

ETHANOL:

THE GOOD, THE BAD, AND THE UGLY

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Abstract

The recent escalation of ethanol production is good for corn farmers, lobbyists, processors, and (so far) politicians. Ethanol supporters claim benefits that include reduced dependence of foreign oil, cleaner air, and rural economic development. What could possibly be wrong with increased government subsidies for ethanol? If ethanol was truly this beneficial, subsidies from the government would not be needed. Economics teaches that all government policies have benefits and costs. While ethanol makes some producers, processors, and politicians wealthier, it is completely lacking in economic merit. This presentation will illuminate both benefits and costs of ethanol subsidies, and demonstrate that many of the claims made by ethanol supporters are not valid. Why does ethanol enjoy popularity and political support? Economics can explain why voters often support legislation that may be harmful to them. Voter biases that encourage ethanol included: (1) anti-market bias, (2) anti-foreign bias, (3) “make-work” bias, and (4) pessimism. While ethanol subsidies may be a political dream with benefits for all in the short run, it may be an economic nightmare in the long run.

Ethanol: The Good, The Bad, and The Ugly

I. Introduction and Background

Ethanol has gained widespread acceptance in recent years as an alternative for gasoline. Ethanol can be made from either petroleum or biomass, but in the United States, it is currently made almost predominantly from corn. Ethanol is widely considered to be an eco-friendly source of domestically-produced energy that is cleaner than fossil fuels, and a source of rural employment and economic development. These potential benefits, coupled with a rapid rise in the price of crude oil, have resulted in the escalation of ethanol production, use, and the investment in ethanol processing plants, most of which are located in the Midwestern corn belt. There are currently 115 biorefineries in production and 79 refineries under construction in the United States (Figure 1, Renewable Fuel Association).

This rapid increase in ethanol production is based on both markets and politics. Since the 1970s, corn producers and processors have lobbied for and received substantial financial incentives for ethanol production and use from the federal government. Initially, legislation was intended to be a temporary subsidy for an “infant industry.” Over time, the financial benefits have become a complex array of subsidies, mandates, tax credits, and tariffs from governments at the federal, state, and local levels. Tens of billions of dollars each year flow from taxpayers to ethanol producers and processors. This complex web of subsidies and enticements, together with a rapid rise in the price of crude oil prices since 2004 have led to massive growth in the ethanol industry. According to the Wall Street Journal, “What we have here is a classic political stampede rooted more in hope and self-interest than science or logic.”

The overall purpose of this paper is to identify and analyze both the benefits and the costs of ethanol as a fuel source. In what follows, we will investigate (1) why the ethanol industry has expanded so rapidly, (2) the strengths and weaknesses of building a biofuel infrastructure based on ethanol, and (3) a political and economic explanation of ethanol subsidies.

II. Why Ethanol? Markets and Government

The federal government has been a major promoter of the ethanol industry, and the industry's genesis in the late 1970s was dependent on subsidies, since the cost of producing gasoline was much lower than the cost of producing ethanol during this period. With low oil prices, ethanol would not have been produced at a profitable level without government intervention.

The ethanol subsidy was initially legislated in 1978, with the passage of the *Energy Tax Act*. This legislation exempted ethanol from the federal excise tax on agriculture (National Legislative History). In 2004, the *Job Creation Act* replaced the tax exemption with a 51 cent per gallon flat rate subsidy as a tax credit for the ethanol blender (EIA). In 2005, a Congress ordered a mandate requiring 4 billion gallons of renewable fuels be produced by 2006. Legislation currently under review could increase this mandate significantly in the future, and the President has set a target of 35 billion gallons of renewable and alternative fuels by 2017.

