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Perspectives on Potential Agricultural
and Budgetary Impacts From an Increased
Use of Ethanol Fuels

Statement for the Record of
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Before the
Committee on Ways and Means
House of Representatives



Mr. Chairman and Members of the Committee:

We are pleased to submit a statement for the record on the preliminary results of our work assessing potential agricultural and budgetary impacts from an increased use of ethanol fuels. Our work, based largely on the use of an econometric model, was performed in response to a request from the Chairman of the Subcommittee on Energy and Power, House Committee on Energy and Commerce, who asked us to assess the effects of expanded ethanol production on (1) the domestic ethanol industry, (2) the agricultural sector and consumer food prices, and (3) certain aspects of the federal budget. The Chairman requested this information to assist the Subcommittee in its consideration of recent legislative proposals that would increase the use of ethanol as a motor fuel or fuel blend and that, in turn, could significantly affect agriculture and other sectors of the economy. The Chairman has given us permission to release this information to the Ways and Means Committee. Because our work is not complete, the information contained in this statement is subject to change.

Our modeling and other analyses project that an expanded use of ethanol fuels would financially benefit some sectors of agriculture, increase consumer food costs, decrease federal farm program outlays, and reduce federal motor fuel tax revenues. Our study was not designed to reach conclusions on whether to extend the ethanol fuel tax exemption or the blenders income tax credit,

or on the other matters now before the Committee, and we are not taking a position on these matters. We believe, however, that our study provides important information that can be useful in the Committee's deliberations.

To assess the effects of increased ethanol production, and to meet our requester's informational needs, we developed two growth scenarios covering an 8-year period: a low-growth projection with ethanol production increasing to 2.2 billion gallons annually (about double the current 1 billion gallon per year capacity) and a higher-growth projection to 3.3 billion gallons annually (about triple the current capacity). We compared the low- and high-growth scenario projections with a baseline scenario that assumed normal crop production, a continuation of current agricultural trends and policies, and little expansion in ethanol production.

We used an econometric model in assessing the impacts that expanded ethanol production would have on the agricultural sector and consumer food prices. We assumed that the added ethanol production would occur--whether mandated by legislation, regulation, or other means--recognizing that current market conditions and government incentives are not likely to stimulate such growth. We did not determine the level of ethanol subsidy or the increase in fuel prices that would result under our scenarios. The growth in ethanol production required under our scenarios is less ambitious than that required under legislative proposals

introduced in the previous Congress. We estimate that our high-growth scenario could provide about one-third of the alternative fuel needed to meet the requirements of the administration's current Clean Air Act proposal. Efforts to stimulate a large scale expansion could raise ethanol feedstock production costs to a point that ethanol could not compete with other fuels.

Our study showed the following:

- There are no technological impediments to increasing the domestic ethanol industry's production capacity to 2.2 billion or 3.3 billion gallons per year over the next 8 years, and American farmers could supply the corn needed to make that much ethanol. Industry officials, however, have cautioned that continued government incentives would be needed to maintain such growth.

- An expanded use of ethanol fuels would have mixed effects on various sectors of American agriculture. Corn producers would benefit from the increased demand for corn to make ethanol and the resulting higher corn prices. However, soybean processors and producers would face lowered demand and prices for their products because the conversion of corn into ethanol also generates protein-rich feed by-products that compete with soybean meal and soy oil in the animal feed and vegetable oil markets. Increases in corn

feed costs could hurt cattle producers, but the lower cost of high-protein feeds could benefit poultry producers. Overall net farm cash income would increase, but not in all sectors.

-- The impact of expanded ethanol production on agriculture would also cause a slight increase in consumer food prices. However, our study did not explore the impact of our scenarios on consumer fuel prices or the impact of the fuel price changes on the overall consumer price index.

-- Expanded ethanol production, as shown by our high-growth model simulation, would decrease federal farm program outlays by an average of about \$1.4 billion per year. On the other hand, the increased use of ethanol fuels--to the levels of our high-growth scenario--could further reduce federal motor fuel tax revenues by an average of about \$813 million per year. Our study did not explore all impacts of expanded ethanol use on the federal budget. For example, we did not analyze changes in income tax revenues from farmers, ethanol producers, and oil companies that could result from an expanded ethanol industry.

