



Fuels of the Future
Bob Epstein, Co-founder E2
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Impact of Advanced Biofuels

We define advanced biofuels as replacements for petroleum-based fuels, derived from non-food agricultural, municipal waste and forest sources that are one-quarter the “carbon intensity” of standard gasoline or diesel. In North America, we have identified 240 companies that collectively will produce 437 million gallons of advanced biofuels in 2011 (see “E2 Advanced Biofuels Report”¹). The production estimates from those companies grow to 3.2 billion gallons by 2015. Whether they actually deliver that much fuel and whether the fuel and its benefits come to California are the subject of my brief comments today.

INDUSTRY PRODUCTION ESTIMATES (MGPY)		
FUEL TYPE	2011	2015
Ethanol - Cellulosic	7.45	539.14
Biodiesel (Non-Soy)	350.00	575.00*
Diesel - Renewable	77.69	525.84
Gasoline - Renewable	0.13	157.83
Multiple Renewable (Gasoline, Diesel)	0.74	875.68
Other (Biobutanol, Biomethane, Syngas)	1.01	510.98
TOTAL	437.03	3,184.47
<i>*Estimate based on RFS2 incremental increases</i>		

As a reference point, California transportation needs comes to about 18 billion gallons/year of gasoline and diesel.

¹ <http://www.e2.org/jsp/controller?docName=AdvancedBiofuelMarketReport>



Demand from California Low Carbon Fuel Standard

Significant private and public investment in advanced biofuels has been motivated in part by the federal Renewable Fuels Standard (RFS2) as well as the California LCFS. A fuel provider can get credit for both so the programs are complementary.

Demand for advanced biofuels from the LCFS is up to

- 600 million gallons in 2015
- 2.4 billion gallons in 2020

The maximum would occur if 100% of carbon reduction came from advanced biofuels. In practice, there will be a mixture of fuels as the previous panel discussed. A benefit of advanced biofuels – especially renewable crude oil, renewable gasoline and renewable diesel is they operate in existing infrastructure and vehicles.

Why is this important for California state policy?

By stimulating both use and production of low carbon fuels in California the LCFS will stimulate job creation as well as generation of economic activity that comes from local energy production. Dollars that today leave the State for fuel purchase would be maintained in the California economy and the State will realize greater energy and economic independence.

What policy enhancements are needed?

For many advanced biofuels, the risk is no longer technology but rather it is securing contracts for fuel production, debt financing for production facilities, and long-term contracts for feedstocks (i.e. biomass). The basis for this statement comes from interviews with biofuels companies, investors and examining the S-1 filings of four public biofuels companies – Amyris & Solazyme in California, and Gevo and Kior in Colorado & Texas respectively. These four companies alone raised over \$550 million in their public offerings.

Initial Public Offerings

- Amyris (California) – Raised \$84M, sugar to hydrocarbon via microbes.
- Solazyme (California) – Raised \$198M, sugar to hydrocarbon via algae
- Gevo (Colorado) – Raised \$123M, retrofit corn to advanced biofuels
- Kior (Texas) – Raised \$150M, woody biomass to hydrocarbon to renewable gas/diesel



E2 believes that California policy needs to encourage more private capital to invest in bringing advanced biofuels and biofuels production facilities to California between now and 2015. Our research has identified four important policies:

1. Maintain LCFS Targets
2. Define Alternative Compliance Mechanisms for LCFS
3. Expand the LCFS credit trading system
4. Establish a competitive fuel purchase program serving public entities

1. **Maintain LCFS Targets** – The current targets are driving demand and E2 and others are encouraging CARB to maintain the current targets. E2 believes they are achievable and any backsliding on the target is a negative signal for the California market.
2. **Define Alternative Compliance Mechanism for LCFS** – E2 is part of a subgroup helping to define alternative ways of compliance for regulated parties for the LCFS. In particular it is important that alternatives provide flexibility but without undercutting the value of low carbon fuel.
3. **Expand the LCFS credit trading system** – E2 is proposing that CARB expand the LCFS credit trading program to registered third parties to attract more investment by allowing new producers to easily and transparently sell credits from low carbon fuels.
4. **Establish a competitive fuel purchase program benefiting public entities** – In our investigation the fuel purchase program established in Hawaii inspired us. We have described the program in Appendix 1. A California program² would aggregate fleet purchases across a volunteer set of interested public agencies including the state, schools and cities. A request for proposal would offer a long-term commitment to purchase fuel beginning within 5 years of award. Payment is only made on delivery of fuel. A percentage of California content would be required. As with Hawaii, a consortium winning such a bid could then use the guaranteed contract to secure feedstock, select a fuel conversion technology and build a facility with debt financing.

Summary

The LCFS program combined with the federal RSF are working. The private sector has solved many of the technology barriers are we now need to focus on enabling a competitive market for all low carbon fuels. We have suggested four policies that we believe will help make California the leader in low carbon fuels.

² For details see: www.e2.org/jsp/controller?docName=ca_fuel_purchase



Appendix 1: State of Hawaii Fuel Purchase Program

Background:

Hawaii is fully dependent (95%) on imported petroleum for its energy supplies. As a result the Hawaiian economy is continually buffeted by remote events that impact the price of oil. Hawaii bleeds \$6-7 billion annually from its economy (the GDP of Hawaii is \$60 billion³) to pay for oil. The State implemented the Hawaii Clean Energy Act in 2009⁴ to promote the local development of clean energy. This act requires Hawaii to convert 70% of its energy requirement to “clean” energy by 2030. The initial steps in deployment start in 2015. These requirements stimulated Hawaiian Electric Company, Inc. (HECO) to issue an RFP in March 2010 to purchase biofuels produced in Hawaii.

How did it work?

HECO released a competitive bid RFP in March 2010. The RFP called for production of up to 200 million gallons of fuel annually, but HECO was under no obligation to purchase the full amount. Bids were due 75 days later in June 2010⁵. Any type and any amount of biofuel could be bid at any price for any term contract. The goal was to replace as much of their petroleum use as possible. The unique aspect of the bid was that the fuel could be delivered as much as 5 years after the bid had been accepted and approved. This time lag was important as with an approved contract that far in advance of delivery it would allow prospective producers to organize the conceptual plans and supply chain as part of the bid but be able to put the actual contracts and financing in place based on a firm contract. This was a powerful tool as it provides a mechanism to reduce the risk to investors and debt institutions and provides ample time after receiving the contract to organize the supply chain, gain permits and build the facility. The financial risk to HECO was minimal as they do not release any funds until they take delivery of the fuel. Outside consultants helped to evaluate the bids and provided accredited 3rd party processes and evaluation procedures.

What was the response? Ten bids were received and then narrowed in a screening process down to five bids that were in August 2010 invited to enter into contract negotiations. To date (October 2011) four contracts have been awarded for a total of 27 million gallons of annual fuel purchase with the potential to increase that amount as negotiations continue with bidders. It is estimated these contracts will stimulate over \$500 million dollars of capital construction and several hundred new jobs in the State of Hawaii.

³ http://hawaii.gov/dbedt/info/economic/data_reports/qser/outlook-economy

⁴ http://www.dsireusa.org/incentives/incentive.cfm?Incentive_Code=HI06R&re=1&ee=1

⁵ http://www.heco.com/vcmcontent/StaticFiles/pdf/QandA_C_052410.pdf