Several individual States have passed additional subsidies to promote the production and use of ethanol. Tyner and Quear (2006) identified six main incentive programs provided by State governments: (1) producer incentive payments, (2) retailer incentives for all ethanol blends, (3) State renewable fuel standards, (4) MTBE bans, (5) Ethanol labels on fuel pumps, and (5) State fleets required to purchase vehicles that run on ethanol blends, primarily 85 percent ethanol-gasoline blends known as E85 (Tyner and Quear). Federal and state subsidies for ethanol were approximately \$6 billion in 2006, about half its wholesale market value (Taylor and Van Dorn, First Quarter 2007, p. 18).

An import tariff of 54 cents per gallon is levied against all ethanol entering the USA, with some exemptions given to Caribbean nations. This form of trade barrier is necessary to stem the flow of ethanol from nations with a cost advantage in production. As with all import barriers, the tariff causes higher ethanol prices which enhance producer profitability at the expense of consumers. A recent publication from the Global Subsidies Initiative (October 2006) provides an extensive summary of all legislation that affects the ethanol industry, and concludes, "This report finds that subsidies to biofuels have reached startling levels, already several billion dollars per year... These subsidies are the result of many independent decisions at different levels of government, resulting in policies that are often poorly coordinated and targeted" (Global Subsidies, p. 56).

III. "The Good": The Arguments for Ethanol

Investors in ethanol plants benefit from the special consideration given to ethanol as an alternative fuel. Since ethanol is currently produced with corn, the producers of corn currently benefit from a strong increase in the demand for maize, to be used as feedstock in ethanol plants. This increase in the profitability of corn relative to other crops has led to the movement of acres out of wheat, soybeans, and cotton into corn. Lower production of these competing crops has led to higher prices for all grains. As a result, net farm income in the United States has risen significantly, and the farm sector's reliance on federal agricultural subsidies has been reduced.

Given the increase in profits for corn producers and ethanol processors, it comes as no surprise that these two groups strongly favor the continuance of government ethanol subsidies (National Corn Growers Association; Renewable Fuel Association). The reasons given by producer groups in favor of ethanol subsidies often include a reduction in dependence on foreign oil, and an increase in rural employment due to biofuel processing plants.

Ethanol is produced from corn, which is produced in abundance by domestic farmers. Therefore, to the extent that American drivers shift out of gasoline and into ethanol, dependence on foreign oil is reduced. Many citizens and politicians favor "energy independence," or self-sufficiency in energy, and have rallied behind ethanol as a means of providing energy to American consumers from domestic sources.

Environmentalists and others concerned with the ozone layer, and the possibility of global warming, look to ethanol as a method of reducing green house gases (GHG), and a reduction in air pollution. Ethanol has a higher octane level than gasoline, and burns cleaner. For decades, ethanol was considered to be an eco-friendly substitute for gasoline, and much of the legislation that promotes ethanol production and use was built on the idea that ethanol would reduce air pollution and reduce global warming.

Ethanol, then, appears to provide enormous benefits to society: higher farm incomes, reduced dependence on foreign oil, rural employment, and a cleaner environment. These claims, however, must be held up to economic and scientific scrutiny. The Global Subsidies Initiative report concludes, "There is an urgent need to examine the claimed benefits from biofuel subsidies, and to compare them with the costs of meeting the same goals in other ways" (p. 61).

IV. “The Bad”: The Consequences of Ethanol

Economists often highlight the obvious: price movements always benefit some, and hurt others. If the price of wheat increases, for example, this would benefit wheat growers, but hurts millers, bakers, and bread buyers. Ethanol has pushed up the price of corn dramatically: the price of corn rose nearly 80 percent in 2006 (Wall Street Journal). This price increase benefits corn farmers, but causes lower economic profits for beef, swine, and poultry producers, since corn is the major input to grain-fed meat. The cattle industry has reacted negatively to ethanol as a result of the substantially higher feed costs.

