An Economic Analysis of Legislation for a Renewable Fuels Requirement for Highway Motor Fuels

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EXECUTIVE SUMMARY

Congress is considering legislation that would require motor vehicle fuel sold in the United States to contain a minimum renewable content. This legislation would provide for the energy security of the United States and promote environmental quality by enhancing the use of motor vehicle fuels from renewable sources. Renewable fuels include biodiesel, ethanol or any other liquid fuel produced from biomass or biogas. Precise estimates of the minimum quantity guidelines are a current topic of discussion. This study assumes that the minimum percentage by volume of renewable fuel content of motor vehicle fuel would increase from 1.2 percent in 2002 to four percent by 2016.

Using current long-term U.S. Department of Energy projections for highway energy use as a baseline,[1] renewable fuel use in the United States would increase from current levels of about 1.9 billion gallons to more than 8.8 billion gallons by 2016. As shown in Figure 1, the majority of renewable fuel would be accounted for by ethanol produced from grain, however, biodiesel is expected to account for about 15 percent of total renewable fuel use by 2016. There will likely be additional gallons of ethanol produced from cellulose conversion as that technology is commercialized. The expansion of renewable fuels in the American motor fuel supply will provide significant benefits to energy security, the agricultural sector, and the overall American economy:

- Increasing the use of renewable fuels to four percent by volume of motor vehicle fuel would displace the annual equivalent of 302 million barrels of crude oil by 2016, or nearly 2.9 billion barrels of crude oil between 2002 and 2016. This

[1] *Annual Energy Outlook 2001 with Projections to 2020*. Report DOE/EIA-03833. Energy Information Administration, U.S. Department of Energy, Table 33, December 22, 2000.

would reduce America's dependence on imported oil to 65 percent by 2016 compared to the 70 percent projected by the Department of Energy.

- The displacement of imported crude oil by domestically produced renewable fuels would improve the U.S. trade deficit by $63.4 billion (1996 dollars) over the next 15 years.

- The renewable fuels industry will invest more than $10.5 billion (1996 dollars) on structures, machinery and equipment, and supplies needed to build new ethanol and biodiesel production plants and to expand existing facilities. Increased utilization of agricultural commodities used to produce renewable fuels will increase the value of agricultural final demand.

  - The combination of increased agricultural demand and new capital spending will add more than $300 billion (1996 dollars) to gross output in the American economy between 2002 and 2016. This is equivalent to nearly $238 billion (1996 dollars) of GDP over the next fifteen years.

  - Increased production and use of renewable fuels will create as many as 300,000 new jobs in all sectors of the economy by 2016.

  - Higher levels of gross output and job creation will generate an additional $71 billion (1996 dollars) of income for American consumers over the next 15 years.

- Increased use of renewable fuels will not result in a significant rise in consumer food prices. The Consumer Price Index for Food is projected to increase at an annual rate of 2.5 percent between 2002 and 2016, compared to an annual increase of 2.4 percent under the baseline. This means that as a result of increased demand for renewable fuels, food prices in 2016 as measured by the Consumer Price Index will be only 1.4 percent higher than baseline levels.

- Corn and soybeans are expected to remain the primary feedstocks for ethanol and biodiesel production respectively, over the next 15 years. However, increased use of wheat, barley, and sorghum is expected to boost the non-corn share of ethanol production from five percent to 12 percent by 2016 while an

increasing share of biodiesel production will come from other oils, including recycled soybean oil.

- Corn demand for ethanol production is projected to increase from 652 million bushels in 2002 to nearly 2.5 billion bushels by 2016. The soybean equivalent of the oil required for biodiesel production is projected to increase from 51 million bushels in 2002 to 318 million bushels by 2016. This higher level of demand can be met with only modest increases in planted area over the fifteen-year period. The total quantity of land planted to the eight major crops is projected to increase by an average of 1.3 million acres above baseline levels.

- The combination of increased utilization of ethanol and biodiesel production will result in higher crop prices. Farm-level corn prices are expected to increase 11.1 percent over the 2002 to 2016 period while soybean prices rise 11.8 percent. Reflecting a substantial increase in demand for biodiesel production, soybean oil prices will increase by an average 10 percent over baseline levels, however soybean meal prices are expected to fall as supplies increase as more soybeans are crushed.

- The impact of higher corn prices for livestock producers is expected to be largely offset by a combination of additional supplies of co-products of the dry and wet milling industries (e.g., distillers dried grains, corn gluten feed, and corn gluten meal) and lower prices for soybean meal. Consequently, the livestock and poultry sector will be only modestly affected by increased use of corn and soybeans for ethanol and biodiesel production.

- Farm income and the economies of the rural communities that support agriculture will receive a significant boost from increased renewable fuel demand. Increased demand for renewable fuels will put an additional $6.6 billion of net cash income in the pockets of American farmers annually over the next 15 years for a cumulative total of $99 billion by 2016.

- Taxpayers also will benefit from a minimum content requirement for renewable fuels as government outlays in the form of direct payments to farmers fall $7.8 billion between 2002 and 2016.

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Congress is considering legislation that would require motor vehicle fuel sold in the United States to contain a minimum renewable content. This legislation has its genesis in concerns for energy security, environmental quality, and the health of the farm and rural economy. The purpose of this study is to examine the broad implications of increased demand for renewable fuels consistent with current legislative proposals and how they would provide for the energy security of the United States and promote environmental quality by enhancing the use of motor vehicle fuels from renewable sources.

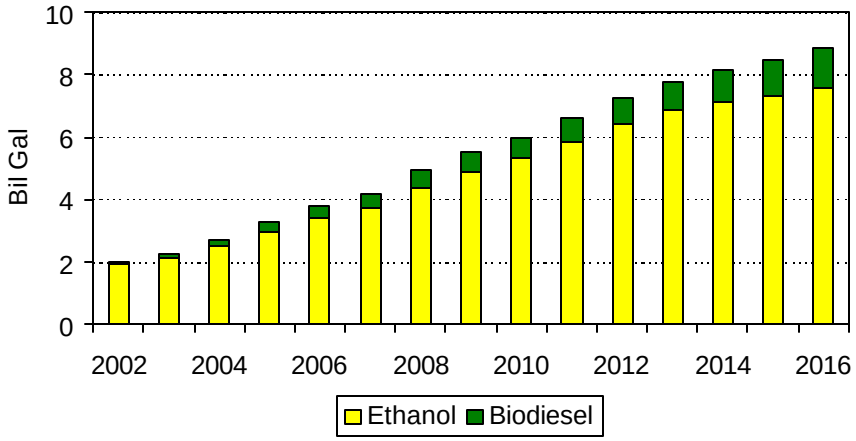
Background

Legislation under consideration would require motor vehicle fuel sold in the United States from 2002 onward to contain a minimum quantity of renewable fuel.[2] Renewable fuels include biodiesel, ethanol or any other liquid fuel produced from biomass or biogas. Precise estimates of the minimum quantity guidelines are a current topic of discussion. This study assumes that the minimum percentage by volume of renewable fuel content will increase from 1.2 percent in 2002 to four percent by 2016.

Using current long-term U.S. Department of Energy projections for highway energy use as a baseline,[3] renewable fuel use in the United States would increase from current levels of about 1.9 billion gallons to more than 8.8 billion gallons by 2016. As shown in Figure 1, the majority of renewable fuel would be accounted for by ethanol produced from grain, however, biodiesel is expected to account for about 15 percent of total renewable fuel use by 2016. There will likely be additional gallons of ethanol produced from cellulose conversion as that technology is commercialized.

[2] S. 670; S.892; S.1006, HR 2423.

Figure 1
Renewable Fuel Demand



Methodology

This analysis was based on the simulation of a large-scale multi-commodity model of the U.S. agricultural sector. An initial projection through 2016 was prepared to serve as a baseline against which the main provisions of legislation can be compared. The baseline projection was aligned to the U.S. Department of Agriculture July 2001 World Agriculture Supply and Demand Estimates. Assumptions for the United States and world macroeconomic environment were taken from the July 2001 Long-Term Economic Outlook prepared by Macroeconomic Advisers, LLC. These assumptions do not reflect the economic impacts and implications of the September 11 terrorist attacks on the World Trade Center and Pentagon. The baseline projection is predicated on current agricultural policy and makes no assumption regarding changes to policy through the projection period.

