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Ethanol Policy in the Clean Air-Free Trade Era

by Norman Rask, Kevin Rask, and Jill Tiefenthaler

The U.S. corn ethanol industry is a subsidized, high cost, trade protected, limited scale industry; unable to compete in free markets or to efficiently supply new fuel demands of clean air legislation. Lower cost, sugarcane ethanol from Latin America (Brazil) should be a supplementary source, especially for U.S. coastal markets. Counter trade—corn for ethanol—would be more beneficial to U.S. corn producers than domestic ethanol corn markets and would result in more efficient land use, less soil erosion, and less fossil fuel use. A variable producer subsidy should replace the current market subsidies and import tax policies, giving limited protection to the domestic ethanol industry while assuring adequate low-cost ethanol supplies through competitive imports.

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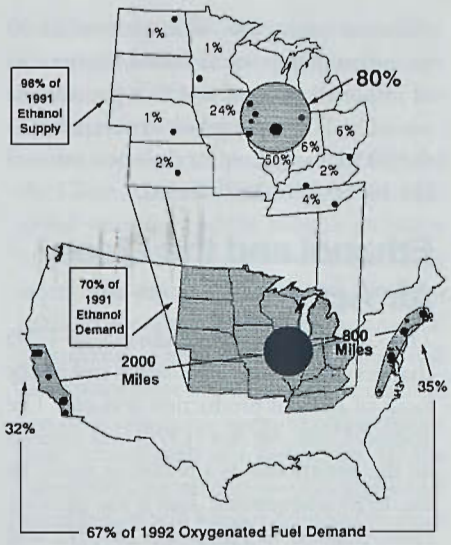
Free-trade arrangements are proliferating in the western hemisphere, and clean air legislation is changing the profile of automotive fuels, especially in the United States. These changes present unprecedented opportunities for agriculture (ethanol) to participate as a major supplier of environmentally positive automotive fuels. The U.S. ethanol industry, however, is ill-prepared to take advantage of this opportunity, and protectionist polices still block wider participation from lower cost ethanol producers throughout the hemisphere.

Many economic and policy problems affect the market potential of the U.S. corn ethanol industry. After ten years of growth, it continues as a high cost, highly subsidized, trade-protected, regionally located, and producer-oriented program without a market focus. In the 1980s, the need to replace lead as an octane additive in gasoline gave ethanol its first significant market opportunity. But petroleum refiners opted in large measure to substitute other octane sources (principally MTBE) for lead, rather than rely on small, subsidized, and uncertain long-run supplies of ethanol. MTBE (methyl tertiary butyl ether) is made from methanol and isobutylene.

A number of additional market shortcomings contributed to low acceptance of ethanol as an octane additive. These included transport and storage difficulties, variable state subsidy levels, a single fixed gasoline-ethanol mixture ratio (90 percent-10 percent) to qualify for state and federal subsidies, and reluctance on the part of refiners to substitute ethanol for 10 percent of their petroleum products. Consequently, ethanol has been used and priced chiefly as



a gasoline substitute, primarily in midwest markets. With this limited market scope and a small regional industry, there has been little demand for policy correction.

Now, all this is changing. The 1990 Clean Air Act Amendment followed by a 1991 industry-government accord to produce gasolines with higher oxygen content has created a second, but greatly expanded and higher value, market opportunity for fuel ethanol; especially in specific pollution non-attainment markets. Some states and cities are enacting fuel regulations that go beyond those specified in the Clean Air Act, adding further to the need for alternative fuels such as ethanol. Estimates place this new oxygenate additive demand at 3.7 billion gallons of ethanol equivalent by 1995, or more than three times current ethanol use.

In response to this new demand, and protected by high subsidies and import taxes, a major corn ethanol expansion effort is on the drawing board and awaits only a favorably ruling for ethanol use in the 1995 component of the Clean Air Act (see below). However, further expansion of a highly protected, noncompetitive industry may not be a wise public investment and certainly runs counter to the emerging regional and GATT free trade agreements.

To be consistent with the move toward freer trade, to limit tax payer and consumer costs, and to assure long run market acceptance, the ethanol policy framework should be broadened to incorporate ethanol supplies from the much more efficient sugarcane-based ethanol industries in Latin America (principally Brazil).