ETHANOL'S USE AS A MOTOR FUEL

Ethanol is widely used in the United States as a gasoline additive--generally in a 10 percent ethanol, 90 percent gasoline blend called gasohol. Gasoline/ethanol blends currently account for about 8 percent of all motor fuel sold in the United States. When blended with gasoline, ethanol increases the fuel octane level and reduces carbon monoxide emissions from motor vehicles. Using ethanol-blended fuels can also improve the nation's energy security posture from the standpoint that our use of oil--about half of our daily needs are now imported--could be lessened. Straight (or neat) ethanol can also be used as a motor fuel replacement for gasoline--as it is in Brazil, where its use is heavily subsidized.

Our growth scenarios were developed before the introduction of the administration's June 1989 Clean Air Act amendment proposal, which provides for an increased use of alternative fuels to reduce automotive air pollution. Several alternative fuels, including ethanol, could possibly be used to meet the proposed requirements. Although the amount and type of alternative fuels that might be required has not been specified, in all likelihood no one fuel will be selected; rather, a combination of different fuels will be made available to consumers. We estimate that under our high-growth scenario, there would be enough ethanol--if used as a straight

(neat) fuel--to satisfy about one-third of the fuel requirements for the flexible fuel vehicles in the administration's proposal.

IMPACT ON ETHANOL PRODUCERS

There are no technological barriers to preclude the expansion of annual ethanol production to 2.2 billion or 3.3 billion gallons over the next 8 years, according to industry officials. The domestic ethanol industry currently has production capacity of about 1 billion gallons per year. In 1988, about 812 million gallons of ethanol were produced. About 95 percent of the ethanol is made from corn; in a typical growing year, about 4 to 5 percent of domestic corn production is used for ethanol. Corn is an attractive source for ethanol because of plentiful domestic supplies, good storage properties, and the valuable by-products--such as high-protein animal feeds and corn oils--that result from its conversion to ethanol. The ethanol industry, to a large extent, emerged from the corn processing industry, and some ethanol facilities are also used to produce corn sweeteners and starches.

According to industry officials and information we analyzed regarding past industry growth, the ethanol industry seems to have the know-how to build and the experience and resources to operate additional production facilities. Our high-growth scenario assumes that ethanol production capacity would grow by about 288 million gallons in each of the 8 years, which is in line with past industry

growth. Some of the added capacity would likely come from expanding existing plants or adding ethanol production to other corn processing plants, which, according to industry officials, are less costly options than building new facilities.

Compared to gasoline, however, ethanol costs more to produce and poses additional distribution problems. In growing to current capacity levels, the ethanol industry has relied on federal and state incentives--such as tax exemptions, tax credits, construction loan guarantees, and distributions of surplus federal grain--to remain competitive with producers of gasoline and other fuel additives. Ethanol blended with gasoline in a ratio of at least 10 percent ethanol is currently exempt from 6 cents of the 9-cent per-gallon federal excise tax on motor fuels.¹ This equates to a total exemption of 60 cents on each gallon of ethanol blended with gasoline. Also, an equivalent 60-cent per-gallon federal blenders income tax credit is available to fuel distributors that blend ethanol with gasoline for use as a motor fuel; the tax credit can be taken in lieu of the excise tax exemption. In addition, a proposed Department of Treasury regulation would extend the blenders credit to ethanol used as an ingredient in the manufacture of ETBE (ethyl tertiary-butyl ether)--a gasoline additive that will potentially provide an efficient, clean-burning fuel additive.

¹Exemption applies to alcohol (ethanol or methanol) but does not include alcohol made from natural gas, petroleum, or coal.

Industry officials told us that assurances for continued government incentives would be needed to sustain a doubling or tripling of current capacity. Without these incentives and/or a legislative requirement to use ethanol fuels, a major expansion of the ethanol industry would be unlikely, according to these officials.

IMPACT ON AGRICULTURE

To capture the widest range of impacts our ethanol growth scenarios could have on American agriculture, we used a large-scale econometric model of agriculture maintained by Wharton Econometric Forecasting Associates (the WEFA model). We selected the WEFA model because it could capture the interactions between major crop and livestock sectors and could estimate the impact on key variables such as the demand and prices for crops and livestock, farm income, consumer prices, and federal agricultural outlays. To the extent possible, our analysis captures the major quantifiable impacts of an expansion of ethanol production on agriculture sectors. However, some necessary simplifying assumptions were made to reduce the scale of our analysis to a more manageable size.

