



Farm Bill Energy Provisions: a California Perspective*

Hyunok Lee and Daniel A. Sumner**

Energy is among the most discussed topics in the lead up to the 2007 Farm Bill. While the high cost of energy to farmers and ranchers has been raised, that issue has not been central to the discussion. Instead, the main focus has been on programs related to agriculture as a producer of energy, especially biofuels.

The Farm Security and Rural Investment Act of 2002 (the current Farm Bill) was the first to include a separate Energy Title. The Energy Title of the 2007 Farm Bill is likely to build on the 2002 Act, with more emphasis on biofuels and efforts to stimulate supply of bioenergy, especially from alternative feedstock sources. The bioenergy situation has changed dramatically since 2002, with a rapid increase in demand and supply, especially for ethanol produced from corn. Federal policy has been central to the increasing demand for ethanol and to the expectations that the demand for ethanol will continue to expand over the next several years. Since most of these demand-side policies are outside the purview of the Farm Bill, much of the Farm Bill focus is on supply-side programs. While this Brief concentrates on Farm Bill issues, we must also consider other energy policies that form a major part of the supply and demand situation in the United States.

Economic and Policy Background

Bioenergy activities include producing biomass-based motor fuels such as ethanol or biodiesel, generating electricity using biomass, and using animal waste for heating. Nevertheless, the debate related to energy production in the Farm Bill context has centered mainly on biofuels. And, given that biodiesel is in its infancy, most discussion of biofuels is still dominated by ethanol.

Ethanol is an alcohol-based fuel produced by fermentation and distillation of starch and sugar crops such as corn, sorghum, potatoes, wheat, sugarcane or sugar beets. Ethanol can also be produced from “cellulosic biomass” such as trees and grasses. The United States has been producing ethanol commercially for almost three decades, with 175 million gallons in 1980 growing to 1.4 billion gallons in 1998 (Figure 1). U.S. demand and production of ethanol has increased from about two billion gallons in 2002 to about five billion gallons in 2006 and even more in 2007. Helped by the jump in oil prices, incentives in the 2005 Energy Act and ethanol import restrictions, demand has expanded to the extent that demand for biofuel feedstock has driven up the price of grains and oilseeds. Increased demand for corn to produce ethanol has significantly influenced the Farm Bill debate, not only through ideas

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** Lee is a research economist with the Department of Agricultural and Resource Economics, University of California, Davis and Sumner is the director of the University of California Agricultural Issues Center and the Frank H. Buck Jr., Professor in the Department of Agricultural and Resource Economics, UC Davis.

about the Energy Title, but more importantly, through implications for the Farm Bill budget and the likely market context for assessing the commodity programs (see *Farm Bill Brief #1*).

Recent investments in corn-based ethanol plants have been spurred by a number of factors. The rise of oil prices from 2003 to 2005 broadened the interest in alternative fuels. This interest led to an escalating mandate for biofuels (included in the Energy Policy Act of 2005) starting at 4 billion gallons in 2006 and reaching 7.5 billion gallons by 2012. The Clean Air Act also stimulated demand for ethanol as a gasoline additive to meet environmental standards in some parts of the country, especially California.

Ethanol production has already exceeded the legislated mandates, but additional government mandates seem likely and the ethanol processing facilities under construction demonstrate anticipation of a large increase in ethanol demand. For ethanol use in excess of mandates to be cost-competitive with gasoline, even with high oil prices, continuation of the longstanding 51-cent per gallon tax credit for ethanol and the 54-cent per gallon tariff on imported ethanol for fuel use is required. Based on these policy underpinnings and continued high oil prices, most analysts project expansion of ethanol production to continue for several years, with accompanying growth in the demand for corn for ethanol. Corn-based ethanol is expected to reach a plateau of about 14 billion gallons by 2010,(Figure 2).

Ethanol Demand and the Jump in Grain Prices

Even though corn supplies have expanded in recent years (2007 plantings jumped almost 20 percent over the already large 2006 crop), the increase in the use of corn in ethanol processing plants has pushed up corn prices, which in turn has led to increases in the prices of crops that compete with corn for land or

that can substitute for corn in livestock feed. The price of corn has jumped from less than \$2.00/bushel at the end of 2005 to more than \$4.00/bushel in the late spring of 2007 (prices moderated with favorable weather in the early summer). The price of soybeans is expected to jump from \$5.90/bushel in 2006 to more than \$8.50/bushel for the 2007 crop. Wheat and barley prices have also jumped. USDA and others project that prices will be high enough so that the main farm price-contingent support programs will have little or no outlays in the years ahead.