This strategy may be politically difficult, because corn producers have provided strong support for cu rrent policy including the ban on imports. But even this support may be shortsighted, because the potential benefits from counter trade in ethanol and corn far exceed the benefits to U.S. corn farmers from domestic use of corn to produce ethanol.

These new market realities signal the need to replace the infant-industry producer-oriented policy arguments that prevailed in the 1980s with a more mature view of the costs and opportunities that ethanol production, trade, and use bring to the U.S. economy. Consumers (taxpayers) will clearly gain from a trade-oriented ethanol policy. Corn farmers will also gain if counter trade provisions are included. U.S. ethanol producers would lose their protected market, but a modest, restructured subsidy program targeted to domestic ethanol producers would protect investments already made while allowing significant benefits of trade to be achieved in the new clean-air era.

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Ethanol production capacity

U.S. ethanol production capacity from corn is currently 1.3 billion gallons per year, about one percent of gasoline use (115 billion gallons). In 1992, 1.1 billion gallons of ethanol were produced, utilizing about 440 million bushels of corn. One bushel of corn produces 2.5 gallons of ethanol and 18 lbs. of distillers' dried grains under a dry-milling process. Wet milling produces a different set of by-products: 1.6 lbs. of corn oil, 2.5 lbs. of corn gluten meal, 12.5 lbs. of corn gluten feed and 15–18 lbs. of carbon dioxide.

These ethanol by-products compete with soybean products in protein feed and oil markets, lessening the impact of additional corn demand on farmer income. For example, adding one billion gallons of ethanol capacity would require an additional 400 million bushels of corn, but would raise the price of corn only $0.10 per bushel (USDA).

Brazil produces 3 billion gallons of ethanol per year from sugarcane, but has an installed distillery capacity sufficient to produce over 4 billion gallons and therefore could be an additional supply source for the U.S market. Since sugar cane requires two years to mature, this excess Brazilian capacity would not be fully available to world markets for at least two years. A minor sugarcane based ethanol industry is also possible in the Caribbean.

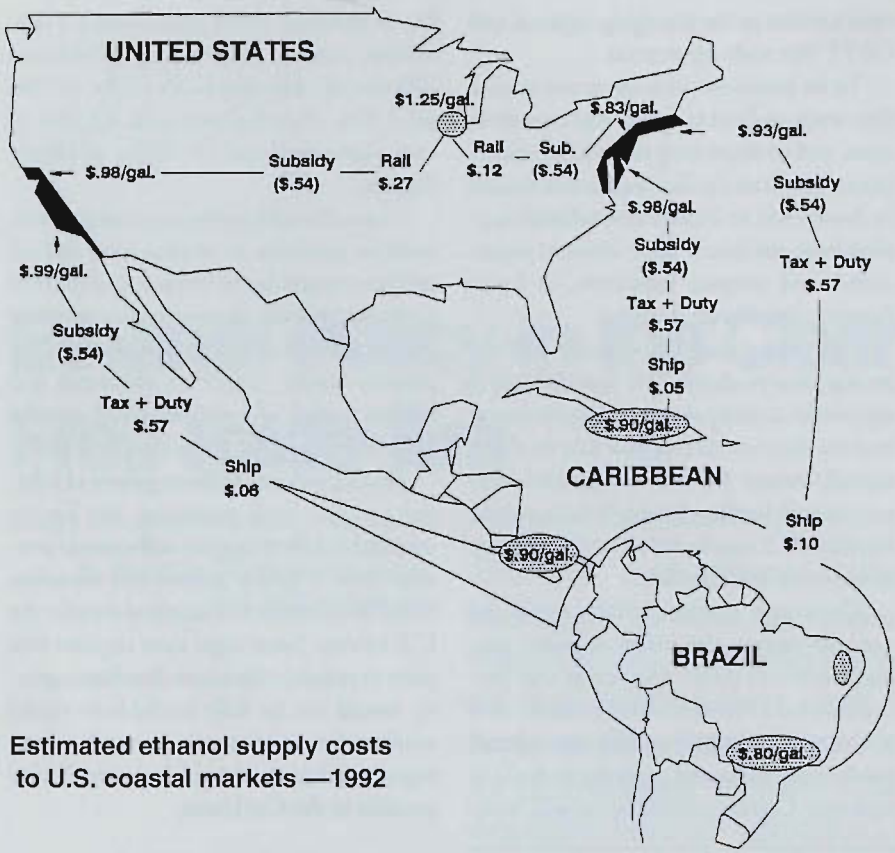
Ethanol production costs

During the 1980s, costs of producing ethanol from corn ranged from $0.90 to $1.50 per gallon depending on corn prices, ethanol by-product prices, and energy costs (USDA). At a typical corn price of about $2.50 per bushel, average ethanol costs are $1.30 per gallon. Corn at $3.00 per bushel would raise this cost to about $1.50 per gallon. Corn at $1.50 per bushel would lower the cost to $1.00 per gallon.