Imposing renewable fuel content requirements as an exogenous shock to the baseline, and solving the model for new equilibrium quantities and prices produced a scenario that incorporates the impacts of increased demand for agricultural commodities needed to produce ethanol and biodiesel. The detailed assumptions for corn and soybean demand for ethanol and

[3] *Annual Energy Outlook 2001 with Projections to 2020*. Report DOE/EIA-03833. Energy Information Administration, U.S. Department of Energy. Table 33. December 22, 2000.

biodiesel production are presented in Appendix Tables 1 and 2, and are discussed below. Summary tables that compare baseline values for supply, demand, and prices of major crops and livestock commodities and farm income are attached as Appendix Tables 3 through 7.

Results

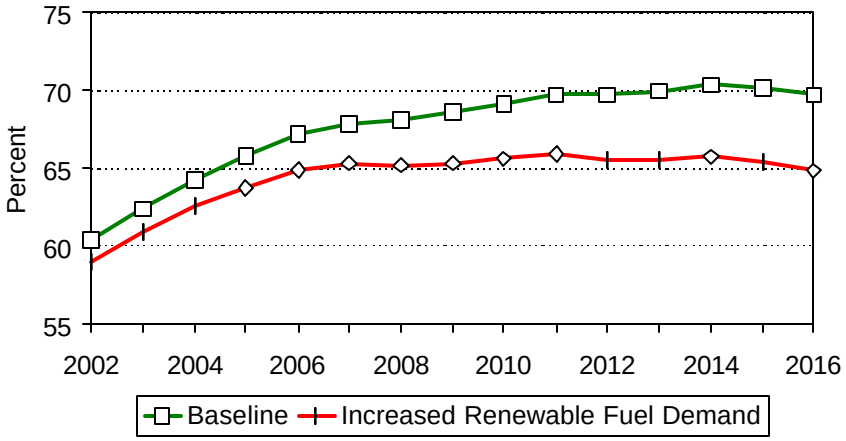
An increase in the demand for renewable fuels of the magnitude discussed above would have significant positive implications for energy security, the agricultural sector, and the economy.

Energy Security

Blending renewable fuel with gasoline and diesel reduces the amount of conventional petroleum-based motor vehicle fuel required to meet transportation needs. Since conventional gasoline and diesel are refined from crude oil, increased use of renewable fuel also reduces the amount of crude oil needed to supply refineries. According to the Energy Information Administration, imports account for about 60 percent of America's crude oil requirements. EIA currently projects U.S. dependence on imported crude oil to reach nearly 70 percent by 2016.

Increasing the use of renewable fuels in motor vehicle fuel would displace the annual equivalent of 302 million barrels of crude oil by 2016, or nearly 2.9 billion barrels of crude oil between 2002 and 2016. As shown in Figure 2, a renewable fuel requirement of four percent by volume of highway motor fuel by 2016 would lower America's dependence on imported oil, reducing the share of imports from 70 percent to 65 percent by 2016. The implications for the U.S. trade deficit of a reduction in oil imports of this magnitude are substantial. The displacement of 2.9 billion barrels of imported crude oil by domestically produced renewable fuels would reduce the U.S. trade deficit by $63.4 billion (1996 dollars) over the next 15 years.

Figure 2
Impact of Increased Renewable Fuel Use
on U.S. Crude Oil Import Dependency

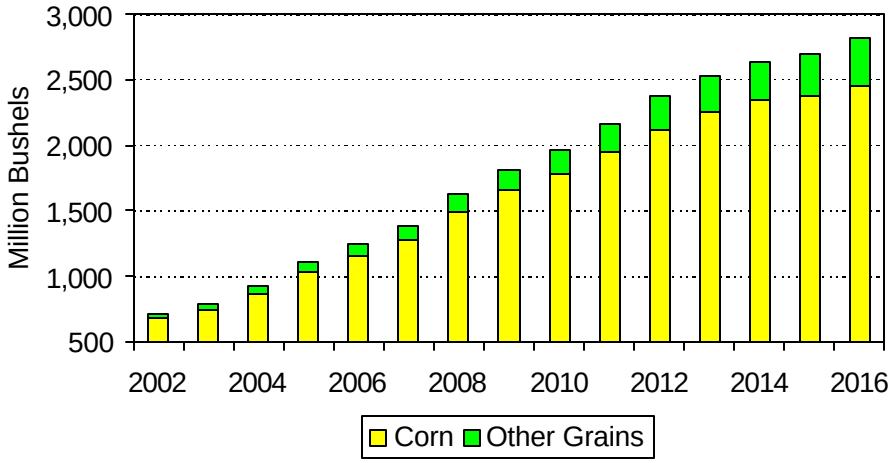


Agriculture Sector Implications

An increase in renewable fuel demand in the United States would have significant positive impacts on commodity prices, farm income, and government spending for agricultural support programs. Virtually all ethanol produced in the United States is made from grain, with corn the leading feedstock, while biodiesel is made mostly from soybean oil which is produced by crushing soybeans. The volume of renewable fuels required to meet the demand created by legislation will increase the amount of corn and other grains used for ethanol production and soybeans crushed for oil to produce biodiesel. This will provide a market-based incentive for increased production, draw down stocks, boost farm-level prices, reduce government spending on agriculture, and increase farm income.

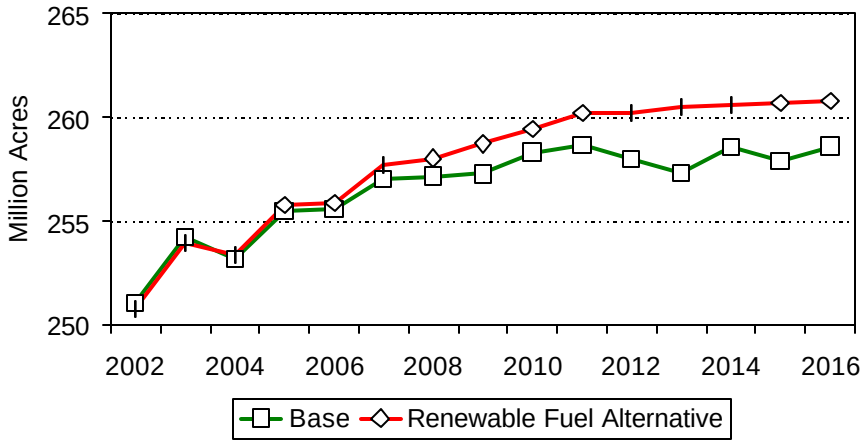
A renewable fuel requirement of four percent by volume of motor vehicle fuel by 2016 is expected to increase ethanol use from nearly two billion gallons in 2002 to 7.6 billion gallons by 2016. The quantity of corn and other grains required to produce the ethanol component of this renewable fuel requirement is shown in Figure 3. Corn is expected to remain the primary feedstock for ethanol production over the next 15 years, however, increased use of wheat, barley, and sorghum is expected to boost the non-corn share of ethanol production from five percent to 12 percent by 2016.

Figure 3
Grain Used for Ethanol Production



Increased demand for corn and other grains to produce ethanol and soybeans to produce biodiesel will increase prices and provide an incentive for farmers to bring idled and fallow land into production. As shown in Figure 4, the total quantity of land planted to the eight major crops is projected to increase from 251 million acres in 2002 to 261 million acres by 2016, an average of 1.3 million acres above baseline levels. Changes in relative profitability among crops are expected to result in increases in both corn and soybean acres that are partially offset by declines in wheat, small grains, and cotton over the projection period.

Figure 4
Planted Area, 8 Major Crops



Corn

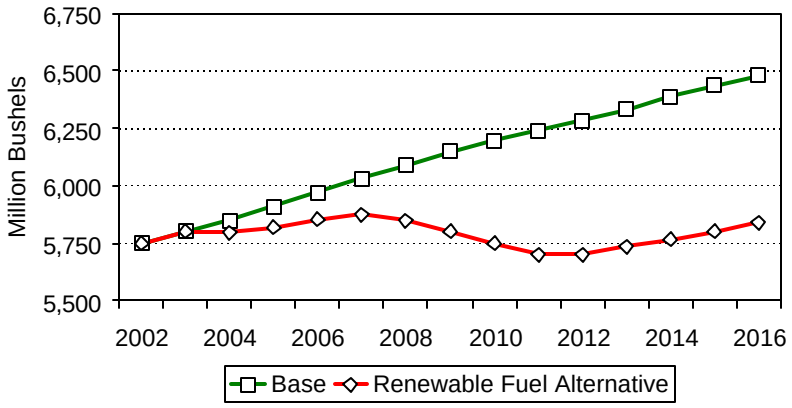
Corn is expected to remain the leading feedstock for ethanol production through 2016. As shown in Figure 3 above, increasing the renewable fuel requirement to four percent by volume of motor vehicle fuel use is expected to boost corn demand for ethanol production from 652 million bushels in 2002 to nearly 2.5 billion bushels by 2016. The initial impact of higher demand for ethanol production is increased corn prices. Planted acres, supply, and demand for feed, food, and exports all adjust to the change in prices. Increased demand for corn to produce ethanol will have several major impacts on the corn sector.

