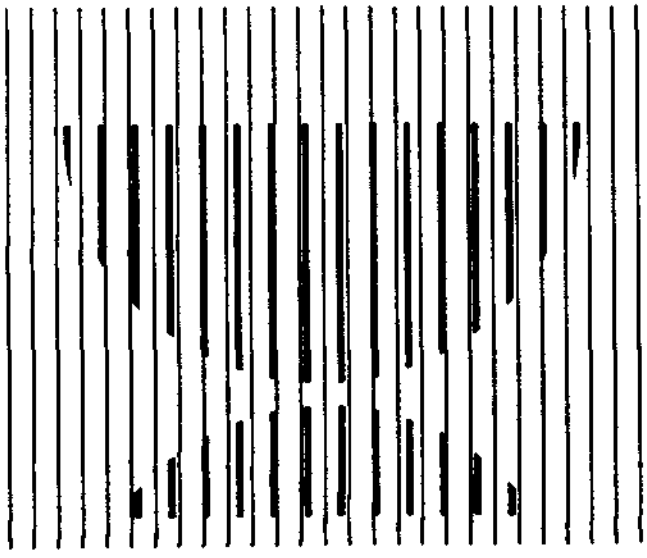
CBO STAFF MEMORANDUM

IMPLICATIONS FOR COMMODITY MARKETS OF THE ALTERNATIVE FUELS REQUIREMENTS CONTAINED IN THE SENATE'S PROPOSED AMENDMENTS TO THE CLEAN AIR ACT

JULY 1990



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This staff memorandum was prepared in response to a request from Senator John Breaux asking CBO to evaluate a report prepared by Sparks Commodities, Inc. The Sparks report estimated the effects on agricultural commodity markets, retail food prices, and federal food programs of the reformulated fuels provisions contained in the Senate's version of the amendments to the Clean Air Act (S. 1630).

The memorandum was prepared by David Trechter and Roger Hitchner of the Natural Resources and Commerce Division.

The Clean Air Act Amendments of 1990, as passed by the Senate (S. 1630), would require that motor fuels used in nine cities with extreme and severe ozone pollution problems contain a minimum of 2.7 percent oxygen. The proposed amendments would also mandate the use of fuels with 3.1 percent oxygen during the winter months in 44 cities that have failed to meet carbon monoxide standards. Areas with less severe air quality problems could, under S. 1630, elect to be covered by the oxygenated fuels requirements. Roughly 100 cities would be covered by these voluntary provisions.

The proposed amendments do not specify how the oxygen requirements are to be met; a number of fuel additives could be used. One additive that could satisfy these requirements is ethanol. Ethanol is an alcohol compound that, in the United States, is derived mainly from corn. A significant increase in the demand for ethanol would also increase the demand for corn and possibly its price. If corn prices increase substantially, important fiscal consequences might include a drop in the cost of farm programs and an increase in the cost of domestic and international food programs. An increase in corn prices would also be expected to affect consumers adversely, mainly through increased prices in meat, eggs, and milk.

Sparks Commodities, Inc., recently assessed the effects of the alternative fuels provisions of S. 1630 on agricultural commodity markets.[1] Its analysis develops three scenarios. The one most fully developed (scenario 1) assumes that ethanol is used to supply 50 percent of the oxygenated fuels required in the 9 cities that have failed to attain ozone standards, 100 percent of the oxygenated fuels required in the 44 metropolitan areas that have failed to attain carbon monoxide standards, and 50 percent of the needs of 18 cities that are assumed to opt for coverage under the oxygenated fuel requirements of S. 1630. Scenario 2 is identical to scenario 1, except that 25 percent of the ethanol demand created by S. 1630 is imported. Scenario 3 is equivalent to scenario 1 without the 18 cities that are assumed to adopt voluntarily the oxygenated fuel standards.