Food prices are also expected to rise, and this has led to a “food vs. fuel” debate. While the demand for ethanol does increase the demand for corn, and thus increases the price of corn significantly, the effect on retail-level food prices is likely to be relatively small. A recent study by Tokgoz et al. from Iowa State University (May 2007) estimated that if corn prices were to remain at \$4.42/bushel for a 1—year period ending in 2016, then: (1) pork prices would increase 8.4 percent, (2) retail chicken broiler prices would increase 5 percent, and (3) retail beef prices would increase by 4 percent. The study also found that higher feed costs would increase U.S. food prices by a minimum of 1.1 percent over baseline levels (Tokgoz et al. May 2007).

Corn’s proportion of the total food costs to American consumers is relatively small. Recent criticism of ethanol based on the “ethanol causes inflation” argument is exaggerated. True inflation, a general increase in the prices of all goods and services in an economy, is caused by monetary policy, when the Federal Reserve Board increases the amount of currency in circulation at a rate higher than the demand for currency by households and firms in the economy. Ethanol will change *relative* prices: the cost of feed grains, meat, eggs, and food in general will increase. However, these costs are not large, given the high standard of living in the United States.

Increased ethanol production will create environmental problems due to the large increase in the production of corn. Corn production requires large quantities of fertilizer, chemicals, water, and land. Higher corn prices not only draw more acres of land into corn production (economists call this increasing along the “extensive margin”), but also result in higher levels of inputs such as nitrogen, pesticides, herbicides, and water (economists call this increasing along the “intensive margin”). The increased pressure on land will pull erodible acres into corn production, creating higher levels of soil erosion. Chemicals cause water pollution. Since increased corn production is not friendly to the ecosystem, ethanol results in increased damage to the environment, particularly in rural areas.

Market volatility is another outcome of the large and rapid increase in ethanol production and use. The major input into the production of ethanol is corn. Agricultural commodities such as corn are subject to production variability due to weather, insects, disease, and other biological aspects of food production. Output variability, and resulting price swings, can be diminished with stocks of stored grain. The surge in demand for corn due to growth in ethanol production has resulted in a drawdown in stocks to meet the growing demand for corn. As a result, stored grain is not available to dampen any shortages in corn, and the price of corn is more volatile. The price volatility is likely to continue as the shift into ethanol fuel continues. One significant difference between fossil fuels and renewable fuels such as ethanol is the reliance of biofuels on agriculture, and thus dependence on weather and other growing conditions. Agricultural production is inherently unstable, and as a result, so are ethanol production and prices.

Interestingly, one of the major arguments for ethanol is to reduce our dependence on volatile oil markets. Ethanol fuel is more volatile than oil, according to Taylor and Van Dorn (First Quarter, 2007): "...the goal of price stability is in itself a poor argument for investing in corn rather than oil for transportation needs. Oil markets deliver low-cost energy most of the time and high-cost energy some of the time. Ethanol markets deliver high-cost energy all of the time, and may –or may not- prove less volatile than oil markets."

Ethanol has an impact on corn consumers throughout the world, including many poor individuals and families in developing nations. In Mexico, corn tortillas are the major source of calories and protein for a majority of the population, particularly among the poor. There, the price of corn tortillas has tripled or quadrupled in some parts of Mexico last summer (Roig-Franzia 2007). Unlike in the United States, where food is highly processed, the diets of individuals in developing nations are directly related to agricultural commodities, and this is particularly true of corn in Mexico. The added volatility of corn prices would also have a bigger impact on corn consumers in Mexico and other developing nations, since a larger proportion of the diet there is based on corn.

In the next section, we will continue to examine the claims made by ethanol proponents, using economic and scientific evidence.

V. “The Ugly”: The Truth about Ethanol

So far, we have documented the economic impacts of increased ethanol fuel production and use, presuming that the increase is a good thing. In this section, we will take a harder look at the claims made by ethanol proponents, including corn producers, ethanol processors, and politicians.