- Additional land will be bid into corn production, primarily from wheat, and, to a lesser extent, cotton. Although corn demand for ethanol production would triple over the next 15 years, the average number of acres planted to corn is projected to post a relatively small increase of 1.4 percent, or 1.1 million acres, between 2002 and 2016.

As depicted in Figure 5 feed demand for corn will decline substantially if ethanol production increases. However, the impact of this outcome on the livestock and poultry sector will be offset by a combination of additional corn co-products produced by both dry and wet milling of corn to produce ethanol (e.g., distillers dried grains (DDG), corn gluten feed, and corn gluten meal), and

lower prices for soybean meal caused by increased crushing of soybeans for biodiesel production. Important to remember is that using corn and other grains to produce ethanol does not eliminate the feed value of the grain. Ethanol production involves converting the starch content of the grain to sugar and alcohol. This process leaves the nutritional content of the grain -- including protein, vitamins, and fiber -- largely intact. Consequently, the co-products of ethanol production can be used for livestock feeding and are used by animal feeders as a protein supplement for dairy and beef cattle, swine, and sheep feed rations because they are an economical source of protein. Several factors affect the decision to use feed co-products such as DDG including the relative price of the feed component, palatability and efficiency gains, and transportation costs from plant to feeding location. Since most livestock and poultry diets are least-cost formulated, delivered price is a major consideration. Expansion of ethanol production is expected to increase the supply of DDG significantly over the next 15 years and keep its price favorable relative to grain and soybean meal. Reflecting this, increased renewable fuels demand is expected to reduce the utilization of corn for feed by 5.5 percent, or an average of 338 million bushels a year between 2002 and 2016.

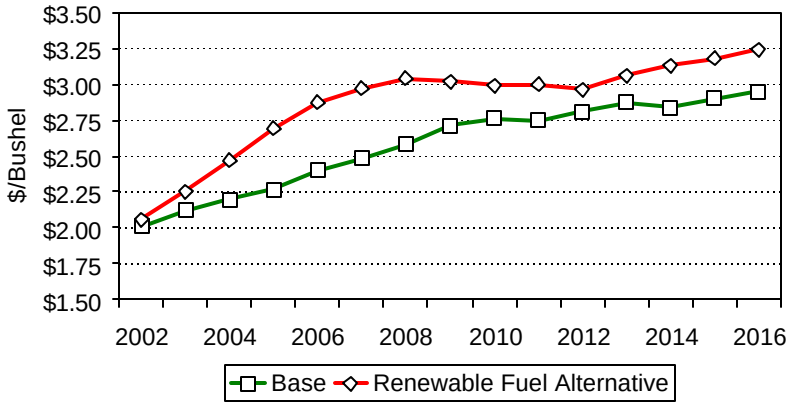
Figure 5
Corn Demand for Feed



- Increased demand for corn for ethanol production will reduce corn exports by an annual average of 230 million bushels, or 9.6 percent, between 2002 and 2016. Some of these exports of grain will be replaced by exports of DDG, corn gluten

feed, and corn gluten meal. The combination of increased utilization of corn for ethanol production and changes to supply and other demand components will result in lower average ending stocks and higher corn prices for American farmers over the projection period. As shown in Figure 6, the farm-level price of corn price is projected to average $2.86 per bushel over the fifteen-year 2002 to 2016 period, 11.1 percent above baseline levels.

Figure 6
Corn Average Price Received by Farmers

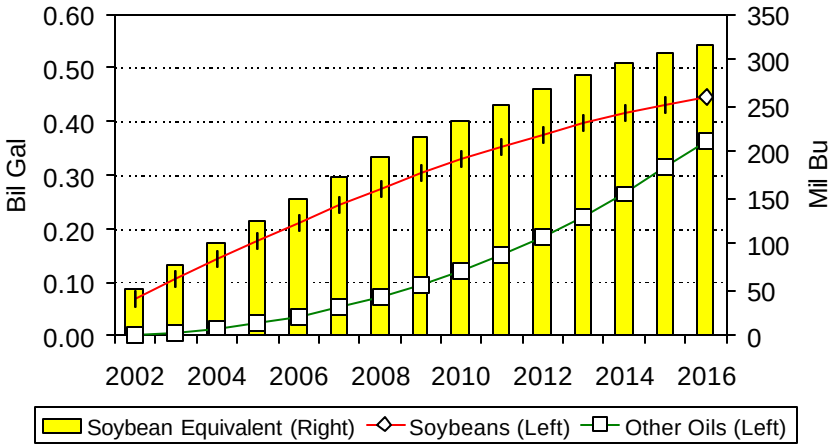


Soybeans

Biodiesel will be a major component of a new renewable fuel requirement. Based on biodiesel producer applications to the CCC Bioenergy program, 35 million gallons of biodiesel fuel were produced in the United States in 2001, virtually all produced from soybean oil. Crushing soybeans and other oilseeds produces oil that is used to make biodiesel fuel. Biodiesel use would increase to 809 million gallons over the next 15 years. The soybean equivalent of the oil required for biodiesel production is projected to increase from 51 million bushels in 2002 to 318 million bushels by 2016.

As shown in Figure 7, soybeans are expected to remain the predominant feedstock, although an increasing share of biodiesel production will come from other oils, including recycled soybean oil.

Figure 7
Biodiesel Produced from Soybeans and Other Oils

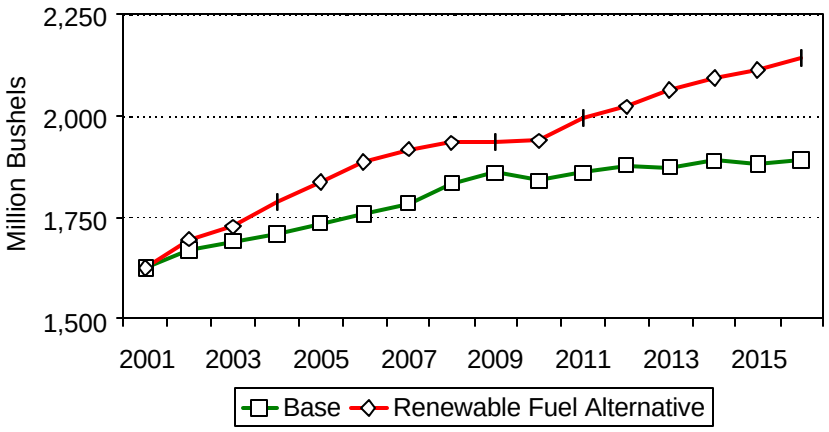


Increased crush demand for soybeans to produce biodiesel will have several major impacts.

- Additional land will be bid into soybean production, primarily from wheat and cotton. Increased renewable fuels demand is expected to increase the average number of acres planted to soybeans by 1.5 million acres, or 1.6 percent, between 2002 and 2016.

- The biodiesel use will require an additional 32 billion pounds of soybean oil over the entire 15-year period ending in 2016. As shown in Figure 8, this will necessitate a 7.1 percent average increase in soy crush demand over this period. Soybean crush demand will be 252 million bushels higher than would be the case with no renewable fuel requirement.

Figure 8
Soybean Crush Demand



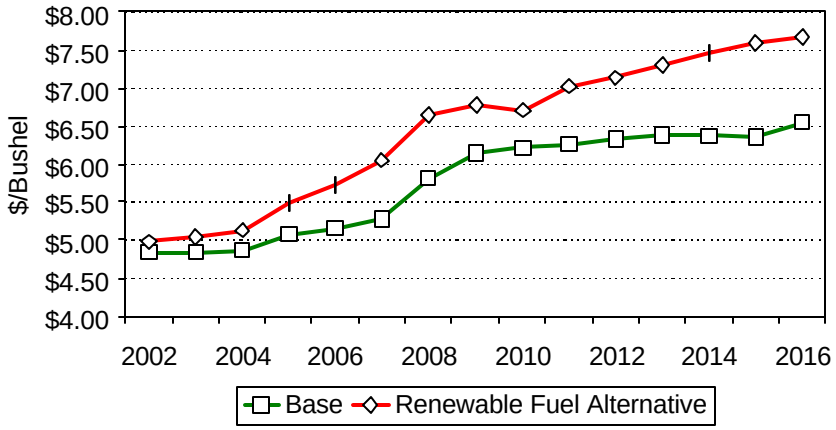
- Soybean oil prices are projected to increase by an average of 10 percent over baseline levels reflecting a substantial increase in demand for biodiesel. As a consequence of higher demand for soybean oil to produce biodiesel the average price of crude soybean oil between 2002 and 2016 is projected at 25.37 cents per pound compared to 23.07 cents per pound without a renewable fuel requirement.

