

**STATEMENT OF KEITH COLLINS
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BEFORE THE
UNITED STATES SENATE COMMITTEE
ON
AGRICULTURE, NUTRITION, AND FORESTRY**

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Mr. Chairman and Members of the Committee, thank you for the invitation to discuss the Department of Agriculture's (USDA) efforts related to the use of renewable fuels. I will discuss briefly our program on bioenergy and bioproducts, the role of ethanol in U.S. agriculture and some limited analysis we have done on the effects on agriculture of replacing MTBE with ethanol. USDA's activities related to renewable fuels include monitoring biofuels in energy markets and U.S. agriculture; conducting analysis on opportunities for agricultural products as alternative fuels; and performing scientific and applied research and other activities to advance biofuel technology and reduce conversion costs.

The Energy Challenge for U.S. Agriculture

U.S. agriculture is closely tied to developments in energy markets because it is a big user of energy directly as fuel, oil and electricity, and indirectly through manufactured inputs, such as chemicals. High energy prices can impose a financial burden on many farmers by raising their production expenses. But, agriculture is also a producer of energy, primarily in the form of ethanol, and in that capacity, increased demand for gasoline provides opportunities for new markets for domestically produced renewable energy.

The recent spike in crude oil prices has drawn attention to these dual effects for agriculture. While agricultural production has become much more energy efficient over time, with energy use (excluding electricity) falling by 25 percent between 1979 and 1993, farm

production expenses on energy are still substantial. Our most recent analysis suggests producers may spend \$2-2.5 billion more on fuel and oil this year than the \$6.4 billion spent in 1999. Fuel and oil costs as a share of total production expenses will likely be the highest since 1986. Little change is expected in electricity, chemical or fertilizer expenses. Crop producers are expected to face higher energy costs than livestock producers, although little effect on farmers' expected planted acreage this year is evident in USDA's March 31 *Prospective Plantings* report.

The potential vulnerabilities of the farm and U.S. economies to oil price increases are raising interest in renewable fuels. Other factors increasing attention include the challenge posed by President Clinton's Executive Order (E.O.)13134 to triple the nation's use of biobased products and bioenergy by 2010; water contamination problems caused by MTBE; the administration's legislative principles to reduce or eliminate MTBE and replace the oxygenate mandate with a renewable fuels standard; congressional legislation supporting renewable fuels; and the positive effects of renewables on a range of environmental variables, such as greenhouse gas emissions.

USDA Activities in Renewable Energy

USDA's Biofuels Program is part of a broader administration effort to promote bioproduct and bioenergy markets. Biofuels include starch and cellulosic ethanol, biodiesel from agricultural oils, and biomass for electric power. The program goal is to increase the use of renewable agricultural resources as biofuels, thereby creating jobs and economic activity in farm and rural areas, reducing dependence on imported oil, and reducing pollution. The Department devotes \$9 million annually to biofuels research. In addition, USDA devotes \$63 million annually to research on new industrial uses of agricultural products. The Department's biofuels and new uses programs are designed to support the objectives of the Energy Policy Act of 1992,

the Clean Air Act Amendments of 1990, E.O. 13134, as well as the administration's activities related to global climate change and sustainable development.

Current State of the U.S. Ethanol Market

The total amount of energy consumed in the United States this year is projected to be about 98 quadrillion btus (quads). Most of the biomass energy consumed is in solid form and used for direct combustion in industrial and residential applications. Total biomass wood energy accounts for 2.6 quads. Ethanol is the only liquid biofuel produced in significant quantities, accounting for only 0.14 quads. However, even that small amount has a significant impact on the farm sector.

There are more than 55 ethanol plants in operation in nearly 20 states with a total production capacity of about 1,800 million gallons per year (MGPY). In addition, plants with an estimated 145 MGPY are currently under construction and 400 MGPY is currently proposed for financing and planning.