1. Who gains from ethanol subsidies, and who loses? Federal and state subsidies for ethanol were approximately \$6 billion in 2006 (Taylor and Van Dorn, First Quarter 2007, p. 18). This level will certainly increase. The major beneficiaries of this subsidy are (1) corn producers, and (2) ethanol industry investors. Ethanol would not be produced without government intervention, as it would cost more than gasoline. With the subsidies, corn producers earn higher profits, as do ethanol processors and blenders. Since the profits are capitalized into the land values, the true beneficiaries of ethanol subsidies in the long run are land owners in the corn belt. Ethanol processors also benefit, as is evidenced by their huge investment in lobbying Congress for the subsidies. “Corn growers and their Congressmen love this, and naturally they are planting as much as they can. Look for a cornfield in your neighborhood soon” (Wall Street Journal).

2. Who pays for the ethanol subsidies? Taxpayers. The average taxpayer must pay for the billions of dollars shifting hands, and the average consumer must purchase the mandated level of ethanol instead of gasoline, given the mandate imposed by the 2005 *Energy Policy Act*. In a market-based economy, consumers could choose whether or not they would like to purchase ethanol or not... not be forced to subsidize a fuel that is less cost-effective than gasoline, and be forced to buy it at the gasoline pump. If all of the claimed benefits of ethanol were true, coercion of consumers and taxpayers would not be necessary, and the ethanol industry would be economically viable on its own.

3. Will Ethanol Make the USA Energy Independent? Currently, ethanol is a small fraction of all fuel consumed in the United States, and the percentage of the U.S. corn crop that is devoted to ethanol is approximately 8.6 billion acres, or 20 percent (Wall Street Journal). If all of the corn produced in the U.S.A. last year were converted into ethanol, it would reduce U.S. gasoline consumption by approximately 20 percent. For corn ethanol to replace gasoline completely would require all of the cultivated cropland in the nation, and an additional 20 percent (Smil 2003).

The U.S. Department of Energy estimates that the practical limit for domestic ethanol production is 700,000 barrels per day, beginning in 2030, which is approximately 6 percent of the projected demand for transportation fuels (EIA 2006). Clearly, ethanol will not have a perceptible impact on achieving “energy independence” in the United States. All serious claims to reducing oil imports involve conservation of gasoline through more efficient vehicles, and public transportation, combined with alternative fuels that are economically viable such as electric cars.

4. Is Ethanol Cost Effective? Much debate exists over whether or not ethanol is economically competitive with gasoline. One recent USDA report estimated the cost of producing ethanol from corn at \$2.53/gallon, several times the cost of producing gasoline, even with the subsidies (Shapouri and Gallagher 2005). Economists do not spend a great deal of time comparing projected costs... they believe that the market does an outstanding job of sorting out cost-effectiveness. If ethanol could be purchased at competitive prices, then it would be. If not, it would not be purchased. Why should taxpayers have to pay subsidies, and consumers be forced to purchase ethanol, when ethanol is more costly to society than gasoline?

5. What are the Environmental Impacts of Ethanol? The entire ethanol industry is dependent on the proposition that ethanol reduces air pollution. The scientific evidence on the impact of ethanol on air pollution is mixed. However, a 2005 review of the academic literature by Robert Niven found that E10 (the most common form of ethanol used in the United States today, a mix of 10 percent ethanol and 90 percent gasoline) increases emissions of total hydrocarbons, non-natural organic compounds, and air toxins compared to regular gasoline. The result is more smog and toxic compounds. The pollution is worse with E85. Most studies show that ethanol and gasoline have nearly equal impacts on greenhouse gas (GHG) emissions. Some studies suggest that ethanol reduces total greenhouse gas emissions by 0-15 percent. Taylor and Van Doren (January 27, 2007) report that reducing GHG emissions with ethanol is 10 times more costly than lowering their emissions with the most efficient methods.