- Increased crushing of soybeans to produce oil for biodiesel also will result in more soybean meal. Soybean meal output is projected to increase by almost three percent between 2002 and 2016. Soybean meal prices will be affected both by higher meal production and increased supplies of medium protein corn co-products such as DDG, which will increasingly compete with soy meal in livestock and poultry feed rations. As a consequence of this, the price of 48 percent protein soybean meal is projected to average $187.57 per ton over the 15-year 2002-2016 period, 8.7 percent below baseline levels.

- The combination of increased crush demand for soybeans to produce oil for biodiesel and changes to supply and other demand components will result in lower average ending stocks and higher soybean prices over the projection

period. As shown in Figure 9, the farm-level soybean price is projected to average $6.45 per bushel over the fifteen-year 2002 to 2016 period, 11.8 percent above baseline levels.

Figure 9
Soybeans, Average Price Received by Farmers



Livestock and Poultry

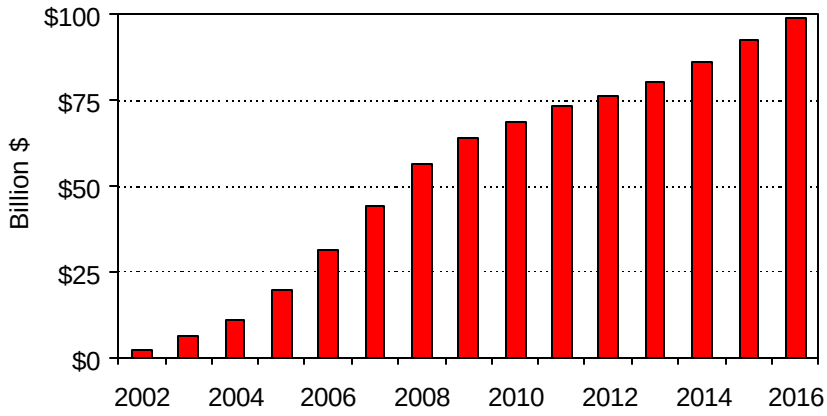
The livestock and poultry sector will only be modestly affected by increased use of corn and soybeans for ethanol and biodiesel production. Increased supplies and lower prices of DDG, corn gluten feed and gluten meal, and soybean meal will offset higher corn prices. Consequently, beef production is projected to decline 0.6 percent compared to baseline levels between 2002 and 2016. Pork production is projected to fall 3.1 percent and broiler output by 1.9 percent versus a market without additional renewable fuel use.

Lower livestock production prompted by higher grain and oilseed prices will result in higher livestock prices. The price of Nebraska Choice Steers is expected to average $72.07 per cwt, 5.9 percent above baseline levels. The price of Barrows and Gilts in seven major markets is projected to increase 8.3 percent to an average of $44.95 per cwt. The 12-city broiler price is expected to increase an average of 5.1 percent between 2002 and 2016.

Farm Income

Legislation to increase the content of renewable fuel in the nation's motor vehicle fuel supply will provide a significant boost to farm income and the economies of the rural communities that support agriculture in America. Increased demand for renewable fuels will put an additional $6.6 billion of net cash income in the pockets of American farmers annually over the next 15 years. Looked at another way, increased demand for renewable fuels will increase net farm cash income by nearly $100 billion by 2016.

Figure 10
Net Farm Cash Income
Cumulative Impact of Minimum Content Requirement for Renewable Fuels



Taxpayers will benefit as well as farmers from a minimum content requirement for renewable fuels. Grain, soybean, and cotton prices are projected to remain considerably above loan rate levels as a result of increased ethanol and biodiesel use. Consequently, the need for loan deficiency payments will be eliminated and requirements for other government cash payments will be reduced. Increased demand for renewable fuels will result in total savings from lower direct government payments to farmers of $7.8 billion between 2002 and 2016, with most of the savings occurring in the first half of the period.

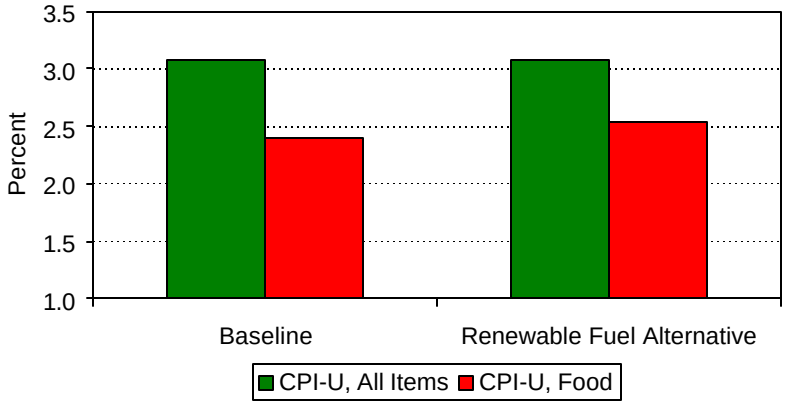
The impact of lower government payments and slightly higher cash expenses will be more than offset by increased revenue from marketings. The combination of increased marketing of grains and oilseeds resulting from demand for ethanol and biodiesel and higher crop prices is expected

to increase crop cash receipts by 7.4 percent over baseline levels between 2002 and 2016. When an average 2.5 percent increase in livestock receipts is included, increased renewable fuels use is projected to add $12.5 billion, or 4.8 percent, to average cash receipts over the next 15 years.

Consumer Food Prices

The farm value of agricultural commodities continues to decline as a share of consumer food prices. Indeed, processing, marketing and transportation costs account for a larger share of the consumer's food dollar. Consequently, increased demand for renewable fuels will not result in a significant rise in consumer food prices. Increased use of renewable fuels will boost demand for grains and oilseeds used to make ethanol and biodiesel. As discussed earlier, increases in demand will result in modestly higher prices for grains and oilseeds, and for livestock, poultry, and dairy products. However, continued declines in the farm share of the value of the consumer's food market basket will mute the effects of the modest rise in commodity prices over the next fifteen years. As shown in Figure 11, the Consumer Price Index for Food is projected to increase at an annual rate of 2.5 percent between 2002 and 2016, compared to an annual increase of 2.4 percent under the baseline. This means that as a result of increased demand for renewable fuels, food prices in 2016 as measured by the Consumer Price Index, will be only 1.4 percent higher than baseline levels.

Figure 11
Impact Increased Renewable Fuels Demand
on Consumer Food Prices
(Annual Growth 2002-2016)



Macroeconomic Impacts

The expansion of renewable fuel demand as outlined above will provide significant benefits to the American economy. The renewable fuels industry will invest more than $10.5 billion (1996 dollars) on structures, machinery and equipment, and supplies needed to build new ethanol and biodiesel production plants and to expand existing facilities. Additional investments in infrastructure will be made for pipelines, storage facilities and transportation infrastructure to handle the larger production of ethanol.

- The additional demand for agricultural commodities used to produce renewable fuels will stimulate production and increase commodity prices. Consequently, the value of agricultural final demand will increase thereby stimulating the demand for goods and services produced by other sectors of the economy.

The spending associated with increasing investment in renewable fuels production and higher agricultural output will stimulate aggregate demand, create new jobs, and generate additional household income. The gross output, household income, and job impacts were estimated by applying the most appropriate final demand multipliers calculated by the U.S. Bureau of

Economic Analysis (BEA) for output, earnings, and employment to the estimates of new capital spending and additional agricultural final demand.[4] The multipliers for the agriculture sector were used to estimate the impact from increased real agricultural final demand resulting from renewable fuels production. Although the production of renewable fuels from agricultural commodities represents output of the food processing (grain milling and soybean processing) industry, the most appropriate multipliers for new plant construction are those for the construction sector.

