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Ethanol Blend E85 Case Study: Iowa

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Iowa - The Saudi Arabia of Ethanol

Iowa is to corn ethanol what Saudi Arabia is to oil. At present Iowa has the capacity to produce 3.5 billion gallons of ethanol per year, which is 26% of the nation's total (Source). This is of course due to the large amount of corn production in Iowa, enabled by ample rainfall and rich topsoil.

But Iowa differs from Saudi Arabia with respect to energy production in one very important detail: Saudi Arabia satisfies their own energy needs with the oil they produce, and exports the excess. Iowa on the other hand exports the vast majority of the ethanol they produce while importing gasoline as motor fuel.

Gasoline consumption in Iowa is presently around 1.6 billion gallons per year (Source). This is the energy equivalent of 2.4 billion gallons per year of ethanol. Yet amazingly, Iowa does not have an E10 blend mandate (that is, a mandate for a mixture of 90% gasoline and 10% ethanol) that is so common in many other states. Of the 3.5 billion gallons of ethanol Iowa produces each year, only 100 million gallons is consumed in the state (less than 3%!). Perhaps even more amazing is that Iowa — seemingly the best candidate in the U.S. for biofuel self-sufficiency — ranks in the Top 10 consumers of gasoline per capita in the U.S. (Source).

Iowa is a state that by all accounts should be able to satisfy their own liquid fuel needs with ethanol, and still have some left for export. They are perhaps unique in the U.S. in that respect. Instead, petroleum continues to supply over 90% of the motor fuel in Iowa, and virtually all of the fuel used in the farm equipment for growing all of that corn. Something is wrong with this picture.

Why Isn't Iowa Self-Sufficient?

That is a perplexing question. If ethanol is a real alternative to gasoline, why hasn't it taken over the marketplace in Iowa? Ethanol should have a greater advantage over gasoline in Iowa than probably in any other state. And in fact, the price spread between gasoline and E85 (the 85% ethanol blend) is consistently higher in Iowa than in other states (Source). The reported price spread in Iowa as of July 2010 was 30.1%, which should be large enough to drive consumers to E85 over gasoline. So what is the problem?

There are three possible problems that I can identify:

1). Perhaps there isn't enough E85 infrastructure in place.
2). There aren't enough E85 vehicles on the road;
3). The price is still too high relative to gasoline.

Regarding infrastructure, as of January 2010, there were an estimated 136 service stations in Iowa selling E85 (out of 977 total service stations) and a total of 2,233 Stations selling E85 in the United States (Source). Iowa also has an incentive program in place to install new E85 infrastructure (see below), but with 136 stations across the state (and growing), availability doesn't seem to be a major limiting factor.

The availability of E85 vehicles may be a more serious impediment. As of 2009, there are reportedly around 8 million vehicles on U.S. roads that are E85 capable (Source). Given a total vehicle population of around 250 million, that means that only around 3% of the cars on the road are E85-capable. (I could not find statistics specific to Iowa). This would seem to be a limiting factor at present for E85 penetration; E85 can't capture 10% of the market if only 3% of the cars can burn it.

Yet even with some E85 vehicles on the road, sales of E85 in Iowa have been falling and sales of ethanol in general lag the rest of the U.S.:

> Final 2009 Iowa Ethanol Sales Figures Show Step Back for State
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> JOHNSTON, IA – The Iowa Renewable Fuels Association (IRFA) today announced that Iowans chose E10, a 10 percent ethanol and 90 percent gasoline blend, only 73 percent of the time during 2009 according to Iowa Department of Revenue (IDR) figures. According to the Des Moines Register, Iowa ranks 32nd in ethanol sales despite being the leading ethanol producer.
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> "Iowa's ethanol sales did not reach the 2009 goal of the Iowa Renewable Fuels Standard," said Monte Shaw, IRFA Executive Director. "These are figures based on mandatory reporting of taxable gallons to the State of Iowa and the IRS – not an incomplete, voluntary report. Obviously, IRFA members are disappointed in the results. The state has also released E85 sales for the first nine months of 2009. During those three quarters, E85 sales were down 15% compared to 2008."