6. Is Corn Ethanol a Transitional Technology to Cellulosic Ethanol? Many Scientists are enthusiastic about the prospects of cellulosic ethanol, which is using any form of biomass to produce ethanol. Cellulosic ethanol is currently much more expensive to produce than ethanol based on corn. However, if an enzyme capable of breaking down switchgrass or trees into starch can be identified, cellulosic ethanol could become commercially viable. The federal government has recently subsidized both research and use of cellulosic ethanol with the 2005 Energy Policy Act, which mandates 250 million gallons of cellulosic ethanol a year, beginning in 2012.

7. Does Ethanol Reduce the Need for Agricultural Subsidies? While it is true that the current demand for corn for ethanol has raised grain prices enough to make total payments from agricultural subsidies lower, it is probably not the best way to accomplish this goal. Ironically, the corn producers typically argue for increased agricultural subsidies.

8. Can Ethanol be Distributed through the Gasoline Infrastructure? Ethanol can not be transported through the current system of pipelines. Alcohol erodes the seals in the pipelines, so another infrastructure for ethanol would have to be built if ethanol were to become a widespread source of fuel. Today, ethanol must be shipped by rail or truck. Gasoline stations must also be equipped to handle ethanol, and cars will need to be redesigned to maximize fuel efficiency with a new fuel source.

9. Can Ethanol By-products be Fed to Livestock? Yes, distillers dried grains (DDGs) can be used to feed cattle, conserving some of the residual energy from corn, after ethanol has been produced. Difficulties in transportation and environmental consequences arise, however: DDGs are largely composed of water, and difficult and expensive to transport in the current form. Also DDGs have high levels of phosphorous and agricultural chemicals, which affect meat production in feedlots.

This list of nine consequences of ethanol production and use highlights some of the difficulties involved with switching from gasoline to ethanol as a fuel source in the United States. The next section will explain why the government continues to subsidize ethanol, in spite of the issues associated with it.

VI. An Economic Explanation of Why Ethanol Subsidies Continue

Economists have been skeptical of the media and political hype surrounding ethanol. Economists typically favor the benefits resulting from free markets and free trade, and oppose government intervention into any industry or market. If ethanol has all of the claimed positive attributes, it certainly does not need a subsidy to be profitable. Recently, there has been a slowdown in the construction of biofuel processing plants, as reported in *The Kansas City Star*: “Biofuels have hit a dry season... confident pronouncements of new facilities have been replaced by the hard realities of financing the gleaming alternative fuel facilities” (Davis, August 6, 2007).

The scientific community has continually questioned the environmental claims made by ethanol promoters, and have built a growing body of evidence that demonstrates that the environmental benefits of ethanol have been exaggerated. A Stanford engineer who is an expert in the impact of ethanol use on the environment concluded, “We need to recognize that the rush toward ethanol, while having admirable objectives, is not based on solid scientific findings” (Jacobson). The economic and scientific evidence above has demonstrated that many of the claims made by ethanol proponents are not based on sound arguments. The question arises, “why has the government continued to subsidize the ethanol industry at such a high level?” The study of “political economy,” also called the economic approach to politics, provides explanations of political outcomes that differ from policies that contribute to the overall well-being of society. Why do these large subsidies continue to exist? Economists have an explanation: special interest legislation, or what can be called, “the importance of being unimportant.”

Policies that are attractive to politicians are often those that have perceived benefits greater than the cost of the proposed policy or program. This type of policy concentrates benefits (subsidies or dollar transfers) on a small group of individuals, and spreads the expenses (taxes) over all taxpayers. The per-person benefits for the beneficiaries is often large, and the per-taxpayer costs are low, since there are approximately 300 million people in the USA. Agricultural subsidies are a good example of this type of legislation: individual farmers receive significant subsidies, averaging \$20 billion per year in the past several years. When these costs are spread out over all taxpayers, the per-taxpayer cost is low. There are an enormous number of policies that fit this pattern of “special interest legislation.” Of course, agricultural producers can claim that these subsidies are good for society, and many voters agree. Although agricultural subsidies are directed at well-off producers, and paid for by the average citizen, most citizens are in favor of continuing subsidies to farmers.

