, however, would lead to the imposition of taxes and regulations on U.S. farmers, but not on farmers in many other countries. As a result, a growing share of the world's food would be produced outside the U.S. with less progressive practices. At the extreme are such countries as Brazil, where hundreds of thousands of acres of carbon-rich rainforests are burned each year to make way for low-yield field crops, a practice that releases tremendous amounts of carbon dioxide into the atmosphere.

U.S. farmers and ranchers presently export $69.7 billion in produce and meat to consumers in other nations each year. American farmers produce 12 percent of the world's wheat, 19 percent of its cotton, 36 percent of its corn, and 47 percent of its soybeans. By making U.S. farm products less competitive in domestic and international markets, the Kyoto Protocol is likely to reduce farm exports, thereby reducing the amount of carbon dioxide sequestered by agricultural and forestry activities.

PART 4

Summary and Conclusion

While the typical farm or ranch in the U.S. doesn't have a smoke stack, it nevertheless produces significant amounts of greenhouse gases. Those gases are not "pollution," in the sense that they pose a direct threat to human health. Indeed, since carbon dioxide makes plant photosynthesis possible, one can accurately say these gases are life-creating and life-saving. Nevertheless, some believe such emissions, together with those from many other sources, may eventually destabilize the global climate. Those ideas form the basis of a proposed treaty, the Kyoto Protocol, that would have sweeping implications for farmers.

If the Kyoto Protocol were implemented, American farmers would find themselves subject to ruinous taxes and regulations. Unable to pass along to consumers the billions of dollars in higher operating expenses, farmers would lose markets both at home and abroad to producers in other countries who are not asked to bear the same financial burdens. Small family-owned farms would be forced out of business, and with them would go countless businesses, both small and large, that rely on the farmer to buy their products.

If lowering CO_2 concentrations in the atmosphere at higher rates is required or prudent, policymakers must eventually come to farmers to find the most cost-effective means.

Farmers are better positioned than any other group to comment with natural authority on the global warming debate. On a day-to-day basis they experience the effects of rising CO_2 concentrations and changes in climate. *Their business is finding ways to capture carbon dioxide from the air and turn it into food and other consumer goods.* If climates suddenly change, they will be on the forefront of efforts to adapt to change with new strains of seeds, different planting and harvesting technologies, and other innovations.

If lowering CO_2 concentrations in the atmosphere is required or prudent, policymakers must eventually come to farmers to find the most cost-effective means. And farmers, because so many of the practices that reduce CO_2 emissions also enhance farm productivity and therefore net profits, are eager to help.

But this is not the direction that public policy, represented by the Kyoto Protocol, is headed. Instead of encouraging farmers to do more to sequester CO_2, the Kyoto Protocol would *take away billions of dollars of net income,* causing a new exodus from the land and to urban centers. Rather than reward American farmers for their successful fight against erosion, and for reducing CO_2 emissions in other ways, the treaty would *reduce the American farmer's competitiveness in global markets,* resulting in more investment in farming abroad and less here at home.

In short, the Kyoto Protocol is exactly the *wrong* way to go about making the agricultural community in the U.S. a larger part of the *solution* to the possible problem of global warming. For this reason, people who are sincerely concerned about the possibility of global warming should oppose, rather than embrace, the Kyoto Protocol. Farmers, obviously, have an added reason to oppose the Protocol.

The Kyoto Protocol is exactly the *wrong* way to go about making the agricultural community in the U.S. a larger part of the *solution* to the possible problem of global warming.

Farmers can be much more than naysayers in the debate over global warming. If the prophets of global catastrophe are correct, farmers hold the key to reducing greenhouse gas concentrations cost effectively. By turning eroded areas into forests and fields, and by better managing their fields and wetlands, farmers can increase the amount of carbon removed from the atmosphere and safely sequestered in plants, consumer products, or underground. By increasing their use of progressive practices that are already well established and profitable, farmers can reduce their own emissions of carbon dioxide and other greenhouse gases as well, perhaps buying scientists more time to learn how the global climate works.

If you are a farmer, and if you have read this far, then you now have all the information you need to be an effective communicator on the global warming issue. We hope you will speak out in conversations with family and friends, with the reporters and editors of your local newspapers, and with your local, state, and national elected officials. Let them know that you understand the issues concerning global warming, and that you have a "win-win" alternative to the Kyoto Protocol.