The Sparks analysis indicates that corn prices could increase by 40 percent by 1995 under scenario 1. Sparks estimates that a 40 percent increase in corn prices would cause consumer costs to increase by an estimated $4.5 billion to $8.0 billion by 1995. In addition, ethanol receives a waiver of federal excise tax equal to $0.60 per gallon. Sparks estimates that the increased production of ethanol would increase the amount of foregone tax revenue by $2.0 billion per year.

The Congressional Budget Office (CBO) believes that the effect of S. 1630 on commodity and retail markets would be less than that concluded by Sparks. These differences reflect both a somewhat different baseline against which S. 1630 is measured and different assumptions about potential supply and demand for ethanol.

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1. *Impacts of the S. 1630 Oxygenated Fuel Provisions on the U.S. Agricultural Sector,* Sparks Commodities, Inc., June 1990.

Key Assumptions about Factors Affecting Corn Prices

The Senate-passed version of the amendments to the Clean Air Act would increase the use of ethanol, which would increase the demand for corn by producers of ethanol. The effects that a shift in demand for ethanol would have on the price of corn depends on the following three factors:

The size of the shift in demand. Other things being the same, the larger the increase in demand for ethanol, the greater would be the tendency for the price of corn to rise.

CBO believes that the net increase in demand for ethanol assumed in the Sparks analysis overstates the increase that could be expected for two reasons. First, Sparks assumes that nearly 60 percent of the new demand for oxygenated fuels would be satisfied by ethanol, rather than other oxygenating agents such as methanol. CBO believes that new ethanol demand assumed by Sparks is near the upper bound of a reasonable range of expected demand and, thus, probably overstates the increase that would occur.

Second, Sparks assumes that none of the existing capacity to produce ethanol is used to satisfy the increased demand brought about by S. 1630. U.S. producers currently supply about 840 million gallons of ethanol. CBO believes that some portion of existing production would be used to meet the new requirements. Net new demand for ethanol would be reduced to the extent that current production is used.

Both of these factors work to reduce the net new demand for corn that would result from S. 1630 and, consequently, work to reduce the expected increase in the price of corn that would result from the legislation.

The response of other uses of corn to changes in its price. The more other types of demand for corn change in response to a change in the price--feed demand or exports, for example--the less the price would rise in response to any shift in demand. Essentially, the more responsive are other sources of demand, the easier it is to bid away the commodity from those uses and, consequently, the less that price would have to rise to satisfy new ethanol demand.

Sparks and CBO both assume that demand for corn for uses other than ethanol production is not very responsive. That is, price would tend to rise more than proportionally to an increase in demand.

The response of the supply of corn to changes in price or to other factors. There would be little or no pressure for the price of corn to change if production increased enough to accommodate the rise in demand caused by S. 1630. Planting of corn would increase if the price of corn rose. But also, planting of corn would increase if restrictions of government programs now limiting corn plantings were eased.

Planting of corn would further increase if greater ethanol production depressed the price of alternative crops. Soybean prices, for example, would be expected to fall because a byproduct of ethanol production is a high-protein animal feed that competes directly with soybean meal.

CBO differs markedly from Sparks with respect to assumed changes in the government programs and the amount of land that might be shifted out of soybeans and into corn because of downward pressure on soybean prices. On the first point, the current CBO baseline assumes that more land would be removed from production under government programs than does the baseline assumed by Sparks. CBO also assumes that the Secretary of Agriculture would relax the acreage reduction requirement of the corn program in anticipation of greater demand for ethanol production. Anticipating greater demand would help to avoid corn price rises that would hurt demand for U.S. corn on international markets. Sparks, in contrast, assumes that the Secretary of Agriculture would relax acreage reduction requirements only after the corn price increases.

On the second point, CBO assumes that downward pressure on soybean prices would cause land to shift from soybean production to corn production. Sparks acknowledges that this might occur but does not consider the consequences of such a shift in its analysis.