Ethanol is a good example of this type of legislation, but it similar to agriculture in its attractiveness to a broad base of voters. The true beneficiaries of the subsidy are corn producers and ethanol processors. This is a small number of individuals, and they typically have much higher levels of income and

wealth than the average taxpayer. Many individuals and groups continue to support ethanol, however. Why? Recent research in political science provides an explanation: it appears that American voters are biased in several important and predictable ways. Caplan (2007) identifies and provides evidence for four voter biases, including: (1) anti-market bias, (2) anti-foreign bias, (3) make-work bias, and (4) pessimism. To these, I add a fifth: (5) pro-farmer bias.

Anti-market bias is pervasive in our culture, even though our economy is a primarily market-based institution. Many American citizens worry about the harsh realities of market outcomes in a purely capitalist economic system. As a result, many government policies are put in place to overcome what are perceived to be harsh market outcomes. Ethanol subsidies were put in place to allow an alternative to gasoline to be economically viable. Economists suggest that consumers would be better off by purchasing the cheapest possible fuel, but government officials believe that alternatives should be available in the "consumer interest." If consumers truly valued ethanol more than gasoline, markets would accommodate this preference, and fuel companies would provide consumers with a choice of fuels, all at market-based prices, rather than at subsidized levels. When politicians argue that their policies are in the consumer interest, they are arguing against a market-based society, where consumer interests determine what is produced and offered for sale.

According to Caplan, a majority of U.S. voters have anti-market bias, defined as, "...a tendency to underestimate the economic benefits of the market mechanism" (Caplan, p. 30). He continues, "Antimarket bias is not a temporary culturally specific aberration. It is a deeply rooted pattern of human thinking that has frustrated economists for generations" (Caplan, p. 31). Antimarket bias favors ethanol, produced by farmers, over oil, produced by oil companies that are often perceived to be "greedy" and "rich."

A second bias put forth by Caplan is anti-foreign bias, "...a tendency to underestimate the economic benefits of interaction with foreigners." In the case of ethanol, anti-foreign bias takes the form of "energy independence" or the ability of a nation to be self-sufficient. Economists rally behind the Law of Comparative Advantage, which results in mutually beneficial trades between individuals, regions, and nations. This economic principle suggests that if it is cheaper to buy oil from another nation, then it is to produce it domestically, then consumers will be better off importing oil (or ethanol) at the lowest possible price.

Free markets and free trade have been the major source of our nation's high and growing standard of living, yet many Americans believe that "buying locally" makes our economy better off. A huge amount of evidence suggests that closed economies such as China under Mao and North Korea suffer

enormous economic losses, whereas open economies such as the USA, Japan, and South Korea continue to trade their way to higher levels of income. Sadly, the economic benefits of free trade are not widely known or accepted in the USA. As a result, the temptation to “protect domestic industry” is huge. This temptation includes many citizens’ desire to produce ethanol fuel within our borders, at the expense of purchasing less expensive ethanol from a lower-cost producer such as Brazil. In Brazil, ethanol is produced using sugar cane, a more efficient feedstock than corn.

Caplan further identified the “make-work bias,” a tendency to underestimate the economic benefits of conserving labor. If making work was a legitimate societal goal, we could easily ban agricultural equipment and replace machines used in food production with labor. Much of the rhetoric behind ethanol is based on the ability of ethanol to boost rural economic performance, and increase rural employment. While this claim resonates with many voters, it may not be entirely accurate. First, ethanol plants are often located in urban areas or small cities, rather than urban areas. Second, ethanol production does not involve a great deal of labor, and as such does not contribute much to local employment in urban areas. Construction of ethanol plants does require labor, but the construction workers may not be from local, rural sources. The claims of the ethanol industry that it will boost rural employment are exaggerated, but nonetheless many voters and citizens believe the argument, and favor continued subsidies for ethanol.