The number of E85 vehicles has been slowly rising, so if E85 sales are falling then there is also apparently a cost factor that is coming into play. For much of 2008, the price differential between E85 and gasoline was 15-20% (historical pricing available at E85prices.com). For the first half of 2009, that price differential had fallen to only 10%. Clearly, if E85 is ever to become the dominant fuel in Iowa, the price differential will have to properly reflect the fuel economy difference of E85 versus gasoline. E85 contains about 25% less energy than gasoline on a volumetric basis. Owners that experience a 25% reduction in fuel economy will expect to pay 25% less for their fuel. In fact, they may expect to pay 30% less due to having to refuel more often.

But, a real game-changer could be ethanol-optimized engines such as that touted by Detroit-based automotive engineering firm Ricardo. While their engine is projected to cost more, they project that they will deliver fuel economy from E85 that is comparable to what can be achieved with gasoline. (I reported on this concept in some detail in All BTUs Are Not Created Equally). In that case, consumers may be willing to buy E85 at a lower differential. The caveats here are that the engine is still in the lab, and the higher engine cost will determine the E85 differential that consumers will expect.

Recommendations

Before making recommendations, it is important to clearly set out the objective. As I have said numerous times, corn ethanol may not be a sustainable solution that is broadly applicable across the U.S. However, I do believe that it could be a very good solution in specific regions. Ethanol made from irrigated corn and shipped to California is in an entirely different sustainability category than ethanol produced and used locally in Iowa. In fact, despite my reputation as an enemy of ethanol from people who are careless with their interpretations, I have used Iowa for years as an example of what sustainable corn ethanol could look like. I have long believed that Iowa is in a good position to lead the way forward.

So from my perspective, the objective would be to increase the sustainability of ethanol — starting in Iowa — by increasing local consumption. This would decrease U.S. dependence on foreign oil more than if we have to transport oil from the coasts inland to Iowa while transporting ethanol from Iowa to the coasts.

Pump infrastructure in Iowa does not appear to be the limiting factor. Plus, Iowa already has good incentives in place that support rolling out additional E85 pumps (See Current E85 Incentives below). Iowa also already has a tax credit in place that is specifically directed at E85 sales (which is on top of the national ethanol tax credit). Ultimately, additional incentives may be required, as evidenced by falling E85 sales in the past year. Incentives could be in the form of direct E85 tax credits or fuel tax reductions or waivers. But the real issue seems to be lack of E85 vehicles.

According to automakers, the vehicles are on the way:

> US automakers on track for more ethanol vehicles
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> U.S. automakers also expect to meet a goal of making half their vehicle production flex-fuel by 2012, up from around 30 percent now. But they warn that they could pull back if there aren't enough gas stations with ethanol pumps.

On the other hand comes news that people may not be interested in buying them:

> Flex fuel vehicles may be on the way out
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> When it comes to buying cars, Americans are still using the price of the vehicle as the primary deciding factor. A well-priced, fuel-efficient vehicle is the car of choice for Americans and this is bad news for the flex fuel vehicle industry. In a survey conducted by Harris Interactive, only 5 percent of respondents said they would be extremely likely to purchase a flex fuel vehicle, even if it only added $250 to the base price of the vehicle.

So it would appear that consumers may need some convincing before they are ready to take the plunge on an E85 vehicle. There are several ways to incentivize sales of E85 vehicles. The worst is probably just to mandate that vehicles sold in the state of Iowa are E85-compatible. (I think this is the worst because mandates often have unintended consequences; hence I prefer incentives over mandates). Probably the most manageable would be rebates or expanded tax credits — at the state or federal level — for the purchase of an E85 vehicle. Instead of a Cash for Clunkers

program (which I was not a fan of), we would have been better served to have a cash for E85 vehicles program.