California is a major importer of livestock feed and thus is a large net loser from higher prices (Figure 3). This places California in a different position relative to Midwestern states that are in net corn surplus areas. The large dairy, beef and poultry industries in California all face much higher input costs with the jump in energy and feed prices. In addition, the large pasture-based cattle industry also faces prices of the calves and feeder cattle that are lower than they would otherwise have been in absence of the feed price increase, because the cost of fattening these animals has jumped for buyers.

Economic Impacts on California of Current Ethanol Policy

California is not only a large importer of livestock feed from the Midwest, it is also the largest market for ethanol, almost all of which is shipped in from the Midwest. The import tariff on ethanol is, therefore, costly to California because it allows the U.S. ethanol price to be higher than the market price available elsewhere. The excise tax exemption lowers the cost of ethanol to buyers, but at the expense of lost government funds that would have been available. This is a costly policy for the nation as a whole and for California in particular.

Since corn has remained the dominant feedstock for ethanol, the public subsidy, tax benefits and regulations that support biofuels has been of significant benefit in regions where most ethanol is produced. Current ethanol plants and those under construction are concentrated in the Midwest where low cost corn is most available. Transporting bulky feedstock to the plant is a major cost of producing biofuels and therefore most plants are built where the feedstock is plentiful (Figure 4). Small ethanol plants operating in California use a variety of feedstock, including the whey byproduct from cheese production. However, larger plants, and those under construction, use corn, mainly shipped into California by rail.

An efficient, modern plant can produce approximately three gallons of ethanol from a bushel of corn. A medium sized ethanol plant produces about 50 million gallons of ethanol per year, requiring about 16.7 million bushels of corn. In 2006, California harvested only 18.2 million bushels of corn, so a single ethanol plant of the size currently operating in California would use up almost the entire corn production of the state. Corn production in California is projected to rise by 20 percent in 2007, but corn production in the state is limited by the higher revenues per acre available from other crops (such as grapes) that are suitable for the soil, climate and market conditions here. The bottom line is that California will never be a major supplier of corn for ethanol. Aside from subsidies to locate plants in California, the economics of corn-based ethanol production in the state hinges on the cost of shipping in corn as a feedstock relative to the cost of shipping in ethanol made from corn. The other potential for significant amounts of biofuel production in California hinges on producing ethanol from alternative feedstocks, especially cellulosic material.

Cellulosic Ethanol Production

Concerns regarding the cost and availability of feedstock to sustain the rapid projected growth of the U.S. biofuels industry has led to efforts to expand alternative feedstock supplies, especially to cellulosic materials, which California has in abundance.

Cellulosic materials include wood and grasses, agriculture and forest residues, and other organic materials. Agricultural waste available for ethanol conversion includes crop residues, animal manures and food processing residues. Among the most abundant nationally, are crop residues including wheat straw, corn stover (leaves, stalks, and cobs), rice straw, nut shells and orchard trimmings. Energy crops, developed and grown specifically for feedstock to produce fuel, include herbaceous crops, such as switch grass and fast-growing trees.

Compared to corn conversion, breaking cellulose into sugars is a complex process. It requires breaking down the lignin (the tough and woody part of plant cells) and treating the remaining product with enzymes to produce the sugars that are fermented into ethanol. The more complex conversion process raises costs because it requires a higher level of capital equipment with more substantial enzyme costs than corn-based ethanol.

Another difficulty with cellulosic ethanol arises from the high raw material cost. The major component is not the price of the raw materials (which may be free), but the cost of handling, including harvesting, baling, storing and transportation of biomass. Most biomass material is bulky and transporting biomass from the field to the processing plant is a major economic issue. Given the high transportation cost of bulky biomass, producing the material near the processing plant is crucial.

