Cost Effectiveness of Ethanol Blended Gasoline as GHG Emissions Reduction Strategy
(D r a f t)

Gasoline Blend	Ethanol Oxygenate		Energy Density (btu/gal)				
	Gasoline	Neat Ethanol	Denaturant[1]	Gasoline	Neat Ethanol	Denaturant	Gasoline Blend	Energy Density Ratio
Non-Oxy	100%	0%	0%	114,500	76,000	114,500	114,500	1
E5.7	94.3%	5.4%	0.3%	114,500	76,000	114,500	112,406	0.982
E10	90%	9.5%	0.5%	114,500	76,000	114,500	110,827	0.968

Assumption:

Rack Price[2] ($/gal)	
Ethanol Oxygenate	1.79
Non-Oxy	1.48
E5.7	1.51
E10	1.52
ExciseTax (cents/gal):	
Federal	18.4
State	18.0
Subsidy[3] (cents/gal):	
E5.7	3.0
E10	5.2
Other (cents/gal):	
UST Fee	1.2
Estimated Transp. Costs + Profits	20.0
Sales Tax (%):	
State	6.00
County	1.25
Local	0.50

Gasoline Blend	Estimated Retail Price ($/gal)		Energy-Equivalent Retail Price[4] ($/gal)		Price Difference Relative To Non-Oxy ($/gal)		Average Price Difference ($/gal)
	w/ Subsidy	w/o Subsidy	w/ Subsidy	w/o Subsidy	w/ Subsidy	w/o Subsidy	
Non-Oxy	2.211	2.211	2.211	2.211	-	-	
E5.7	2.210	2.243	2.252	2.285	0.040	0.073	0.057
E10	2.200	2.257	2.273	2.331	0.062	0.120	0.091

Gasoline Blend	E5.7			E10		
GHG Emissions Benefit[5] (%)	0.57	0.86	1.14	1.00	1.50	2.00
GHG Emissions Reduction[6] (tons/gal)	0.00007	0.00011	0.00014	0.00013	0.00019	0.00025
Average Gasoline Retail Price Difference ($/gal)	0.057	0.057	0.057	0.091	0.091	0.091
Cost Effectiveness[7] ($/ton)	**794**	**529**	**397**	**725**	**483**	**363**

Note:

[1]Archer Daniel Midland, Co.,"Denatured Fuel Ethanol: Manufacture, Properties, and Specifications," May 4, 2000.

[2]Oil Price Information Service (OPIS): all gasoline prices are for regular grade in November 2004 (average of four Fridays data); E10 rack price is estimated.

[3]California Energy Commission: http://www.energy.ca.gov/gasoline/fuel_tax_rates.html

[4]On energy-equivalent basis with respect to non-oxy gasoline.

[5]Argonne National Laboratory: http://www.transportation.anl.gov/pdfs/TA/58.pdf, where E10 provides about 1% to 2% GHG emissions benefit relative to conventional gasoline; E5.7 benefit is estimated.

[6]Estimated from Argonne National Laboratory report, where non-oxy gasoline produces about 25.09 pounds GHG per gallon.
e.g., if a gallon of E10 provides about 2% GHG emissions benefit relative to non-oxy gasoline, the emissions reduction is (25.09x2%)/2000=0.00025 tons/gal.

[7]The cost effectiveness is approximately $350/ton (best) to $800/ton (worst).