Brazilian sugarcane-based ethanol can be produced for $0.80 per gallon and delivered to U.S. gasoline refineries for $1.00-1.10 per gallon, but a $0.54 import tax and $0.03 import duty bring the total U.S. market cost to about $1.60 per gallon. Production costs for sugarcane-based ethanol are relatively constant because the feedstock is typically produced by the distillery and the crushed cane stalk serves as the primary source of process energy to produce ethanol.

Ethanol subsidies

The federal subsidy is $0.54 per gallon of ethanol. State subsidies, on average, add another $0.10 for a total subsidy of about



Estimated ethanol supply costs to U.S. coastal markets —1992

$0.65 per gallon. The federal subsidy is generally applied at the blending or retail level in the form of a $0.054 exemption from the federal excise tax on each gallon of ethanol-gasoline mixture sold (10 percent ethanol, 90 percent gasoline). Recently, ETBE (ethanol and isobutylene) production has been cleared for an equivalent subsidy at the refinery level. ETBE will compete with MTBE as an octane enhancer and as an oxygenate source.

State subsidies vary in amount and form and are concentrated in corn producing states. In Ohio, the state tax exemption is applied at the wholesale level directly to ethanol sales and is currently $0.15 per gallon of ethanol. Thus, in Ohio, the net cost of ethanol to a gas station would be $0.69 less than the market price of ethanol. For example, if ethanol sold for $1.30 per gallon, the net cost to the gas station would be $0.61 per gallon ($1.30–$0.69=$0.61)

State subsidies, however, are gradually declining as state budgets come un der increasing pressure and policy makers realize that local producers cannot capture all of the state subsidy rents. For example, while state subsidies vary widely, state producer prices do not. This is because the subsidy is given to the retailer and not the producer. It is unclear who in the marketing chain retains most of the subsidy; local producers, surplus producers in other states, the transportation system, wholesalers, or retailers.

A $0.57 per gallon import tax-duty ($0.54 tax, $0.03 duty) effectively shields U.S. ethanol producers from foreign competition. The import tax offsets the federal excise tax exemption. With a cost of $1.10 per gallon of imported ethanol, the net cost of imported ethanol to Ohio gas stations would be $0.98 per gallon as compared to the $0.61 per gallon for domestic ethanol ($1.10+$0.57–$0.67=$0.98).

For farmers, trade markets are preferable to ethanol producer markets, because they avoid the price-depressing effects of ethanol by-product competition with soybeans.

Ethanol and the Clean Air Act

The Clean Air Act Amendment of 1990 changes dramatically the market and policy focus of ethanol production and use. The original Clean Air Act (1970) was focused on the automobile as a polluting agent. In the 1990 amendment, fuel is the primary focus. Starting in November of 1992 and continuing over the next several years, a number of new fuels will replace traditional gasoline in over one-half of U.S. gasoline markets. The first change was to a winter months oxygen requirement (2.7 percent) for gasoline sold in about 40 metropolitan areas. The oxygen is needed to reduce carbon monoxide (CO) emissions. This created an immediate new oxygenate additive market demand equivalent to 1.3 billion gallons of ethanol annually.

A mixture of 8 percent ethanol and 92 percent gasoline satisfies this new requirement. MTBE also meets the oxygen requirement, but at double the ethanol concentration. Combinations of the two additives can be used, gaining their octane properties as well. This changes significantly the economics of gasoline refining. It also changes the reference price for ethanol from the wholesale gasoline price.