Individual plant capacities vary from less than one MGPY to more than 300 MGPY. Among producing states, Illinois ranks first with ethanol plants totaling more than 600 MGPY combined production capacity. Iowa, ranks second, with about 500 MGPY capacity; Nebraska ranks third, with more than 300 MGPY capacity; and Minnesota ranks fourth, with more than 200 MGPY capacity. More than 50 percent of the ethanol production capacity converts corn to ethanol using the wet milling process, with the remainder using the dry milling process.

Ethanol production increased from a few million gallons in late 1970's to about 1.5 billion gallons in 1999. Production during the year shows considerable seasonality. Ethanol production is higher during October through March than during April through September. High

fructose corn syrup is produced during the summer by wet mills. Most recent data show ethanol production at a record-high 108,000 barrels per day during February 2000.

Corn today accounts for 90 percent of all feed stocks used in production of ethanol. Other feed stocks include sorghum, wheat, and processing wastes containing sugar and starch. Corn use in ethanol production has increased from 35 million bushels in 1980/81 to 550 million bushels expected during 1999/2000.

One gallon of ethanol has 35 percent oxygen with a 115 octane rating. These properties have given rise to three markets for ethanol: an octane market for use in conventional gasoline, an oxygenate market for use in the winter time carbon monoxide program, and an oxygenate market for use in the Reformulated Gasoline Program in smog-prone areas. Last year, about 800 million gallons of ethanol were blended with conventional gasoline, about 400 million gallons of ethanol were used in the reformulated gasoline programs in Chicago and Milwaukee, and 300 million gallons were used during the winter season in the oxygenated gasoline program.

Two key factors supporting ethanol production today are the increase in oil prices and low corn prices. The 1999 corn crop was the fourth largest on record at 9.4 billion bushels and farm-level prices for the crop are expected to average \$1.90 per bushel, compared with \$2.52 per bushel averaged during the previous 5 crop years. High oil prices have led to high prices for gasoline and other refined petroleum products. These increases are making ethanol more competitive in octane markets where most ethanol sales have occurred in the past. If current law, programs and market conditions continued, including continued use of MTBE, USDA's long-term baseline projections indicate 770 million bushels of corn could be used to produce 1.93 billion gallons of ethanol by 2009/2010, the equivalent of 7 percent of U.S. corn production, compared with 5.8 percent during the 1999/2000 corn marketing year.

The increase in ethanol production is positive for U.S. agriculture. Two years ago, Senator Harkin requested that USDA answer the question: what would elimination of the ethanol industry mean for U.S. agriculture and the rural economy? The USDA responded with an analysis that set corn use in ethanol to zero beginning in 1998 and estimated the agricultural market effects over the ensuing 7 years. Corn cash receipts were estimated to decline \$2.6 billion and net farm income by \$1.3 billion per year during 1998 through 2005. Lower farm prices also reduce the value of farm exports. The decline in agricultural export value, combined with the increase in the import value of the oil needed to replace ethanol, were estimated to contribute \$1.0 billion annually to the trade deficit during 1998-2005. U.S. employment was estimated to decline by 14,000 by the end of the period. These effects indicate the important role ethanol plays today in supporting the farm economy.

The role of ethanol in energy security has been questioned because of ethanol's small market share—a little over 1 percent of U.S. gasoline use—ethanol's competitiveness with fossil fuels, and its net energy balance. USDA's original study on the net-energy balance of corn ethanol released in July 1995 showed that it is positive. That is, the energy in ethanol exceeds the energy used to produce the ethanol. Since that study, technological innovations in corn production and ethanol conversion have reduced the energy required to produce corn ethanol. Corn yields have improved, and ethanol plants are rapidly adopting energy-saving innovations which reduce the energy required to convert corn into ethanol. Our most recent estimate of the energy ratio is 1.34, up from our 1995 estimate of 1.24. The new estimate indicates that the energy content of ethanol is 34 percent greater than the energy used to grow, harvest, and transport corn, produce ethanol, and distribute the ethanol. Analysis by the Argonne National

Laboratory evaluating climate change benefits shows that corn ethanol reduces greenhouse gas emissions by 30 percent relative to gasoline, gallon for gallon.