The estimates summarized below result from a static analysis of the impact of increasing renewable fuels demand and production on the American economy. That is, they reflect the combination of a series of snapshots of the economy rather than a dynamic flow analysis. The major economic benefits of increased renewable fuels demand include the following:

- The combination of increased agricultural demand and capital spending to build production capacity for renewable fuels will add almost $300 billion (1996 dollars) to gross output in the American economy between 2002 and 2016. Gross output represents the market value of an industry's production, including commodity taxes, and it differs from GDP.[5] Generally speaking, Gross Output is larger than GDP since it includes the value of intermediate goods and services, which are "netted out" of GDP.[6] Reflecting this difference, GDP is expected to grow by an additional $238 billion (1996 dollars) over the next fifteen years. The annual increases in gross output by source are detailed in Table 1.

[4] The multipliers used in this analysis are the current two-digit industry RIMS II multiplier estimated by the Bureau of Economic Analysis, U.S. Department of Commerce. The final demand multiplier for the agriculture and construction sectors are 3.259 and 3.282, respectively; the household income multipliers are 0.8469 and 1.0159; and the employment multipliers are 42.3 for agriculture and 35.0 for new construction.

[5] BEA description of Gross Output taken from www.bea.doc.gov/bea/dn2/readgo.htm

[6] A review of BEA published estimates of Gross Output and GDP by industry for 1999 indicates that Gross Output for all non-manufacturing industries totaled $9,261.6 billion (1996 dollars) in 1999 while real GDP for those same industries was estimated at $7,346 billion. Using this as a guide, the value of real GDP for the entire economy is approximately 80 percent of the value of total Gross Output.

Table 1
Impact of Increased Renewable Fuels Demand on Gross Output
(Million 1996 $)

	Additional Renewable Fuel Output (Mil gal)	New Investment Spending (Mil 96$)	Additional Agricultural Final Demand (Mil 96$)	Gross Output		
				Investment Spending (Mil 96$)	Ag Final Demand (Mil 96$)	Total (Mil 96$)
2002	160	$240	$1,041	$786	$3,390	$4,177
2003	247	$370	$2,486	$1,216	$8,098	$9,314
2004	450	$675	$3,869	$2,215	$12,605	$14,820
2005	553	$829	$5,743	$2,721	$18,711	$21,432
2006	473	$709	$7,191	$2,327	$23,427	$25,754
2007	436	$654	$7,304	$2,146	$23,796	$25,942
2008	744	$1,116	$7,972	$3,661	$25,973	$29,634
2009	564	$847	$5,512	$2,779	$17,958	$20,737
2010	493	$739	$4,690	$2,425	$15,279	$17,704
2011	637	$955	$5,426	$3,134	$17,677	$20,811
2012	639	$958	$4,561	$3,146	$14,861	$18,007
2013	508	$762	$5,469	$2,500	$17,818	$20,318
2014	396	$594	$6,355	$1,949	$20,706	$22,654
2015	264	$396	$6,707	$1,301	$21,853	$23,154
2016	414	$620	$6,570	$2,036	$21,405	$23,441
2002-16	6,976	$10,463	$80,895	$34,341	$263,557	$297,898

- New jobs will be created as a consequence of a higher rate of economic activity. As shown in Table 2, the increase in gross output (final demand) resulting from construction of new capacity, the production and use of renewable fuels and increased final demand for agricultural products described above will support the creation of nearly 300,000 new jobs in all sectors of the economy by 2016.

- Increased economic activity and new jobs will result in higher levels of real income for American households. Increased production and use of renewable fuels will put an additional $71.1 billion (1996 dollars) into the pockets of American consumers over the next 15 years. The impact of increased renewable fuels demand on household income is shown in Table 3.

Table 2
Impact of Increased Renewable Fuels Demand on Total Employment

	Investment Spending (Jobs)	Ag Final Demand (Jobs)	Total (Jobs)
2002	8,386	44,016	52,402
2003	12,963	105,142	118,105
2004	23,626	163,651	187,277
2005	29,016	242,934	271,950
2006	24,811	304,168	328,979
2007	22,886	308,952	331,837
2008	39,043	337,223	376,265
2009	29,634	233,157	262,791
2010	25,861	198,371	224,233
2011	33,418	229,510	262,928
2012	33,545	192,951	226,496
2013	26,659	231,343	258,002
2014	20,780	268,829	289,609
2015	13,873	283,722	297,595
2016	21,716	277,909	299,624

Table 3
Impact of Increased Demand for Renewable Fuels
on Real Household Income
(Million 1996 $)

	Investment Spending (Mil 96$)	Ag Final Demand (Mil 96$)	Total (Mil 96$)
2002	$243	$881	$1,125
2003	$376	$2,105	$2,481
2004	$686	$3,277	$3,962
2005	$842	$4,864	$5,706
2006	$720	$6,090	$6,810
2007	$664	$6,186	$6,850
2008	$1,133	$6,752	$7,885
2009	$860	$4,668	$5,528
2010	$751	$3,972	$4,722
2011	$970	$4,595	$5,565
2012	$974	$3,863	$4,837
2013	$774	$4,632	$5,406
2014	$603	$5,382	$5,985
2015	$403	$5,680	$6,083
2016	$630	$5,564	$6,194
2002-16	$10,630	$68,510	$79,140

Conclusion

Farmers, consumers, and taxpayers will directly benefit from legislation that would increase the renewable content of motor vehicle fuel used in the United States.

- Farmers will benefit from the development and steady growth of a significant base of domestic demand for grains, oilseeds, and other crops that would result in higher prices and revenues from marketings. Legislation to increase the content of renewable fuels in the nation's motor fuel supply will put an additional $6.6 billion of net cash income in the pockets of American farmers annually over the next 15 years.

- Taxpayers will benefit because improved demand and prices for grains will reduce the amount of taxpayer dollars needed for direct government payments to farmers.

- Consumers will benefit as domestically produced renewable fuels displace imported crude oil thereby reducing America's dependence on imports from an increasingly unstable region of the world. Producing and using renewable fuels can displace expensive imported oil thereby reducing America's dependency on imports from an increasingly unstable region of the world. Relying on renewable fuels for an increasing share of our transportation fuel requirements means that every acre of land that produces biomass used to make a renewable fuel ethanol becomes an oil patch that never runs dry. The direct economic consequence of this will include a reduction in the nation's trade deficit by $63.4 billion (1996 dollars) by 2016.

- Increased production and use of renewable fuels will create as many as 300,000 new jobs in all sectors of the economy by 2016.

- The combination of increased output and job creation will generate an additional $71 billion (1996 dollars) of income for American consumers over the next 15 years.

Appendix Table 1
Ethanol Demand Assumptions

	Highway Energy Use /1 (Bil Gal)	Renewables as % of Highway Use (%) /2	Renewable Use /3 (Bil Gal)	Biodiesel (Bil Gal)	Biodiesel Ethanol Equiv	Ethanol Use (Bil Gal)	Ethanol From Corn (Pct)	Ethanol From Corn /4 (Mil Bu)
2000	162.6	1.0%	1.690	0.034	0.052	1.637	95%	576
2001	167.7	1.1%	1.867	0.035	0.054	1.813	95%	638
2002	172.7	1.2%	2.026	0.073	0.112	1.914	95%	670
2003	176.1	1.3%	2.273	0.113	0.173	2.100	94%	731
2004	179.6	1.5%	2.723	0.155	0.238	2.486	94%	861
2005	183.3	1.8%	3.276	0.200	0.306	2.970	93%	1,023
2006	187.1	2.0%	3.749	0.247	0.378	3.370	93%	1,155
2007	190.5	2.2%	4.185	0.296	0.453	3.731	92%	1,271
2008	193.8	2.5%	4.928	0.347	0.531	4.398	92%	1,490
2009	197.0	2.8%	5.493	0.398	0.609	4.884	91%	1,646
2010	199.9	3.0%	5.985	0.452	0.691	5.295	91%	1,775
2011	202.7	3.3%	6.622	0.506	0.774	5.848	90%	1,949
2012	206.4	3.5%	7.261	0.561	0.858	6.403	90%	2,122
2013	210.1	3.7%	7.769	0.619	0.948	6.821	89%	2,248
2014	213.9	3.8%	8.164	0.681	1.041	7.123	89%	2,335
2015	217.7	3.9%	8.429	0.744	1.139	7.290	88%	2,376
2016	221.6	4.0%	8.842	0.809	1.238	7.605	88%	2,464

NOTES:

1. Annual Energy Outlook 2001 with Projections to 2020, Table 33. Transportation Sector Energy Use by Mode and Type (tril btu).

2. Assumption.

3. Converted from btu at 83,961 btu per gallon (taken from Shapouri, H,. Duffield, J., Graboski, M. "Estimating the Net Energy Balance of Corn Ethanol" USDA/ERS. AER 721, July 1995.