The net effect of these differences between CBO and Sparks is that CBO believes that the upward pressures on corn prices that might result from S. 1603 would be much less than concluded by Sparks. A more detailed discussion of the differences in assumptions follows. In this discussion, changes in demand and supply of corn are discussed in terms of equivalent numbers of acres of corn to allow the effects of differences in assumptions to be compared and combined. Ethanol can be made from other grains (sorghum, wheat, barley) and these grains can substitute for corn in other uses. Therefore, the discussion will also, where appropriate, account for acres of other grains that can directly or indirectly contribute to ethanol production.

The Likely Demand for Ethanol Under S. 1630

The demand for ethanol created by S. 1630 would depend, in part, upon the availability and price of alternative oxygenating products. Given regulatory restrictions on the amount of alternative oxygenating agents that can be used and the legislative requirement to achieve 3.1 percent oxygen in fuels used during the winter in cities out of compliance with carbon monoxide standards, some additional ethanol demand would be created by S. 1630. The level of ethanol use assumed in the Sparks analysis depends upon a continuation of the exemption to federal excise taxes (worth $0.60 per gallon of ethanol) and no substantial change in the price of ethanol, relative to the price of substitute products. It is unclear whether the federal tax exemption, which expires in 1993, will be extended. It is also unclear whether the price of ethanol, relative to its substitutes such as methyl tertiary butyl ether (MTBE), will

remain at current levels. Indeed, if Sparks' analysis is correct and corn prices increase by 40 percent, other oxygenating products would probably become more economical to use and, therefore, demand for ethanol would fall.

CBO's judgement is that the level of ethanol demand used by Sparks is near the upper bound of what is likely to occur. In the analysis to follow, however, the ethanol use assumed by Sparks will be used. Using Sparks assumptions, Table 1 indicates that between 6.4 million and 8.6 million acres of land under corn production would be needed to meet ethanol demand in 1994. In 1995, between 9.6 million and 12.9 million acres of corn production would be required to satisfy projected demand.

Use of Existing Ethanol Production Capacity

Sparks' assumption that all increased demand for ethanol associated with S. 1630 would have to be met by new ethanol production capacity seems unnecessarily restrictive. Redirecting existing supplies of ethanol from markets without pollution problems to markets with pollution problems will likely be the least-cost solution in many cases. Sparks recognizes that a portion of existing ethanol capacity might be used to satisfy the demand generated by S. 1630. If existing capacity were used in this way, Sparks states that demand for corn would not increase by as much as indicated by its analysis.

The United States currently has the capacity to produce about 840 million gallons of ethanol per year. Some cities with oxygenation requirements would probably pay a slight premium to acquire the right to consume this ethanol, if S. 1630 were enacted. Most of the existing ethanol production capacity is located in the Midwest. Cities such as Milwaukee, Chicago, Cleveland, St. Louis, and Minneapolis-St. Paul would likely try to satisfy at least a portion of their demand for ethanol from existing production capacity. Table 2 indicates the cities that might use existing ethanol capacity and the amount of ethanol that Sparks assumes these cities will require. Table 3 indicates the location of existing ethanol production capacity. If the metropolitan areas listed in Table 2 satisfied all of their needs from existing capacity, they would consume roughly one-half of currently available supplies. If they satisfied one-half of their expected requirements, they would use about 25 percent of existing capacity.

Using existing ethanol production to satisfy demand created by S. 1630 would reduce the upward pressure on corn prices. If between 25 percent and 50 percent of existing capacity were directed to markets failing to comply with the Clean Air Act

TABLE 1: DEMAND FOR ETHANOL ASSUMED BY SPARKS

	1994	1995
Gallons of Ethanol Needed (In billions)		
Scenario 1	2.2	3.4
Scenario 2	1.7	2.5
Scenario 3	1.9	2.9
Acres of Corn Needed (In millions) 1/		
Scenario 1	8.6	12.9
Scenario 2	6.4	9.6
Scenario 3	7.4	11.2

SOURCE: Congressional Budget Office.