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Appendix

Table 5
U.S. Production Cash Costs, Field Crops

Table 6
U.S. Production Cash Costs, Hogs and Milk

Table 5
U.S. Production Cash Costs, Field Crops
(dollars per acre)

	Corn			Soybeans			Cotton			Wheat		
		Impact of Higher Energy Prices			Impact of Higher Energy Prices			Impact of Higher Energy Prices			Impact of Higher Energy Prices	
	1994	Low	High	1994	Low	High	1994	Low	High	1994	Low	High
Gross Value of Production	296.32			219.56			477.39 [2]			104.95 [3]		
Cash Expenses												
Fertilizer, lime & gypsum	46.07	55.28	65.38	9.25	10.65	12.03	38.16	45.79	53.42	15.21	17.49	19.77
Pesticides	25.22	30.26	35.30	24.45	29.34	34.23	49.87	59.84	69.82	6.18	7.42	8.65
Custom Operations	10.05	11.56	13.07	3.73	4.29	4.85	19.59	22.53	25.47	4.87	5.60	6.33
Fuel, lube and electricity	18.96	23.70	28.44	7.93	9.91	11.90	31.03	38.79	46.54	8.12	10.15	12.18
Other [1]	46.78	49.12	51.46	30.40	31.92	33.44	138.30	145.22	152.13	20.20	21.21	22.22
Total, Variable Cash Expenses	147.08	169.92	193.65	75.76	86.11	96.45	276.95	312.17	347.38	54.58	61.87	69.15
Percent Change in Expenses		**15.5%**	**31.7%**		**13.7%**	**27.3%**		**12.7%**	**25.4%**		**13.4%**	**26.7%**
Total, Fixed Cash Expenses	50.13	50.13	50.13	42.89	42.89	42.89	57.08	57.08	57.08	24.89	24.89	24.89
Total, Cash Expenses	197.21	220.05	243.78	118.65	129.00	139.34	334.03	369.25	404.46	79.47	86.76	94.04
Gross Value of Production Less Cash Expenses	99.11	76.27	52.54	100.91	90.56	80.22	143.36	108.14	72.93	25.48	18.19	10.91
Percent Change in Net Profit		**-23.0%**	**-47.0%**		**-10.3%**	**-20.5%**		**-24.6%**	**-49.1%**		**-28.6%**	**-57.2%**

[1] Includes seed, repairs, hired labor, other variable cash expenses and ginning for cotton.
[2] Total for Cotton (421.04) and Cottonseed (56.35).
[3] Total for Wheat (103.64) and Wheat Straw (1.31).

Table 6
U.S. Production Cash Costs, Hogs and Milk
(dollars per hundredweight)

Hogs				Milk			
		Impact of Higher Energy Prices				Impact of Higher Energy Prices	
	1994	Low	High		1994	Low	High
Hog Production				Milk Production			
Market Hogs	36.29			Milk	12.99		
Feeder Pigs	4.52			Cattle	1.00		
Cull Stock	2.31			Other Income	0.51		
Breeding Stock	2.11						
Inventory Change	0.44						
Other Income	1.13						
Gross Value of Production	46.80				14.50		
Cash Expenses				Cash Expenses			
Grain	11.54	12.35	13.16	Concentrates	3.69	3.84	3.95
Protein Sources	9.35	9.72	10.10	Silage	1.41	1.51	1.61
Complete Mixes	5.69	6.06	6.43	Other Feed	2.07	2.07	2.07
Other Feed Items	0.59	0.63	0.67				
Total Feed Costs	27.17	28.76	30.36	Total Feed Costs	7.17	7.42	7.63
Other Variable Cash Expenses	11.27	11.56	12.05	Other Variable Cash Expenses	4.18	4.36	4.57
Total, Variable Cash Expenses	38.44	40.32	42.41	Total, Variable Cash Expenses	11.35	11.78	12.20
Percent Change in Expenses		**4.9%**	**10.3%**	**Percent Change in Expenses**		**3.8%**	**7.5%**
Total, Fixed Cash Expenses	3.66	3.66	3.66	Total, Fixed Cash Expenses	1.55	1.55	1.55
Total, Cash Expenses	42.10	43.98	46.07	Total, Cash Expenses	12.90	13.33	13.75
Gross Value of Production Less Cash Expenses	4.70	2.82	0.73	Grass Value of Production Less Cash Expenses	1.60	1.17	0.75
Percent Change in Net Profit		**-40.0%**	**-84.5%**	**Percent Change in Net Profit**		**-26.9%**	**-53.1%**

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