4. Ethanol yield: 2.7 gal/bu.

Appendix Table 2
Biodiesel Demand Assumptions

BIODIESEL DEMAND

	Hwy Diesel Use /5 Lt Duty Vehicles (Tril btu)	Hwy Diesel Use /5 Freight Trucks (Tril btu)	Hwy Diesel Use /5 Transit Busses (Tril btu)	Hwy Diesel Use /5 Inter-City Busses (Tril btu)	Hwy Diesel Use /5 School Busses (Tril btu)	Hwy Diesel Use /5 Total Highway (Tril btu)	Hwy Diesel Use /6 (Bil gal)	Biodiesel Blend /7 (Pct)	Biodiesel Volume (Bil gal)	Biodiesel from Soybeans (Pct)	Biodiesel from Soybeans (Bil gal)	Soybean Oil Equiv /8 (Bil lb)	Soybean Equiv (Mil Bu)	Ethanol Equiv /9 (Bil gal)
2000	217.7	4,179.9	83.2	23.6	68.4	4,572.8	34.125	0.1%	0.034	100.0%	0.034	0.256	24.4	0.052
2001	258.6	4,284.9	83.6	23.7	68.7	4,719.5	35.220	0.1%	0.035	100.0%	0.035	0.264	25.2	0.054
2002	299.3	4,431.5	84.0	23.9	69.1	4,907.7	36.625	0.2%	0.073	97.0%	0.071	0.533	50.8	0.112
2003	338.2	4,547.9	84.4	24.0	69.4	5,063.9	37.790	0.3%	0.113	94.0%	0.107	0.799	76.1	0.173
2004	379.0	4,643.2	84.8	24.1	69.8	5,200.9	38.813	0.4%	0.155	91.0%	0.141	1.060	100.9	0.238
2005	419.7	4,759.8	85.2	24.2	70.1	5,359.0	39.992	0.5%	0.200	88.0%	0.176	1.320	125.7	0.306
2006	462.5	4,881.4	85.5	24.3	70.3	5,523.9	41.223	0.6%	0.247	85.0%	0.210	1.577	150.2	0.378
2007	506.3	4,985.6	85.7	24.3	70.5	5,672.3	42.330	0.7%	0.296	82.0%	0.243	1.822	173.6	0.453
2008	547.3	5,079.7	85.9	24.4	70.6	5,808.0	43.343	0.8%	0.347	79.0%	0.274	2.054	195.7	0.531
2009	586.7	5,158.7	86.0	24.4	70.7	5,926.6	44.229	0.9%	0.398	76.0%	0.303	2.269	216.1	0.609
2010	624.4	5,244.7	86.0	24.4	70.7	6,050.2	45.151	1.0%	0.452	73.0%	0.330	2.472	235.4	0.691
2011	659.2	5,320.0	85.9	24.4	70.7	6,160.3	45.972	1.1%	0.506	70.0%	0.354	2.655	252.8	0.774
2012	691.6	5,391.3	85.8	24.4	70.6	6,263.7	46.744	1.2%	0.561	67.0%	0.376	2.819	268.4	0.858
2013	722.8	5,480.1	85.7	24.3	70.5	6,383.5	47.638	1.3%	0.619	64.0%	0.396	2.973	283.1	0.948
2014	754.3	5,579.5	85.6	24.3	70.4	6,514.2	48.613	1.4%	0.681	61.0%	0.415	3.114	296.5	1.041
2015	783.0	5,684.5	85.5	24.3	70.3	6,647.5	49.608	1.5%	0.744	58.0%	0.432	3.237	308.3	1.139
2016	809.2	5,785.6	85.3	24.2	70.2	6,774.6	50.556	1.6%	0.809	55.0%	0.445	3.337	317.8	1.238

NOTES:

5. Annual Energy Outlook 2001 with Projections to 2020, Table 34.
6. Converted from btu at 134,000 btu/gal
7. ASA assumption
8. Converted using 7.5 lb soybean oil = 1 gal biodiesel
9. Converted using ratio of DOE high energy values (128,340 diesel oil / 84,100 ethanol = 1.53)

Appendix Table 3
Impact of a Minimum Renewable Fuels Content Requirement on Crop Supply

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2002-16 Avg
Planted Area, 8 Major Crops (Mil)																
Baseline estimates	251.0	254.2	253.2	255.5	255.6	257.0	257.1	257.3	258.3	258.7	258.0	257.3	258.5	257.9	258.6	256.6
Renewable Alternative	250.7	253.9	253.4	255.8	255.9	257.7	258.0	258.7	259.4	260.2	260.3	260.5	260.6	260.7	260.8	257.8
Difference from baseline	-0.1%	-0.1%	0.1%	0.1%	0.1%	0.3%	0.3%	0.6%	0.4%	0.6%	0.9%	1.2%	0.8%	1.1%	0.8%	0.5%
Corn Planted Area (Mil ac)																
Baseline estimates	76.1	78.3	79.2	80.2	80.1	80.7	80.6	80.4	80.4	80.9	80.5	80.4	81.7	81.4	80.9	80.1
Renewable Alternative	76.1	78.3	79.2	80.7	80.6	81.2	81.8	82.1	82.2	82.4	82.6	82.7	82.8	82.9	83.0	81.2
Difference from baseline	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	1.5%	2.1%	2.2%	1.9%	2.6%	2.9%	1.4%	1.8%	2.6%	1.4%
Soybean Planted Area (Mil ac)																
Baseline estimates	75.7	75.5	74.0	74.7	74.9	75.2	75.3	75.5	75.8	76.0	76.2	75.3	75.2	74.9	75.3	75.3
Renewable Alternative	75.7	75.5	74.5	75.2	75.7	76.5	76.4	76.7	77.0	77.4	77.6	77.9	78.2	78.5	78.8	76.8
Difference from baseline	0.0%	0.0%	0.7%	0.7%	1.1%	1.7%	1.5%	1.6%	1.6%	1.8%	1.8%	3.5%	4.1%	4.8%	4.6%	2.0%
Corn Production (Mil bu)																
Baseline estimates	9,480	9,871	10,112	10,368	10,482	10,689	10,805	10,906	11,034	11,231	11,428	11,544	11,855	11,949	12,006	10,917
Renewable Alternative	9,480	9,871	10,112	10,432	10,548	10,756	10,965	11,136	11,281	11,440	11,726	11,874	12,022	12,170	12,318	11,075
Difference from baseline	0.0%	0.0%	0.0%	0.6%	0.6%	0.6%	1.5%	2.1%	2.2%	1.9%	2.6%	2.9%	1.4%	1.8%	2.6%	1.4%
Soybean Production (Mil bu)																
Baseline estimates	2,944	3,024	2,989	3,044	3,078	3,115	3,147	3,182	3,221	3,256	3,291	3,278	3,298	3,313	3,357	3,169
Renewable Alternative	2,944	3,024	3,010	3,064	3,111	3,168	3,193	3,232	3,272	3,316	3,351	3,392	3,432	3,473	3,513	3,233
Difference from baseline	0.0%	0.0%	0.7%	0.7%	1.1%	1.7%	1.5%	1.6%	1.6%	1.8%	1.8%	3.5%	4.1%	4.8%	4.6%	2.0%
Soy Meal Production (thou tons)																
Baseline estimates	39,883	40,364	40,844	41,445	42,046	42,646	43,848	44,449	43,968	44,449	44,929	44,809	45,170	44,953	45,194	43,266
Renewable Alternative	40,488	41,254	40,888	41,983	43,167	43,864	44,165	44,226	44,256	45,496	46,190	47,200	47,853	47,911	48,626	44,504
Difference from baseline	1.5%	2.2%	0.1%	1.3%	2.7%	2.9%	0.7%	-0.5%	0.7%	2.4%	2.8%	5.3%	5.9%	6.6%	7.6%	2.9%
Soy Oil Production (mil lbs)																
Baseline estimates	18,783	19,016	19,249	19,540	19,831	20,122	20,704	20,995	20,762	20,995	21,227	21,169	21,344	21,239	21,355	20,422
Renewable Alternative	19,076	19,562	20,451	21,196	21,998	22,361	22,518	22,550	22,566	23,213	23,575	24,102	24,443	24,694	25,070	22,492
Difference from baseline	1.6%	2.9%	6.2%	8.5%	10.9%	11.1%	8.8%	7.4%	8.7%	10.6%	11.1%	13.9%	14.5%	16.3%	17.4%	10.1%