Caplan’s fourth (and last) argument about voter bias is “pessimism,” or a tendency to overestimate the severity of economic problems. Ethanol fits neatly into this bias, since ethanol perceived by many to be a panacea, or “silver bullet” that will solve all of our energy, agricultural, and employment issues. Many ethanol promoters are pessimistic about the economy and oil imports from other nations. As a result, the “good news” offered by ethanol strikes a harmonic chord with many voters.

I will add a fifth voter bias among citizens of high-income nations such as the United States, and that is the “pro-farmer” bias. Farmers receive approximately \$20 billion of subsidies from taxpayers each year, in spite of the fact that the average subsidy recipient has higher income and wealth than the

average tax payer. Yet, taxpayers continue to support the subsidies. This bias is typical among the high-income nations of North American, Western Europe, and Japan. Ethanol provides another avenue to support farmers, through ethanol subsidies that increase the demand for corn. Opinion polls show that voters strongly support continued agricultural subsidies, in spite of the greater levels of wealth and income of the subsidy recipients, relative to the taxpayers who fund them.

VII. Conclusions

Like all forms of energy, ethanol has both benefits and costs. If the characteristics of ethanol were superior to gasoline, there would be no need for government subsidies that transfer billions of dollars from taxpayers to corn producers and ethanol processors. Economists will always desire to let the market decide which form of energy provides the most usefulness with the least cost. The role of government is best left to fund research into future fuel alternatives such as biodiesel and cellulosic ethanol. Taylor and Van Dorn (January 27, 2007) concluded, "If ethanol has commercial merit, it doesn't need the subsidy. If it doesn't, no amount of subsidy will bestow it."

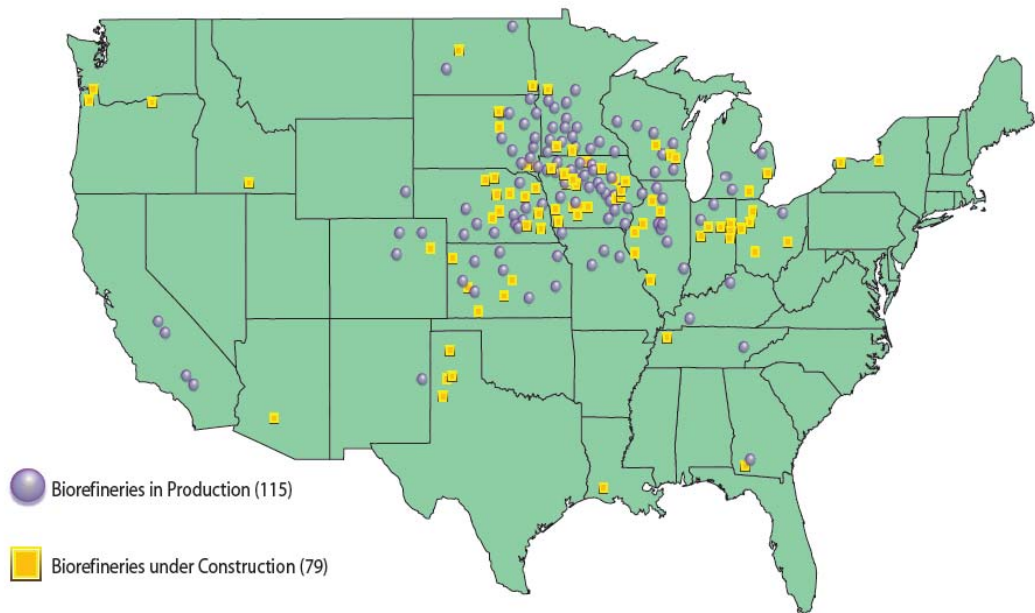
Once the scientific and economic realities of ethanol are described, it is difficult to be enthusiastic about government subsidies to ethanol producers and mandates that require consumers to purchase ethanol instead of gasoline. However, it seems unlikely that the financial incentives to ethanol production will be reduced or eliminated in the near future. Why? Because politicians have found a policy that concentrates benefits on a small number of individuals and firms, and spreads the costs among all taxpayers. This winning political combination results in long-lasting programs and policies that are difficult to change. Economists have called for the reduction and elimination of agricultural subsidies since their inception in 1933, yet we continue to transfer \$20 billion each year to farmers (Barkley 1996). The future of ethanol appears to be guaranteed by the government. Perhaps what is needed is an "ethanolics Anonymous 12-Step Program."