Significant technical barriers to the commercial development of cellulosic ethanol also remain. USDA reports that projected cellulosic ethanol production costs by 2012, even with favorable developments, will remain in the range of \$1.50 to \$1.75 per gallon compared to \$1.40 per gallon for corn-based ethanol, even at historically high corn prices. Despite government goals and federal incentives, no commercial ethanol plants use cellulosic materials. The key to creation of a cellulosic biofuels industry is research and development in plant sciences and engineering. In addition, a better understanding of the economic realities of using biomass for biofuels is required to determine efficient plant location, raw material choices, and byproduct and waste product distribution and disposal. The 2007 Farm Bill will likely have provisions to approach these major research issues.

California has abundant forestry and agricultural wastes. For example, rice straw in the Sacramento Valley is readily available since the phasing out of rice straw burning. Although past pilot projects of biorefinery using rice straw as raw material have not been economically successful, research breakthroughs could solve some problems. California may also be able to provide ethanol raw material by growing energy crops. However, competition from horticultural crops, high land and water costs and a relatively small irrigated cropland base mean that producing switchgrass or other proposed energy crops may not be efficient in California relative to states with more abundant water and much cheaper cropland. However, California does have a competitive hay industry, which relies on the long growing season, high yields per acre and lower production costs. Biofuel crops may follow a similar model.

California and the Energy Title of the 2007 Farm Bill

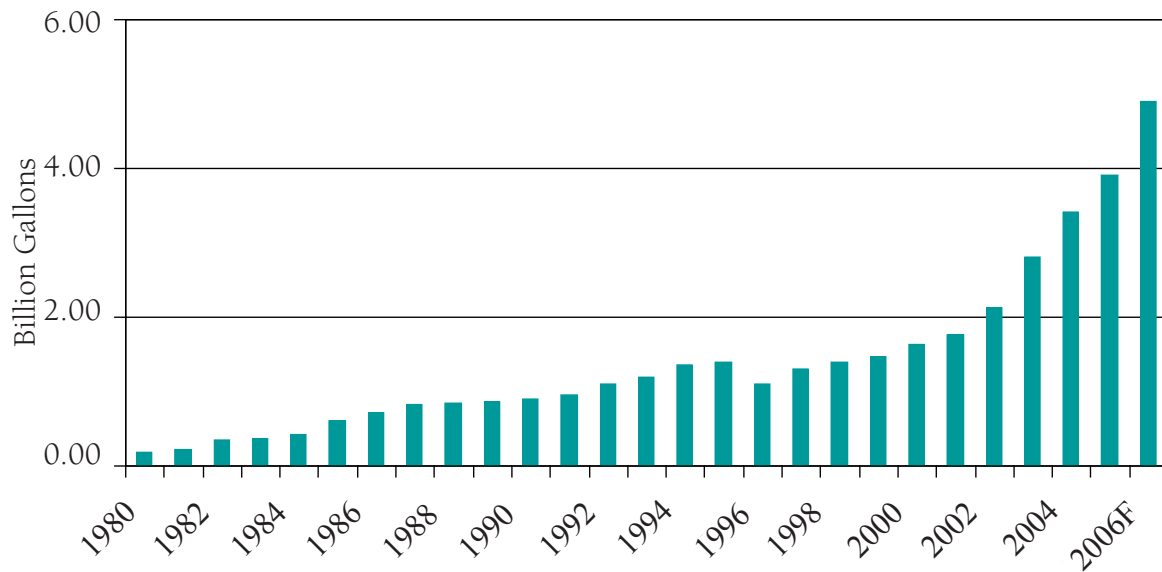
California is a minor producer but a major consumer of biofuels. This market position is unlikely to change over the life of the proposed Farm Bill. California is unlikely to produce a major share of the biofuels consumed here unless there is a rapid breakthrough in cellulosic technology and California can develop an advantage in supplying agricultural wastes or energy crops relative to Midwestern crops where grain crop residues are highly concentrated and where cropland is cheap and abundant.

The 2007 Farm Bill Energy Title seems likely to focus attention and funding on research and development and subsidies for biofuels production. California biofuel consumers and producers would gain from these developments, but the cost to taxpayers must be considered in accounting for the net impacts. Furthermore, devoting additional resources to biofuels research and development and subsidies of biofuels production may crowd out other agricultural research and other rural development efforts that are also valuable for California. Thus, the Energy Title of the 2007 Farm Bill is important for California and provisions must be evaluated with care.