1. Assumes that corn yields are 115 bushels per acre in 1994 and 116 bushels per acre in 1995, that 90 percent of planted acres are harvested, and that each bushel of corn yields 2.5 gallons of ethanol.

TABLE 2: ESTIMATED ETHANOL DEMAND IN SELECTED CITIES WITH SERIOUS AIR POLLUTION PROBLEMS

City	Gallons (In millions)
Milwaukee	35.8
Chicago	169.7
Memphis	26.2
Cleveland	66.9
Minneapolis-St. Paul	56.5
Steubenville-Weirton	3.6
Oshkosh	1.7
St. Louis	59.4
Louisville	10.4
Total	430.2

SOURCE: "Impacts of the S. 1630 Oxygenated Fuel Provisions on the U.S. Agricultural Sector," Sparks Commodities, Inc., June, 1990.

TABLE 3: EXISTING ETHANOL PRODUCTION CAPACITY IN THE MIDWEST

Company	Location	Capacity 1/
Archer Daniels Midland	Decatur, IL	255.0
Archer Daniels Midland	Peoria, IL	95.0
Archer Daniels Midland	Cedar Rapids, IA	80.0
Archer Daniels Midland	Clinton, IA	70.0
Pekin Energy	Pekin, IL	70.0
South Point Ethanol	South Point, OH	60.0
New Energy Co of IN	South Bend, IN	60.0
A.E. Staley Man. Co.	Loudon, TN	40.0
Tennol Energy Co	Jasper, TN	25.0
Midwest Grain Products	Pekin, IL	12.0
Grain Processing Corp	Muscatine, IA	10.0
High Plains Corp	Colwich, KS	10.0
Midwest Grain Products	Atchison, KS	5.5
Other	KS, MN, WI, ND, IL	10.9
Total 2/		803.4

SOURCE: "Fuel Ethanol Cost-Effectiveness Study," National Advisory Panel on Cost-Effectiveness of Fuel Ethanol Production, November 1987.

1. In millions of gallons.
2. Additional ethanol production capacity exists outside the Mid-West.

Amendments and those voluntarily deciding to oxygenate their fuels, this would be equivalent to between 0.8 million and 1.6 million additional acres of corn.[2]

Baseline Assumptions About Idled Farm Land

Accurately predicting the amount of land that will be idled by annual agricultural programs five years in the future is difficult. The number of acres removed from production depends upon a host of factors: supply and demand in agricultural markets, budgetary pressures, and the decisions of individual farmers. A case could be made for the assumptions made by both Sparks and CBO with respect to the number of idled acres in 1994 and 1995.

CBO assumes that considerably more land is idled by farm programs than does Sparks. Three farm programs are responsible for most of the land removed from production: the Conservation Reserve Program, the acreage reduction program, and the "0/92" program.[3] Only land in the acreage reduction program will be considered in this analysis. If the ethanol program put significant upward pressure on corn prices, however, some land currently projected to be in the 0/92 program would return to production; the Secretary of Agriculture might also look for ways to release land from the Conservation Reserve Program.

In addition to differences regarding the amount of land over which the Secretary of Agriculture has some discretion, Sparks and CBO also differ about when this land would become available to help satisfy ethanol demand. CBO assumes that the Secretary of Agriculture would anticipate the additional demand for corn created by S. 1630 and would allow acreage to return to production in 1994. Sparks assumes that the Secretary releases this land only in 1995, after corn prices have increased. The decision to build additional ethanol production capacity to meet the requirements contained in S. 1630 would have to be made in 1991 or 1992. Corn growers would have advanced warning of increased demand for their product, as would the Secretary of Agriculture. Given this advanced warning and an assumed desire to maintain U.S. competitiveness in grain markets, it seems reasonable to

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2. This assumes that the average yield is about 116 bushels per acre, 90 percent of planted acres are harvested, and 2.5 gallons of ethanol are produced per bushel of corn. This means that slightly more than 262 gallons of ethanol are produced per acre of corn. One-fourth of existing capacity is about 210 million gallons; one-half is 420 million gallons. Dividing the proportion of existing capacity assumed to be used in areas with significant air pollution problems by the gallons of ethanol produced per acre gives the equivalent number of acres of corn.