Lowering net feedstock costs and other costs associated with ethanol production would improve the competitiveness of ethanol as a fuel or fuel additive. Analysis published by USDA's Economic Research Service suggests that long-term technology improvement could reduce ethanol production costs by 9 to 15 cents per gallon. Our researchers believe that additional savings of 8 to 13 cents per gallon may be possible through coproduct development and process improvement.

To achieve such cost reductions, USDA research is targeting the following areas:

- Discovering microorganisms and enzymes that would more efficiently convert biomass and multiple sugars to ethanol, thus reducing the cost of ethanol production.
- Developing higher value coproducts to reduce net feedstock costs.
- Improving production systems and methods for harvesting, handling and storing biomass crops. Also, new varieties of biomass could result in more efficient conversion to ethanol and other biobased products.

Implications for Agriculture of Replacing MTBE with Ethanol

Last year, USDA was asked to advise the EPA's Blue Ribbon Panel on MTBE whether expanded ethanol production could replace MTBE and whether expansion of ethanol production would disrupt the agricultural sector or substantially increase retail food prices.

Our analysis assumed MTBE would be phased-out during 2000-2004 and the oxygen content requirement for reformulated gasoline would remain in effect. The analysis assumed a 4-year adjustment period is sufficient to enable ethanol production and distribution capacity to expand to meet the projected increase in demand. Ethanol transport by barge, rail, ocean vessels,

and trucks is expected in the longer term, when MTBE is phased-out. Initially, ethanol would likely be shipped by barge to the Gulf and distributed to fuel blenders through customary shipping channels. Over time, the movement of ethanol by rail would likely increase as more rail connections between ethanol plants and refiners are developed.

Our analysis did not address broader economic issues of the MTBE phase out and maintenance of the oxygenate requirement, such as the need for increased investment spending in production capacity, the effects on overall fuel costs, or the effects of a quicker phase-out period for MTBE. The USDA analysis focused on the effects on agriculture of expanded corn demand. The increase in ethanol use resulting from a MTBE phase-out was estimated to increase corn used for ethanol by over 500 million bushels per year by 2004. The increase in corn demand was projected to raise the average price of corn by 14 cents per bushel during 2000-2010. Farm prices rise for other grains, while soybean prices decline slightly due to competition in livestock feed markets from an increase in byproduct feeds production. With generally higher farm prices, U.S. net farm income was projected to average \$1.1 billion higher during 2000-2010. Higher agricultural export value combined with the MTBE import value decrease would contribute a positive \$1.3 billion per year on average to the U.S. balance of trade. The increase in farm and ethanol production was projected to create 13,000 jobs across the economy by 2010, with over a third of the new jobs created in the ethanol sector itself.

Implications for Agriculture of a Minimum Average Renewable Fuels Standard

Last month, the administration announced a legislative framework which includes three recommendations to be taken together. First, Congress should amend the Clean Air Act to provide authority to significantly reduce or eliminate the use of MTBE. Second, as MTBE is reduced or eliminated, Congress must ensure that air quality gains are not diminished. Third,

Congress should replace the existing oxygenate requirement with a renewable fuels standard for gasoline. USDA will work with other agencies to assess the impacts of potential legislation.

Last year, Senator Daschle requested that USDA evaluate the effects on the farm economy of an example of a minimum average renewable fuels standard. While strictly illustrative of many possible renewable fuel standards, the analysis helps gauge how an MTBE phase out with a renewable fuels standard would affect agriculture, compared with an MTBE phase out and the oxygenate requirement remaining in place.

The renewable fuels standard examined assumed fuels produced from renewable sources account for 1 percent of the nation's gasoline in 2001 and increase linearly to 2.5 percent in 2010. The analysis was limited to the gasoline market and the effects on the farm economy of increased production of ethanol from corn. The amount of ethanol used in any year is therefore a fixed, assumed percentage of total projected gasoline use with no adjustment for other factors which could affect ethanol use. Ethanol production from biomass would likely be small initially, but was assumed to increase over time with advances in cost-saving technology, providing added farm sector benefits.