University of California Agricultural Issues Center
One Shields Avenue, Davis, CA 95616-8270
Tel 530.752.2320 Email agissues@ucdavis.edu

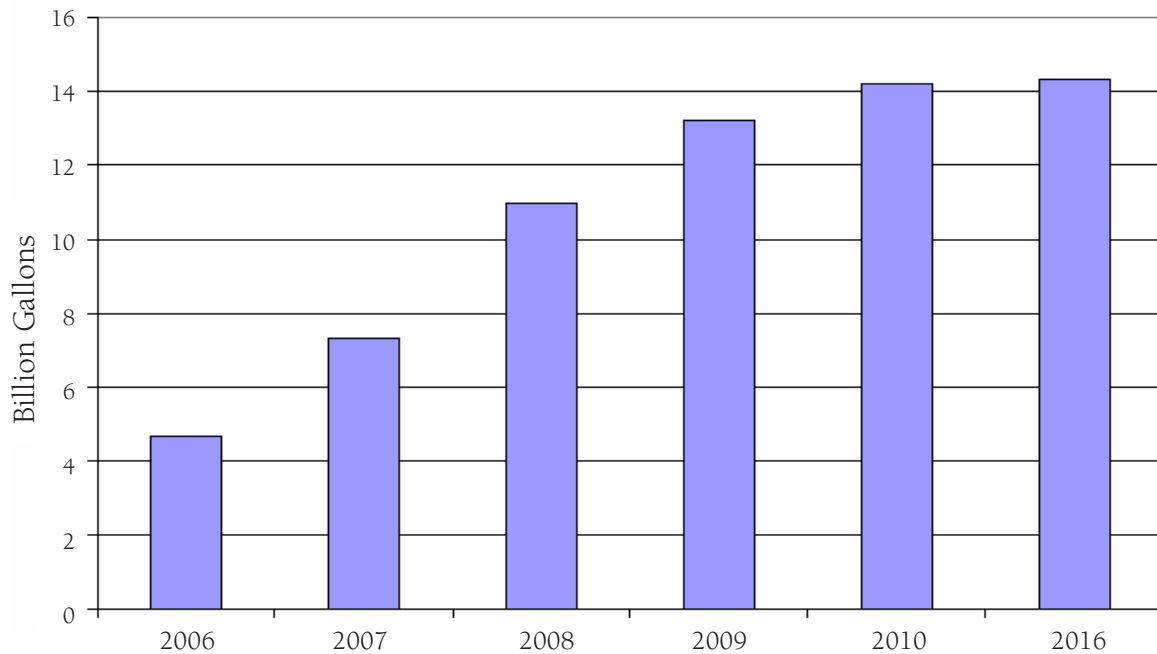
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Figure 1. U.S. Annual Ethanol Production



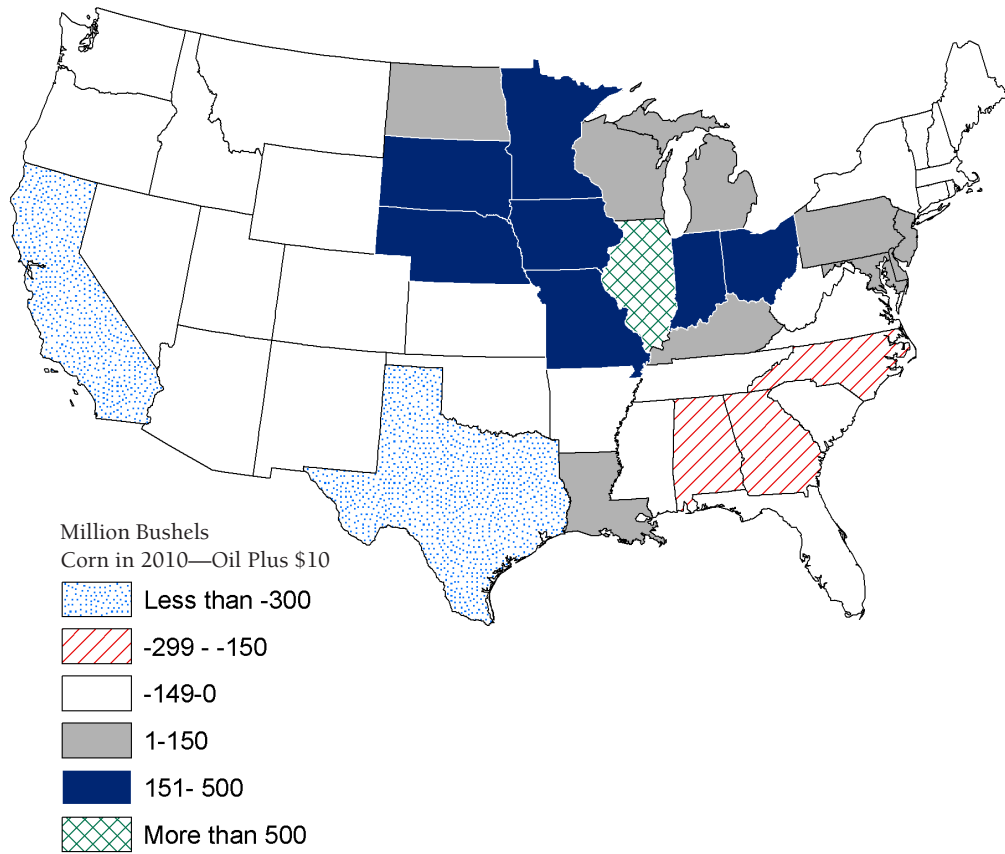
Source: The Center for Agricultural and Rural Development (CARD), <http://www.card.iastate.edu>