References

- Barkley, Andrew P. "Are Politicians Addicted to Agricultural Protection? A Dynamic Model of Political Economy." Chapter 15 in: *The Economics of Agriculture, Volume 2: Papers in Honor of D. Gale Johnson*, 1996. Eds. John M. Antle and Daniel A. Sumner, pages 263-282.
- Caplan, Bryan. *The Myth of the Rational Voter: Why Democracies Choose Bad Policies*. Princeton, New Jersey: Princeton University Press, 2007.
- Davis, Mark. "Money Pipeline is Drying Up for Some Biofuel Projects." *The Kansas City Star*. Monday, August 6, 2007.
- Energy Information Administration. Energy Kid's Page: Ethanol Timeline.
<http://eia.doe.gov>
- Energy Information Administration. "Annual Energy Outlook with Projections to 2030." DOE/EIA-0383 (2006). U.S. Department of Energy, February 2006.
- Global Subsidies Initiative. *Biofuels – At What Cost? Government Support for Ethanol and Biodiesel in the United States*. October 2006.
<http://www.globalsubsidies.org>
- Jacobson, Mark Z. "Rush Toward Ethanol Ignores Better Options." *The Sacramento Bee*. Monday, August 6, 2007.
- National Corn Growers Association. <http://www.ncga.com> Retrieved August 7, 2007.
- National Legislative History. <http://www.goefuel.com/ethanol>
- Niven, Robert. "Ethanol in Gasoline: Environmental Impacts and Sustainability." *Renewable and Sustainable Energy Review* 9:6 2005, pp. 535-555.
- Renewable Fuel Association. <http://www.ethanolrfa.org> Retrieved August 7, 2007.
- Roig-Franzin, Manuel. "A Culinary and Cultural Staple in Crisis: Mexico Grapples with Soaring Prices for Corn – and Tortillas." *Washington Post*. Saturday, January 27, 2007.
- Shapouri, H. and P. Gallagher. USDA's 2002 Ethanol Cost-of-Production Survey. *Agricultural Economic Report*, U.S. Dept. of Agriculture, Office of Energy and New Uses, 2005
- Smil, Vaclav. *Energy at the Crossroads*. Cambridge, Massachusetts: MIT Press, 2003, page 246.
- Taylor, Jerry, and Peter Van Dorn. "Expensive, Wasteful Ethanol Can't Solve Our Problems." *Chicago Sun-Times*. January 27, 2007.
- Taylor, Jerry, and Peter Van Dorn. "The Ethanol Boondoggle." *The Milken Institute Review*. First Quarter 2007, pages 16-27.
- Tokgoz, S. et al. "Emerging Biofuels: Outlook of Effects on U.S. Grain, Oilseed, and Livestock Markets." Iowa State University. May 2007.
- Tyner, Wallace E. and Justin Qear. "Development of a Variable Ethanol Subsidy and Comparison with the Fixed Subsidy." Staff Paper #06-16. November 2006. Department of Agricultural Economics, Purdue University, West Lafayette, Indiana.
- Wall Street Journal. "Very, Very Big Corn: Ethanol and its Consequences." January 27, 2007.

Figure 1.

U.S. Ethanol Biorefinery Locations



Source: Renewable Fuels Association
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