There is controversy over the ability of ethanol to reduce ozone formation. Thus, its role as a component in reformulated gasoline is still to be determined. The current situation is confusing. EPA has ruled that the increased volatility of gasoline-ethanol mixtures exceeds the maximum level set for the 1995 reformulated gasoline. This effectively excludes ethanol from the 1995 provisions of the Clean Air Act. President Bush, however, in a preelection finding mandated that gasoline refiners had to supply five of the nine metropolitan areas with a lower volatility gasoline to mix with ethanol (30 percent of all gasoline to the five areas). Up to 20 percent of the low volatility gasoline could be requested by (but was not

mandated for) the other four areas. The Clinton administration has provisionally continued the mandate for ethanol in the 1995 reformulated gasoline.

Beyond the current considerations for the Clean Air Act, there are concerns with global warming and the possible inclusion of a carbon tax policy for fossil fuels. These issues will clearly favor ethanol use from both an economic and an environmental perspective. The new administration will likely place more emphasis on the impacts of fuel choice on global warming and on policy prescriptions such as a carbon tax. By the turn of the century, even more stringent fuel specification will bring additional changes to automotive fuel markets.

Brazil can produce almost twice as much ethanol per acre from sugarcane as the U.S. can from corn, and U.S. corn yields are more than double Brazil's.

Counter trade possibilities

As noted above, Brazil has a cost advantage in producing and marketing ethanol; and also a current one billion gallon annual excess distillery production capacity and the land available to expand sugarcane production if international ethanol markets are available.

Brazil is also the world's third largest producer of corn. But corn production in Brazil is competitive only in interior production regions. U.S. corn can be delivered to deficit coastal regions of Brazil at lower costs than Brazil can produce and transport corn from interior producing regions. This creates a comparative advantage relationship—corn from the U.S. and ethanol from Brazil—that can form the basis for bilateral trade. Similar trade potential exists in the Caribbean and other Latin American countries. For farmers, trade markets are preferable to ethanol producer markets, because they avoid the price-depressing effects of ethanol by-product competition with soybeans.

Environmental gains

The clean-air gains from using ethanol are significant. Ethanol is an excellent source of fuel oxygen, providing double the oxygen content of the other major oxygenate—MTBE. Also, ethanol is a renewable fuel with near zero net carbon emission when made from sugarcane (the crushed stalk provides the processing fuel). Corn-based ethanol uses fossil fuels for processing energy, while MTBE is derived entirely from fossil-based fuels (methanol and isobutylene). Furthermore, a substantial portion of MTBE is, and increasingly will be, imported from the Middle East.

On the supply side, sugarcane is a five-year crop with substantial canopy and ground cover. It is less soil erosive than annual crops like corn. Furthermore, with a corn-for-ethanol trade policy, total land area in corn and sugarcane would be minimized as Brazil can produce almost twice as much ethanol per acre from sugarcane as the U.S. can from corn, and U.S. corn yields are more than double those in Brazil.

Suggested policy reform

The current federal policy involves an exemption from federal excise taxes at the blender and retail levels for specific ethanol uses, (a 10 percent ethanol–90 percent gasoline mixture and ETBE) with an off-setting tax duty. The net result of this narrowly focused policy is a limited ethanol supply, a high priced product that has narrowly defined uses only, and an ethanol industry with periodic booms and busts as it operates on a fixed subsidy level, but faces volatile prices for corn (cost side) and oil (costs and revenue side).

As we contemplate ethanol policy in the clean air-free trade era (and assuming that we wish to maintain a minimum domestic ethanol program), a far better alternative would be a variable ethanol subsidy paid directly to ethanol producers. This would eliminate the current high market price for ethanol and the need for an import tax. The variable subsidy would be determined periodically (monthly or quarterly), and would take into account average industry production costs and current corn and fuel (additive) prices, eliminating the economic uncertainty associated with wide swings in corn and fuel prices. It would also minimize treasury costs.

With a subsidy paid directly to U.S. ethanol producers, ethanol prices would find their own competitive level in the market as ethanol is drawn automatically to its best use. Refiners, gasoline marketers, and other ethanol users would be free to adjust to the most economic use. Imports would compete on a nonsubsidized level and add to and diversify our fuel sources.

Many important public interests (clean air, diversified energy supplies, renewable energy sources, and consumer and taxpayer costs) have been lost in previous policy debates over the private interests of corn farmers, ethanol producers, and automobile and oil companies. The economics are clear. If ethanol is produced, traded, and used in relatively free markets, it can play a major role in the clean-air era. We need to refocus public discussion on the important policy issues. ■

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