Figure 2. Projected U.S. Ethanol Production From Corn



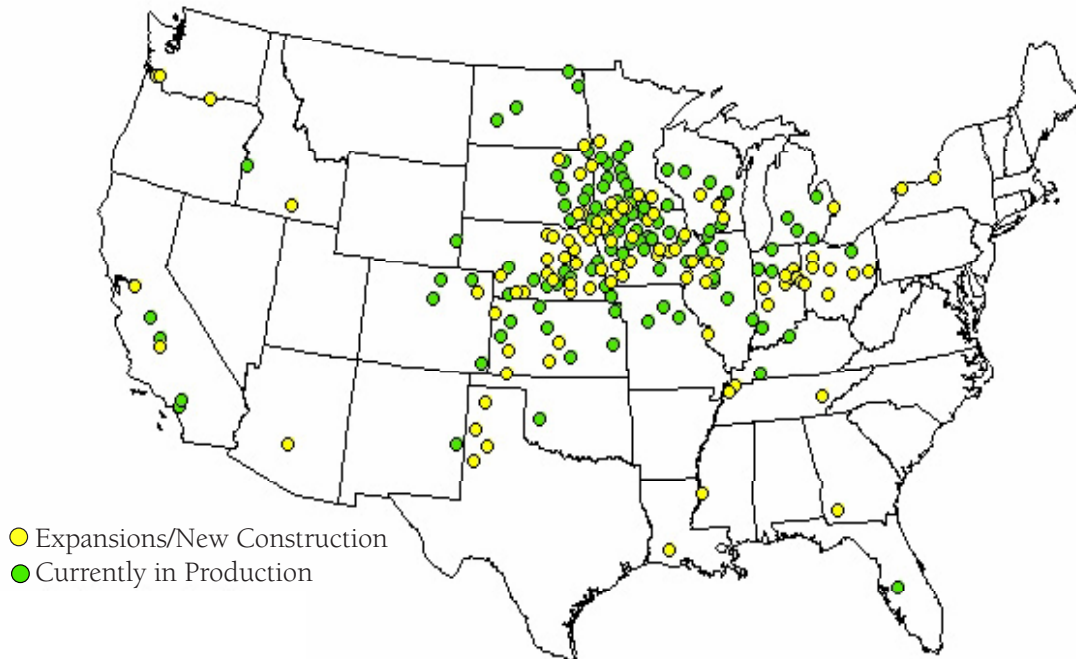
Source: The Center for Agricultural and Rural Development (CARD), <http://www.card.iastate.edu>

Figure 3. Domestic Surplus Corn in 2010—Oil Plus \$10



Source: The Center for Agricultural and Rural Development (CARD), <http://www.card.iastate.edu>

Figure 4. Ethanol Plant Location Mostly Follows the Location of Feedstock



Source: The Center for Agricultural and Rural Development (CARD), <http://www.card.iastate.edu>