3. The Conservation Reserve Program is a long-term land retirement program designed to remove ecologically fragile land from production for ten years. The acreage reduction program applies only to acreage that is eligible for benefits from the federal commodity programs. Federal commodity programs cover production of corn, wheat, sorghum, barley, oats, rice, and cotton. The 0/92 program is so-named because participants can receive 92 percent of farm program benefits if they agree to plant only a cover crop on acreage eligible for benefits.

expect that the Secretary of Agriculture would release idled acres in advance of the increased demand.

Two scenarios are explored by CBO. In scenario 1, the Secretary allows one-half of the land previously expected to be in the acreage reduction program to return to production; in scenario 2, all of this land is released. All land released from the acreage reduction program is assumed to be used to produce ethanol directly or indirectly (by substituting for the corn that would have been fed to livestock).

If one-half of the acreage reduction program land were released by the Secretary of Agriculture, the equivalent of 3.7 million acres of corn would return to production in 1994 and 3.4 million acres in 1995 as shown in Table 4. If the Secretary releases all land in the acreage reduction program, the equivalent of 7.3 million acres of corn would be available in 1994 and 6.8 million acres in 1995. Thus, with a 50 percent release, between 43 percent and 57 percent of projected demand for ethanol could be met in 1994, depending upon the scenario considered. If the Secretary released all land in the acreage reduction program, all or nearly all ethanol demand in 1994 expected in scenarios 2 and 3 could be met and 85 percent of use expected under scenario 1 could be satisfied. By 1995, even with release of 100 percent of the land currently projected to be in the acreage reduction program, only 53 percent to 71 percent of projected demand for ethanol would be satisfied. Thus, the proposed amendments to the Clean Air Act could cause corn prices to rise modestly in 1994 and by significantly greater amounts in 1995, if this were the only response to increased demand for corn as an ethanol feedstock.

Shifting Acres Between Soybeans and Corn

The distillation of ethanol produces a high-protein animal feed supplement as a by-product. This by-product could displace other feed supplements, principally soybean meal. CBO believes that if returns to soybean production fall, a significant number of acres could easily be shifted to corn.[4] Sparks does not explicitly consider the implications of such a shift.

Essentially, the process of making ethanol removes the carbohydrates from corn but leaves the protein intact. Table 5 calculates the amount of feed supplement that would be produced if the projected demand for ethanol, adjusted for the assumed use of existing ethanol production capacity, were met by using corn as a feedstock. Sparks reports that between 10.3 and 10.4 pounds of feed supplement are produced per bushel of corn. Given this yield per bushel and assuming 50 percent of existing ethanol capacity is used to meet demand created by S. 1630, 4.8 million to 6.5 million tons of protein supplement would be produced from the corn used to

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4. CBO's policy assumptions do not include a marketing loan for soybeans. If Congress enacted a marketing loan program, the number of acres shifting out of soybeans and into corn would be greatly reduced.