Our model showed that the expansion of domestic ethanol production would have a mixed impact on American agriculture. Based on our model simulations, the corn sector--which is the primary source of ethanol feedstock--would be the sector most

affected by expanding ethanol production. However, through a complex system of economic relationships, other agricultural sectors would also be affected--some positively and some negatively.

According to our model, corn farmers would benefit as the demand for and prices of corn would increase. The initial demand for corn to make ethanol would increase under our high-growth scenario, reaching nearly a billion bushels per year at the end of our 8-year simulation period. However, this increase would be partially offset as higher corn prices trigger a reduction in the corn demanded for livestock feed or for export. With these offsets, our model shows that the net increased demand for corn would be about 540 million bushels by 1997. As increased prices make corn a relatively more profitable crop, farmers would respond by planting corn on idle land and switching other crop acreage (mainly soybean acreage) into corn production. The average corn prices, over our low- and high-growth simulation periods, would increase by about 12 cents and 22 cents per bushel, respectively.

Our model showed that increased ethanol production would have a small but mixed impact on other feed grains, such as sorghum, barley, and oats, and that the overall price of these other feed grains would increase by about 2 cents per bushel. Other feed grains could also be used, to a very limited extent, to make ethanol. The net impact of increased ethanol production on the

demand for and price of other feed grains would likely be different if these grains were also used to make ethanol.

Soybean producers would be adversely affected by the lower demand for and price of soybeans because soybean meal and soybean oil would face increased competition from ethanol production by-products in the high-protein animal feed and vegetable oil markets. Soybean meal is commonly used as a high-protein animal feed supplement. Our high-growth model results showed that, with reduced demand for soybean processing, the average price of soybeans would decrease by about 6 percent. Soybean production would also decline as soybean growers, faced with lower soybean prices and higher corn prices, switch acreage to corn. The negative impact of lower soybean prices would be less on those farmers who switch acreage from soybean to more profitable grains; however, some soybean farmers--especially those outside the Corn Belt²--may be unable to shift acreage.

Corn and other feed grains account for about half the feed used in livestock operations. Thus, the higher corn prices would increase cattle producers' feed costs and lower their profits. Our model simulation showed that, faced with higher feed costs, livestock producers would reduce the size of their herds and put fewer cattle on feed. Higher feed grain prices would also trigger

²The Corn Belt states include Illinois, Iowa, Indiana, Missouri, and Ohio.

reductions in the number of hogs on feed and held for breeding. On the other hand, to the extent that high-protein ethanol by-products can be used in poultry feeding, poultry producers, responding to the lower feed prices, would increase their production of turkeys and chickens.

Our model simulations showed that overall net farm cash income would increase by an average of about 1.3 percent under our high-growth scenario. Increased cash income from crops would more than offset small decreases in cash income from livestock and some higher cash expenses. Federal farm support programs are intended to insulate farmers from market price changes; therefore, changes in farm cash income are partially offset by reduced program payments as crop income increases and by higher payments when crop income declines.

Consumers would face slightly higher food prices because of these agricultural impacts. Increased production of ethanol would have a small impact on the overall food component of the consumer food price index, raising it by an average of about 0.1 percent under our high-growth model projections, although some individual food indexes would increase more. The consumer price index for meat, poultry, and fish products would increase by an average 0.28 percent, and for cereal and bakery products, by an average 0.21 percent.

We should caution the Committee that modeling complex economic relationships, such as those existing in the agriculture sector, is subject to great uncertainty, especially when models deal with events such as large-scale increases in the demand for corn. Our modeling results provide insights into the interaction of various agriculture sectors and the general order of magnitude of change associated with these sectors only for the period under study. The results should not be considered as exact predictions. Any change in assumptions, such as timing and size of the industry expansion, prevailing market or weather conditions, government agricultural policies, or farmers' responses to these policies could materially affect the final results and estimates of the model. For example, in our model we assumed that provisions of the current (1985) farm program legislation remained in place over our 8-year simulation period. The 1990 farm bill, coming before the Congress this year, could result in changes to the programs and materially affect our model projections.