Appendix Table 4
Impact of a Minimum Renewable Fuels Content Requirement on Crop Demand

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2002-16 average
Corn Used for Ethanol (Mil bu)																
Baseline estimates	652	708	800	835	870	879	876	874	877	888	897	922	947	972	997	866
Renewable Alternative	652	731	861	1,023	1,155	1,271	1,490	1,646	1,775	1,949	2,122	2,248	2,335	2,376	2,464	1,607
Difference from baseline	0.0%	3.3%	7.6%	22.5%	32.7%	44.6%	70.0%	88.3%	102.3%	119.5%	136.6%	143.9%	146.6%	144.5%	147.2%	85.5%
Corn Feed Demand (Mil bu)																
Baseline estimates	5,750	5,800	5,850	5,910	5,970	6,030	6,090	6,150	6,195	6,240	6,285	6,330	6,390	6,435	6,480	6,127
Renewable Alternative	5,750	5,800	5,794	5,820	5,852	5,875	5,850	5,800	5,750	5,700	5,700	5,735	5,765	5,800	5,840	5,789
Difference from baseline	0.0%	0.0%	-1.0%	-1.5%	-2.0%	-2.6%	-3.9%	-5.7%	-7.2%	-8.7%	-9.3%	-9.4%	-9.8%	-9.9%	-9.9%	-5.5%
Corn Exports (Mil bu)																
Baseline estimates	2,000	2,075	2,125	2,175	2,225	2,275	2,325	2,375	2,425	2,475	2,525	2,575	2,700	2,775	2,850	2,393
Renewable Alternative	2,000	2,075	2,125	2,175	2,150	2,140	2,200	2,100	2,180	2,200	2,225	2,250	2,200	2,210	2,220	2,163
Difference from baseline	0.0%	0.0%	0.0%	0.0%	-3.4%	-5.9%	-5.4%	-11.6%	-10.1%	-11.1%	-11.9%	-12.6%	-18.5%	-20.4%	-22.1%	-9.6%
Soybean Crush (mil bu)																
Baseline estimates	1,670	1,690	1,710	1,735	1,760	1,785	1,835	1,860	1,840	1,860	1,880	1,875	1,890	1,881	1,891	1,811
Renewable Alternative	1,695	1,728	1,788	1,836	1,887	1,918	1,934	1,937	1,939	1,993	2,023	2,065	2,093	2,113	2,144	1,940
Difference from baseline	1.5%	2.2%	4.6%	5.8%	7.2%	7.5%	5.4%	4.2%	5.4%	7.2%	7.6%	10.2%	10.7%	12.3%	13.4%	7.1%
Soybean Exports (mil bu)																
Baseline estimates	1,020	1,105	1,115	1,130	1,155	1,180	1,190	1,180	1,190	1,200	1,210	1,190	1,200	1,210	1,230	1,167
Renewable Alternative	1,020	1,105	1,075	1,076	1,086	1,088	1,088	1,104	1,130	1,133	1,139	1,143	1,149	1,157	1,167	1,111
Difference from baseline	0.0%	0.0%	-3.6%	-4.8%	-6.0%	-7.8%	-8.6%	-6.4%	-5.0%	-5.6%	-5.9%	-4.0%	-4.3%	-4.4%	-5.1%	-4.8%
Soy Meal Demand (thou tons)																
Baseline estimates	32,204	32,320	33,028	33,798	34,398	34,417	34,161	33,929	33,464	34,202	34,437	35,008	35,272	35,400	35,670	34,114
Renewable Alternative	32,205	32,321	33,020	34,344	34,910	35,067	34,972	34,550	34,785	36,022	36,258	36,829	37,092	37,223	37,589	35,813
Difference from baseline	0.0%	0.0%	0.0%	1.6%	1.5%	1.9%	2.4%	1.8%	3.9%	5.3%	5.3%	5.2%	5.2%	5.1%	5.4%	5.0%
Soy Oil Demand (mil lb)																
Baseline estimates	17,069	17,447	17,707	18,066	18,427	18,843	19,312	19,787	20,295	20,703	21,174	20,960	20,751	20,542	20,331	19,428
Renewable Alternative	17,593	18,236	18,756	19,373	19,984	20,638	21,340	22,037	22,748	23,334	23,969	23,906	23,831	23,744	23,636	21,542
Difference from baseline	3.1%	4.5%	5.9%	7.2%	8.4%	9.5%	10.5%	11.4%	12.1%	12.7%	13.2%	14.1%	14.8%	15.6%	16.3%	10.9%

Appendix Table 5
Impact of a Minimum Renewable Fuels Content Requirement on Livestock

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2002-16 average
Production (Mil lbs)																
Beef Production																
Baseline	24,925	26,168	26,650	27,289	27,933	28,625	29,224	29,719	30,167	30,467	31,557	32,045	32,264	32,362	32,406	29,453
Renewable Alternative	24,925	26,168	26,650	27,289	27,933	28,625	29,224	29,719	30,167	30,467	31,309	31,423	31,642	31,740	31,783	29,271
Difference from baseline	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	0.0%	-0.8%	-1.9%	-1.9%	-1.9%	-1.9%	-0.6%
Pork Production																
Baseline	19,625	20,861	21,279	21,860	22,250	22,518	22,808	23,452	23,917	24,312	24,708	24,751	24,794	24,838	24,881	23,124
Renewable Alternative	19,625	20,861	21,279	21,417	21,473	21,881	22,332	22,790	23,255	23,150	23,546	23,589	23,632	23,675	23,718	22,415
Difference from baseline	0.0%	0.0%	0.0%	-2.0%	-3.5%	-2.8%	-2.1%	-2.8%	-2.8%	-4.8%	-4.7%	-4.7%	-4.7%	-4.7%	-4.7%	-3.1%
Broiler Production																
Baseline	31,500	32,000	34,000	33,750	34,525	35,340	36,250	37,100	38,000	38,500	39,078	39,664	40,259	40,862	41,475	36,820
Renewable Alternative	31,500	32,000	33,000	32,769	33,523	34,294	35,151	35,924	36,715	37,449	38,198	38,962	39,741	40,536	41,836	36,106
Difference from baseline	0.0%	0.0%	-2.9%	-2.9%	-2.9%	-3.0%	-3.0%	-3.2%	-3.4%	-2.7%	-2.3%	-1.8%	-1.3%	-0.8%	0.9%	-1.9%
Prices ($/cwt)																
Choice Steers, Neb Direct																
Baseline	$76.64	$74.16	$71.94	$69.78	$68.08	$67.20	$67.72	$68.76	$67.20	$66.63	$65.55	$65.08	$64.88	$63.77	$63.77	$68.08
Renewable Alternative	$80.00	$76.64	$74.16	$72.87	$71.63	$71.23	$71.43	$72.03	$73.04	$71.38	$70.77	$69.63	$69.13	$68.91	$68.22	$72.07
Difference from baseline	4.4%	3.3%	3.1%	4.4%	5.2%	6.0%	5.5%	4.8%	8.7%	7.1%	8.0%	7.0%	6.6%	8.1%	7.0%	5.9%
Hogs, 7-Mkt Barrows&Gilts																
Baseline	$43.00	$41.46	$45.63	$42.95	$39.20	$42.46	$42.19	$41.59	$41.18	$40.84	$40.51	$40.47	$40.44	$40.40	$40.36	$41.51
Renewable Alternative	$43.00	$41.46	$45.63	$42.95	$44.36	$46.01	$46.94	$46.47	$46.00	$45.62	$45.25	$45.21	$45.17	$45.13	$45.09	$44.95
Difference from baseline	0.0%	0.0%	0.0%	0.0%	13.2%	8.4%	11.3%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	11.7%	8.3%
Broilers, 12-City																
Baseline	$62.00	$57.35	$57.00	$57.17	$57.50	$57.60	$57.80	$57.90	$59.00	$59.89	$60.78	$61.70	$62.62	$63.56	$64.51	$59.76
Renewable Alternative	$62.00	$59.35	$60.28	$60.07	$60.76	$61.46	$62.22	$62.91	$63.54	$63.86	$64.24	$64.69	$65.14	$65.60	$66.06	$62.81
Difference from baseline	0.0%	3.5%	5.7%	5.1%	5.7%	6.7%	7.7%	8.7%	7.7%	6.6%	5.7%	4.9%	4.0%	3.2%	2.4%	5.1%

Appendix Table 6
Impact of a Minimum Renewable Fuels Content Requirement on Commodity Prices