Such a program should probably be driven from within Iowa. After all, they arguably stand to benefit from using the ethanol they produce and moving toward true energy independence. Transportation costs cited in the recent DOE study on the proposed ethanol pipeline (that I discussed here) suggested that railing ethanol costs $0.19/gallon (shipping via pipeline was cited at $0.28/gal). Imagine that only half of the ethanol produced in Iowa is used in Iowa; there is a potential shipping savings of over $330 million per year. (However, under the present system these costs are passed through to consumers out of state, so it might be hard for Iowa to justify a program on the basis of savings for Iowans).

Beyond personal transportation, corn growers should be pushing for tractors that can run off of ethanol. They can be built. In 2006 the Saskatchewan Research Council unveiled a tractor modified to operate on 100 per cent hydrated ethanol. More on that development here:

> From late December 2006 to late January 2007, the 120 horsepower ethanol-fuelled tractor clocked 60 hours of running time and got fuel mileage of 24 litres per hour. It takes about 15 bushels of wheat to create one tank of hydrated ethanol for the tractor, says Rueve, explaining that the fuel consists of 94 per cent alcohol and 6 per cent water.
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> As farm input costs increase, both the tractor and the truck are examples of developments that may make farm operations more sustainable in the future. Meanwhile, biofuels in general offer one option for those who are looking for ways to revitalize the rural economy.

So often we hear about how ethanol is providing homegrown fuel for automobiles, and yet the tractors that produce the homegrown corn run off of petroleum. I think it would be in the best interest of Iowa and of the country as a whole (given Iowa's importance as a food producer) to break the petroleum dependence of Iowa's farms by building tractors that can run off of ethanol (or biodiesel).

Conclusions

Iowa could be self-sufficient with their ethanol production if certain policies are supported. Some policies are already in place that are meant to address E85 availability and cost. However, the availability of E85 vehicles and the willingness of consumers to buy them is probably the key limiting factor. Ultimately, building up an E85 market in Iowa and eventually in the rest of the Midwest could solve a number of issues for the ethanol industry. If the Midwest adopted E85 as its flagship fuel, there would be no blend wall to be concerned about, nor would an expensive ethanol pipeline be needed to export ethanol out of the region. The potential market across the Midwest is triple the nation's current ethanol production, giving ethanol producers an ample opportunity to grow without forcing national mandates that put E15 into cars that aren't designed for it.

Current E85 Incentives

Iowa has tax credits in place specific to E85 sales:

E85 Retailer Tax Credit

A tax credit is available to retail stations dispensing E85 for use in motor vehicles in the amount of $0.20 per gallon for calendar year 2010, and $0.10 per gallon in calendar year 2011. After 2011, the tax credit decreases by $0.01 each year and expires after December 31, 2020. Taxpayers claiming the E85 tax credit may also claim the tax credit available for retail ethanol blends for the same gallon of fuel and tax year. (Reference Iowa Code 422.11O)

And toward blending infrastructure:

Biofuels Infrastructure Grants

The Renewable Fuel Infrastructure Program provides financial assistance to E85 and biodiesel retailers. Cost-share grants are available for up to 70% of the total cost of the project, or $50,000, whichever is less, to upgrade or install new E85 or biodiesel infrastructure. Applicants may also qualify for supplemental incentives for up to 75% of the cost of making the improvement, or $30,000, whichever is less, to upgrade or replace an E85 fueling dispenser that has not been approved by an independent testing laboratory. The supplemental incentive is available only to applicants who made the improvement no later than 60 days after the date of the publication in the Iowa administrative bulletin of the state fire marshal's order providing that a commercially available fueling dispenser is listed as compatible for use with E85 by an independent testing laboratory.

Biodiesel distributors may apply for a cost-share grant for infrastructure upgrades and installations at biodiesel terminal facilities. Facilities blending or dispensing blends ranging from B2 to B98 are eligible for up to 50% of the total project, or $50,000, whichever is less. Facilities blending or dispensing B99 or B100 are eligible for up to 50% of the total project, or $100,000, whichever is less. The Renewable Fuels Infrastructure Board was established under the guidance of the Iowa Department of Economic Development; this 11-member board has authority to determine the eligibility of applicants. (Reference Iowa Code 15G.202-15G.204)