TABLE 4: POTENTIAL ACREAGE RELEASED FROM ACREAGE REDUCTION PROGRAM AND GALLONS OF ETHANOL THAT COULD BE PRODUCED

Crop	1994		1995	
	50 Percent	100 Percent	50 Percent	100 Percent
	Acreage Potentially Released From Acreage Reduction Programs (In millions of acres)			
Corn	2.4	4.7	2.3	4.6
Sorghum	0.3	0.5	0.3	0.5
Barley	0.3	0.5	0.3	0.5
Oats	0.1	0.1	0.1	0.1
Wheat	2.1	4.2	1.5	3.0
Total	5.0	10.0	4.4	8.7
	Potential Ethanol Production From Grain Grown on Released Acres 1/ (In millions of gallons)			
Corn	674.7	1,349.4	669.6	1,339.3
Sorghum	42.6	85.2	43.2	86.5
Barley	34.5	69.0	35.0	70.0
Oats	7.7	15.4	7.8	15.7
Wheat	189.5	378.9	137.4	274.7
Total	949.0	1,897.9	893.1	1,786.2
	Corn-Equivalent Acres 2/ (In millions of acres)			
Total	3.7	7.3	3.4	6.8

SOURCE: Congressional Budget Office, June 1990 Baseline Assumptions.

1. Assumed yields per harvested acre in 1994 are 115 bushels for corn, 68 bushels for sorghum, 55 bushels for barley, 61 bushels for oats, and 36 bushels for wheat. Comparable figures for 1995 are 116 bushels for corn, 69 bushels for sorghum, 56 bushels for for barley, 63 bushels for oats, and 37 bushels for wheat. Table 8 in "Fuel Ethanol and Agriculture: An Economic Assessment," Department of Agriculture, August 1986, reports that wheat, corn, and sorghum all yield 2.5 gallons of ethanol per bushel. It is assumed that barley and oats also yield 2.5 gallons per bushel.
2. Assumes that corn yields in 1994 are 115 bushels per acre and are 116 bushels per acre in 1995, that 90 percent of planted acres are harvested, and that each bushel of corn yields 2.5 gallons of ethanol.

TABLE 5: POTENTIAL FOR SHIFTING SOYBEAN ACREAGE TO CORN PRODUCTION

	1994		1995	
	Minimum	Maximum	Minimum	Maximum
Protein Supplement Produced During Ethanol Production 1/ (In millions of tons, 44 percent protein)				
Scenario 1	3.7	4.1	6.1	6.5
Scenario 2	2.6	3.0	4.3	4.8
Scenario 3	3.1	3.5	5.2	5.6
Percentage of Projected Soybean Meal Production 2/				
Scenario 1	14.4	16.0	23.6	25.3
Scenario 2	9.9	11.6	16.9	18.6
Scenario 3	11.9	13.6	20.2	21.9
25 Percent of Potential Soybean Acres Diverted to Corn 3/ (In millions of acres)				
Scenario 1	2.1	2.3	3.4	3.7
Scenario 2	1.4	1.7	2.4	2.7
Scenario 3	1.7	2.0	2.9	3.2
33 Percent of Potential Soybean Acres Diverted to Corn 3/ (In millions of acres)				
Scenario 1	2.7	3.1	4.5	4.9
Scenario 2	1.9	2.2	3.2	3.6
Scenario 3	2.3	2.6	3.9	4.2

SOURCE: Congressional Budget Office.

NOTE: Scenario 1 assumes 2.2 billion gallons of ethanol will be used in 1994 and 3.4 billion in 1995. Scenario 2 assumes 1.7 billion gallons in 1994 and 2.5 billion 1995. Scenario 3 assumes 1.9 billion gallons in 1994 and 2.9 billion in 1995.
Minimum response assumes 50 percent of existing ethanol capacity is used to satisfy demand; maximum assumes 25 percent of existing capacity is used.

1. Each bushel of corn used to produce ethanol yields 10.3 pounds of feed supplement.
2. Assumes soybean meal demand is 25.7 million tons.
3. CBO baseline assumes 58 million acres of soybeans will be planted in 1994 and 1995. Potential acres diverted equals 58 million acres times percentage of soybean meal displaced times diversion factor of .25 or .33.

meet ethanol demand in 1995. This quantity of protein supplement could displace between 19 percent and 25 percent of the market for U.S. soybean meal (domestic plus export demand) in 1995. CBO's baseline assumes that 58 million acres of soybeans will be planted in both 1994 and 1995. Thus, in 1995, between 10.8 million and 14.7 million acres that had been used to produce soybeans could be available to produce corn. If between one-fourth of this acreage were actually shifted, corn acreage would increase by between 2.7 million acres and 3.7 million acres in 1995. If one-third of this acreage shifted, the increase in corn acreage would be between 3.6 million acres and 4.9 million acres.