USDA's illustrative analysis of a renewable fuels standard indicates that a standard can provide significant economic benefits to U.S. farmers by increasing the demand for corn used in ethanol and investment in corn-ethanol production facilities. With 2.5 percent of the nation's gasoline comprised of ethanol by 2010, U.S. corn ethanol production would increase from a baseline projection of 1.7 billion gallons in 2010 to 3 billion gallons. The price of corn was projected to be over 15 cents per bushel higher in 2010 and average 11 cents per bushel higher during 2002-2010 than in the absence of the fuels standard. With higher corn prices and greater

corn production, U.S. net farm income was projected to increase by \$1.4 billion in 2010, and average \$750 million higher per year during 2002-2010.

These results indicate that the same or greater general types and magnitudes of economic benefits to agriculture and rural areas that would come from a MTBE phase out with no waiver of the oxygenate requirement could be obtained with a properly specified renewable fuels standard in place of the existing oxygenate requirement. In addition, the renewable fuels standard would provide refiners more flexibility to produce gasoline to meet Clean Air Act requirements, thereby helping to hold down increases in gasoline production costs.

An Incentive Program for Bio-based Energy Production

In support of the President's Executive Order to stimulate use of renewable fuels and in response to low commodity prices, the Secretary of Agriculture announced on February 2, 2000, that USDA would initiate rulemaking to increase the production of biobased energy. Under section 5(e) of the Commodity Credit Corporation (CCC) Charter Act, the CCC is authorized to use its general powers to "...increase the domestic consumption of agricultural commodities by expanding or aiding in the expansion of domestic markets...". Drawing upon that authority, the Secretary has indicated plans to propose a rule that would have CCC issue payments to bioenergy producers who increase their production of bioenergy beyond their historical production level. The proposed rule is now in development.

Such a program could have a number of beneficial effects. First, it could provide additional demand for the agricultural commodities used as feedstocks in the production of ethanol and biodiesel, raising farm prices and income. Second, the program could encourage development of processing plants, mostly located in rural areas, generating rural jobs and income from value-added products. Third, encouraging increased production capacity of biofuels would

make an important contribution toward enabling the petroleum industry to phase out MTBE as an additive in oxygenated gasoline. Finally, increasing biofuels production at this time demonstrates our determination to more fully develop domestic energy resources.

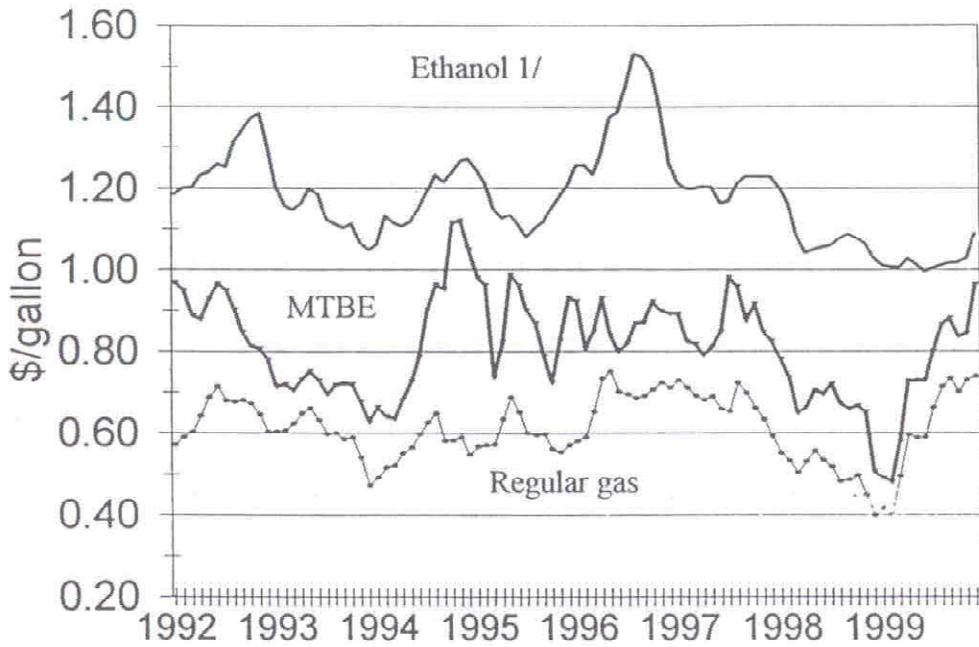
Other Initiatives to Expand Bioenergy and Bioproducts