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2002-16 average
Corn Farm Price($/bu)																
Baseline	$2.01	$2.12	$2.20	$2.27	$2.40	$2.48	$2.58	$2.71	$2.76	$2.75	$2.81	$2.87	$2.84	$2.90	$2.95	$2.58
Renewable Alternative	$2.06	$2.25	$2.47	$2.69	$2.87	$2.97	$3.04	$3.02	$2.99	$3.00	$2.96	$3.06	$3.13	$3.18	$3.24	$2.86
Difference from baseline	2.4%	5.8%	12.6%	18.8%	19.6%	19.6%	17.8%	11.3%	8.4%	9.4%	5.5%	6.8%	10.5%	9.7%	9.6%	11.1%
Wheat Farm Price ($/bu)																
Baseline	$3.05	$3.16	$3.32	$3.36	$3.35	$3.44	$3.42	$3.51	$3.64	$3.72	$3.75	$3.76	$3.79	$3.83	$3.85	$3.53
Renewable Alternative	$3.06	$3.19	$3.30	$3.35	$3.47	$3.48	$3.62	$3.68	$3.77	$3.82	$3.79	$3.86	$3.90	$3.99	$4.09	$3.62
Difference from baseline	0.1%	1.0%	-0.6%	-0.2%	3.6%	1.2%	5.8%	4.9%	3.4%	2.6%	1.3%	2.7%	2.9%	4.0%	6.2%	2.7%
Soybeans, Farm price ($/bu)																
Baseline	$4.84	$4.83	$4.87	$5.08	$5.15	$5.28	$5.81	$6.15	$6.22	$6.26	$6.33	$6.39	$6.37	$6.36	$6.55	$5.77
Renewable Alternative	$4.98	$5.04	$5.13	$5.49	$5.73	$6.05	$6.65	$6.77	$6.70	$7.02	$7.13	$7.31	$7.46	$7.59	$7.67	$6.45
Difference from baseline	2.9%	4.4%	5.3%	8.1%	11.3%	14.6%	14.5%	10.0%	7.6%	12.1%	12.5%	14.3%	17.1%	19.3%	17.0%	11.8%
Soy Meal, 48% Decatur ($/ton)																
Baseline	$174.34	$173.86	$175.49	$182.77	$185.31	$190.11	$209.22	$221.56	$223.92	$225.30	$228.01	$230.05	$229.37	$228.91	$235.92	$207.61
Renewable Alternative	$175.84	$176.04	$170.73	$175.97	$180.92	$179.20	$193.74	$202.31	$206.47	$201.83	$203.05	$200.00	$193.23	$197.16	$187.07	$189.57
Difference from baseline	0.9%	1.3%	-2.7%	-3.7%	-2.4%	-5.7%	-7.4%	-8.7%	-7.8%	-10.4%	-10.9%	-13.1%	-15.8%	-13.9%	-20.7%	-8.7%
Soy Oil, Crude Decatur (cents/lb)																
Baseline	$0.194	$0.193	$0.195	$0.203	$0.206	$0.211	$0.232	$0.246	$0.249	$0.250	$0.253	$0.256	$0.255	$0.254	$0.262	$0.231
Renewable Alternative	$0.195	$0.197	$0.200	$0.212	$0.223	$0.239	$0.260	$0.265	$0.267	$0.278	$0.282	$0.290	$0.295	$0.300	$0.302	$0.254
Difference from baseline	0.9%	2.1%	2.4%	4.2%	8.4%	13.3%	12.0%	7.5%	7.5%	11.0%	11.1%	13.5%	15.9%	17.8%	15.3%	10.0%
Upland Cotton (cents/lb)																
Baseline	$0.535	$0.460	$0.435	$0.438	$0.461	$0.519	$0.520	$0.579	$0.549	$0.518	$0.532	$0.561	$0.588	$0.591	$0.577	$0.524
Renewable Alternative	$0.552	$0.497	$0.492	$0.514	$0.557	$0.582	$0.616	$0.643	$0.633	$0.581	$0.578	$0.596	$0.620	$0.646	$0.634	$0.583
Difference from baseline	3.3%	8.1%	13.0%	17.3%	20.6%	12.3%	18.5%	11.1%	15.4%	12.3%	8.6%	6.3%	5.3%	9.3%	9.9%	11.2%

Appendix Table 7
Impact of a Minimum Renewable Fuels Content Requirement on Farm Income

	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2001-16 Avg
Cash Receipts:																
Livestock & products (Bil $)																
Baseline estimates	$106.8	$101.9	$105.4	$105.2	$105.4	$108.3	$110.1	$112.5	$115.8	$116.7	$119.6	$121.5	$123.5	$125.5	$127.2	$113.7
Renewable Alternative	$106.8	$102.8	$106.2	$105.9	$107.8	$111.1	$114.2	$117.0	$120.0	$120.8	$123.5	$125.1	$127.1	$129.3	$131.1	$116.6
Difference from baseline	0.0%	0.9%	0.7%	0.6%	2.3%	2.6%	3.7%	3.9%	3.6%	3.5%	3.3%	3.0%	3.0%	3.0%	3.1%	2.5%
Crops (Bil $)																
Baseline estimates	$100.6	$102.8	$104.8	$110.0	$115.7	$121.7	$129.5	$136.2	$139.0	$141.4	$144.9	$148.0	$150.4	$153.6	$156.5	$130.4
Renewable Alternative	$103.1	$107.1	$111.1	$120.7	$128.3	$136.0	$142.6	$144.9	$146.5	$149.7	$152.5	$158.4	$163.6	$168.1	$172.3	$140.3
Difference from baseline	2.5%	4.2%	6.0%	9.7%	10.9%	11.7%	10.1%	6.4%	5.4%	5.9%	5.3%	7.0%	8.8%	9.4%	10.1%	7.6%
Government Payments (Bil $)																
Baseline estimates	$9.5	$9.0	$8.4	$7.8	$7.0	$6.4	$5.9	$5.7	$5.4	$5.2	$5.0	$4.9	$4.7	$4.6	$4.4	$6.2
Renewable Alternative	$9.1	$8.4	$7.7	$7.1	$6.4	$5.8	$5.4	$5.1	$4.9	$4.7	$4.5	$4.4	$4.3	$4.1	$4.0	$5.7
Difference from baseline	-4.3%	-6.9%	-8.3%	-9.0%	-9.0%	-9.0%	-9.0%	-9.0%	-9.0%	-9.0%	-9.0%	-9.0%	-9.0%	-9.0%	-9.0%	-8.3%
Case Expenses (Bil $)																
Baseline estimates	$183.8	$188.8	$194.2	$199.7	$205.3	$211.0	$216.5	$221.9	$227.2	$232.7	$238.3	$244.0	$249.9	$255.9	$262.0	$222.1
Renewable Alternative	$183.8	$189.4	$195.6	$201.7	$208.1	$214.6	$221.0	$227.3	$233.5	$239.9	$246.5	$253.3	$260.3	$267.4	$274.8	$227.8
Difference from baseline	0.0%	0.3%	0.7%	1.0%	1.4%	1.7%	2.1%	2.4%	2.8%	3.1%	3.5%	3.8%	4.2%	4.5%	4.9%	2.6%
Net Cash Income (Bil $)																
Baseline estimates	$49.3	$41.3	$41.0	$40.2	$39.8	$42.6	$46.4	$50.1	$50.8	$48.5	$49.3	$48.7	$47.3	$46.6	$45.1	$45.8
Renewable Alternative	$51.4	$45.3	$46.0	$48.7	$51.3	$55.5	$58.6	$57.3	$55.7	$53.2	$52.3	$53.0	$53.3	$52.8	$51.6	$52.4
Difference from baseline	4.2%	9.6%	12.3%	21.3%	29.0%	30.2%	26.3%	14.5%	9.7%	9.7%	5.9%	8.7%	12.7%	13.2%	14.5%	14.4%
Net Cash Income (Bil 1996 $)																
Baseline estimates	$44.0	$35.9	$34.6	$33.0	$31.8	$33.1	$35.2	$37.0	$36.7	$34.2	$34.0	$32.8	$31.0	$29.9	$28.2	$34.1
Renewable Alternative	$45.9	$39.4	$38.8	$40.0	$41.0	$43.1	$44.4	$42.3	$40.2	$37.5	$36.0	$35.6	$35.0	$33.8	$32.3	$39.0
Difference from baseline	4.2%	9.6%	12.3%	21.3%	29.0%	30.2%	26.3%	14.5%	9.7%	9.7%	5.9%	8.7%	12.7%	13.2%	14.5%	14.5%