Conclusion

The preceding section indicates that CBO believes that there is substantial capacity within agriculture with which to respond to an increase in the demand for ethanol. Table 6 summarizes the number of acres of corn that might be needed to meet increased ethanol demand created by S. 1630 and possible sources of needed acres. In the table, if new acres of corn exceed the number of acres that might be needed to meet the additional demand for ethanol, there would be no pressure for the price of corn to rise.

Table 6 indicates that for 1994 production capacity within agriculture is probably sufficient to accommodate the projected demand for ethanol created by S. 1630. In all cases the maximum total potential supply response exceeds the total increase in potential demand by a wide margin. Given the relatively conservative supply responses assumed, there would appear to be ample corn production capacity in 1994 to meet demand in all scenarios.

The situation in 1995 is somewhat more problematic, since total projected demand exceeds the maximum potential total supply for scenario 1. However, the responses labeled maximum in Table 6 would be considered relatively conservative, and the projections for ethanol demand would be considered optimistic by most analysts. If, for example, 40 percent of the potential soybean acreage shifted to corn rather than the assumed 33 percent or if ethanol demand was 10 percent lower, then the maximum potential supply exceeds potential increase in demand in scenario 1.

Even if the supply and demand for corn acres shown in Table 6 actually materialize, the increase in the price of corn would be much less than the 40 percent increase that Sparks' analysis indicated. Sparks assumes that 4.8 million acres of corn could become available by reducing the acreage reduction requirement. Using Sparks assumptions for scenario 1, an additional 8.1 million acres would have to be bid away from export markets or other uses in 1995. In contrast, in the CBO analysis only 0.4 additional million acres would be required to satisfy total potential demand under scenario 1 in 1995. In conclusion, this analysis suggests that while corn prices might increase as a result of adoption of S. 1630, the increase would be modest, probably less than 10 percent.

TABLE 6: POTENTIAL SUPPLY AND DEMAND FOR CORN ACREAGE FOR USE IN ETHANOL PRODUCTION (In millions of acres)

	1994		1995	
	Minimum	Maximum	Minimum	Maximum
	Potential Increase in Supply			
Reduce Acreage Reduction Program 1/	3.7	7.3	3.4	6.8
Shift Acreage From Soybeans 2/				
Scenario 1	2.1	3.1	3.4	4.9
Scenario 2	1.4	2.2	2.4	3.6
Scenario 3	1.7	2.6	2.9	4.2
Total Potential Increase in Supply				
Scenario 1	5.8	10.4	6.8	11.7
Scenario 2	5.1	9.6	5.8	10.4
Scenario 3	5.4	9.9	6.3	11.0
	Potential Increase in Demand			
Scenario 1	8.6	8.6	12.9	12.9
Scenario 2	6.4	6.4	9.6	9.6
Scenario 3	7.4	7.4	11.2	11.2
Less:				
Use Existing Ethanol Capacity 3/	1.6	0.8	1.6	0.8
Total Potential Increase in Demand				
Scenario 1	7.0	7.8	11.3	12.1
Scenario 2	4.8	5.6	8.0	8.8
Scenario 3	5.8	6.6	9.6	10.4

SOURCE: Congressional Budget Office.

1. Minimum assumes 50 percent of acreage reduction program land is released; maximum assumes 100 percent is released.
2. Minimum assumes 25 percent of potentially displaced soybean acreage shifts to corn; maximum assumes 33 percent shifts.
3. Minimum assumes 50 percent of existing ethanol capacity is used; maximum assumes 25 percent of capacity is used.