Key issues regarding the expansion of renewable fuels have been the level and types of Federal activities and the coordination among the various Federal efforts. Such concerns were addressed by S. 935, the National Sustainable Fuels and Chemicals Act of 1999; the administration supports the goals of this legislation and appreciates the Committee's leadership on this issue. USDA and other agencies have been making strong efforts to improve cooperation and coordination. As you know, that was an objective of the President's Executive Order (E.O.) 13134 on Developing and Promoting Biobased Products and Bioenergy. Federal agencies, under the leadership of USDA and the Department of Energy, are taking steps to meet the requirements of the E.O. and the accompanying Presidential Memorandum.

To coordinate these activities within USDA, Secretary Glickman established the Biobased Products and Bioenergy Coordination Council which Under Secretary Gonzalez chairs. Roger Conway, Director of the Office of Energy Policy and New Uses from my office, is the Vice Chair. The Council promotes biobased product research, development, and commercialization through information sharing, implementation of strategic planning and providing policy advice for the Department. It is also developing a list of biobased products for use by Federal agencies and their procurement officials as directed by E.O. 13101.

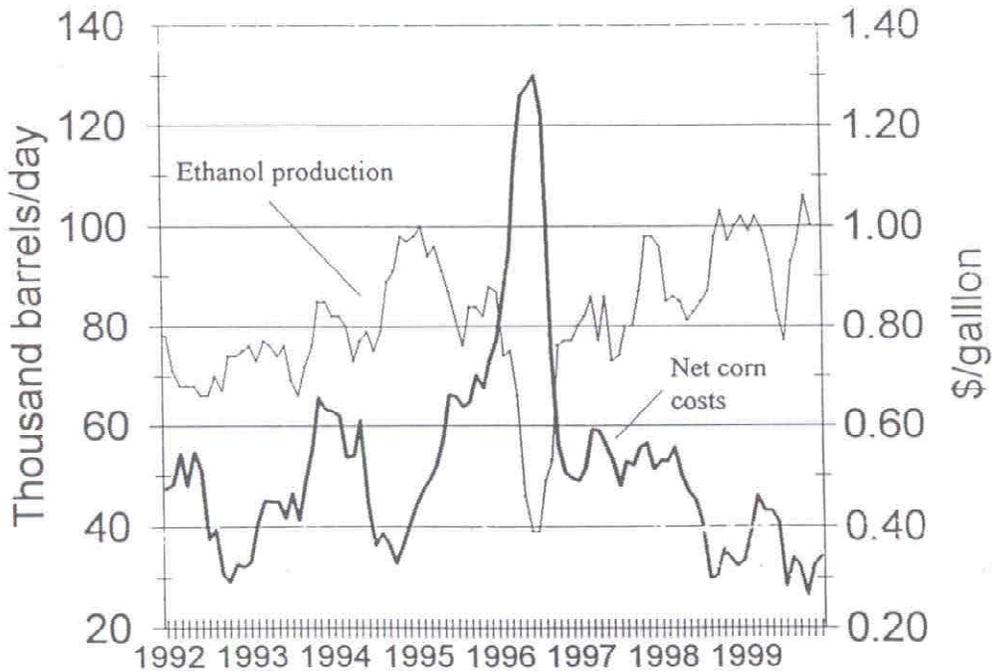
Mr. Chairman, that completes my testimony, and I will respond to any questions you or the other Members may have.

Fuel Prices



1/ Does not include tax incentive

Net corn cost of producing ethanol



Returns to Producing Ethanol

Wet milling