IMPACT ON FEDERAL BUDGET

To assess the implications of expanded production and use of ethanol fuels on the federal budget, we (1) used the WEFA model to estimate the impact on federal farm program outlays and (2) developed information to show the amount of motor fuel taxes that might be lost if production were expanded to 2.2 billion and 3.3 billion gallons over our 8-year growth period. The expanded use of

ethanol fuels could also affect other federal outlays and revenues, such as highway expenditures and tariff and income tax revenues. We did not consider these or other outlays and revenues in our analyses.

Farm Support Program Impacts

Our model showed reductions in federal outlays for farm support programs that would average about \$900 million and \$1.4 billion per year, respectively, under our low- and high-growth simulations. The cumulative outlay reductions over the 8-year period would total about \$7.4 billion and \$11.4 billion, respectively. With more ethanol produced, the demand for and price of corn would increase, causing fewer farmers to participate in farm support programs, fewer farmers to default on their commodity loans, and deficiency program and acreage diversion program payments to decrease.

Changes in either our model's baseline projections for the crop prices (especially for corn) or the provisions of federal agriculture programs, over the simulation period, could substantially affect the estimated outlay reductions. For example, a separate simulation of our high-growth scenario using "target prices" fixed at their 1990 level (instead of dropping as in our basic model simulation) showed outlay reductions averaging about \$3.5 billion per year over the 8-year simulation period--cumulative

reductions of about \$28 billion. On the other hand, a more rapid decline in target prices than shown in our base-line would limit the potential for program outlay savings.

Federal Motor Fuel Tax Impacts

The federal government collects about \$9.5 billion in motor fuel excise taxes annually. The 6-cent per-gallon tax exemption on ethanol fuel blends reduced 1988 motor fuel tax revenues by an estimated \$450 million. For our study, we assumed that the current 6-cent exemption was available throughout our simulation period. Our analysis of potential tax exemption impacts showed that, under our baseline projection, the annual tax revenue losses would reach \$530 million at the end of 8 years. We estimate that a continuation of ethanol's tax exemption could further reduce tax revenues by an annual average \$440 million and \$813 million, respectively, over the 8-year low- and high-growth scenarios. Foregone annual fuel tax revenues would increase to about \$1.3 billion and \$2 billion, respectively, at the end of our simulation period when the use of ethanol fuels would reach 2.2 and 3.3 billion gallons per year.

Annual Budgetary Impacts

Our modeling simulates a transition to the expanded use of ethanol fuels over an 8-year period--up through 1997--and we are

not projecting impacts beyond that point. Our analysis of tax revenue impacts reflects a consistent buildup in ethanol production and use over the 8-year period and, therefore, a consistent decrease in tax revenues. Our model simulations showed that reductions in farm program outlays would differ from year to year, depending primarily on the relationship among market prices, target prices, and loan rates. For example, our analyses showed that in the final year of our projection (1997), farm program outlay reductions would exceed ethanol tax revenue losses by about \$2.7 billion. Whether the reductions in outlays would continue in follow-on years is speculative and would depend on all prices and other variables staying at 1997 levels.

We should state here that the above reductions in federal outlays and tax revenue losses are but two monetary impacts on the federal budget that could result from an expanded use of ethanol. There are many other possible budgetary impacts, outside the scope of our study, that preclude an overall budget impact assessment, such as changes in income tax revenues from farmers, ethanol producers, and the petroleum industry.

OBSERVATIONS

Our study was not designed to reach conclusions on whether to extend the ethanol fuel tax exemption or the blenders income tax credit, and we are not taking a position on these matters. We

believe, however, that our study provides important information that can be useful in the Committee's deliberations on these tax issues. However, a number of other issues also need to be factored into the debate. For example, there are important environmental, energy security, and economic growth consequences attributable to the use of ethanol as a fuel or a fuel blend, which were not addressed in our study. Some of these issues are also being addressed under separate legislative proposals now before the Congress, such as the amendments to the Clean Air Act and the 1990 farm bill. The Committee may wish to consider the interrelationships of all these issues in its deliberations on the ethanol tax questions.