E10 Unleaded* in Hawaii: 4/2/06

* Gasoline with 10% Ethanol

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Department of Business, Economic Development & Tourism
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587-3809

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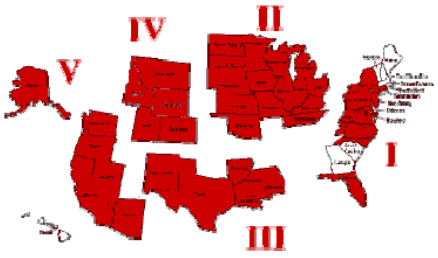
Topics

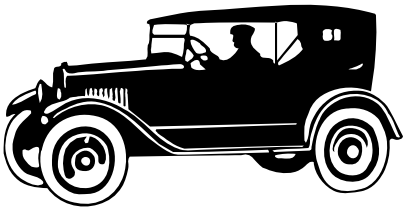
- Ethanol fuel in the U.S.
- Cost / Pricing
- Marketing – examples
- Hawaii's Ethanol Content Requirement April 2, 2006
- Fuel storage tanks
- Information Resources



Fuel Ethanol

- Ethanol is also known as ethyl alcohol. It's the alcohol in beer, wine, rum, vodka, etc.

- Ethanol was used to fuel some of the first automobiles.



Fuel Ethanol

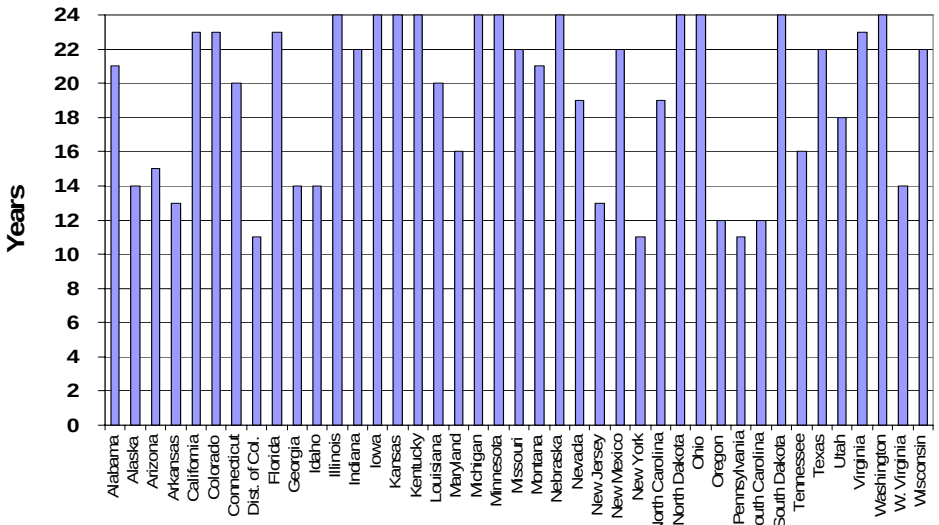
- Ethanol is also known as ethyl alcohol. It's the alcohol in beer, wine, rum, vodka, etc.
- Ethanol was used to fuel some of the first automobiles.

Not Methanol

Fuel Ethanol

- On the Mainland, “independent” gasoline stations were generally first to offer E10 (formerly known as gasohol).
  - 1970s-1980s: Used as a “**gasoline extender**”
  - 1980s: An “**octane booster**” (raises octane 2-3 points)
  - 1990s: Used as an “**oxygenate**” for clean air (Adds oxygen & reduces emissions of carbon monoxide)

States With 10 or More Years of Fuel Ethanol Use



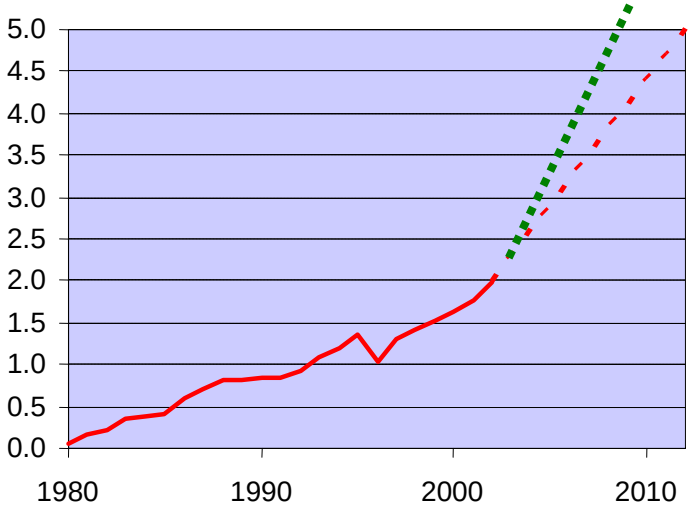
(41 states)

Fuel Ethanol

- All of **Minnesota**'s gasoline contains ethanol (Minneapolis/Saint Paul, 1995; statewide, 1997)
- Ethanol-blended gasoline is available in most states.
- **California**, **New York**, and **Connecticut** switched in 2003.
- **30% of U.S. gasoline** contains ethanol.
- A **nation-wide** Renewable Fuels Standard was enacted in August of 2005.

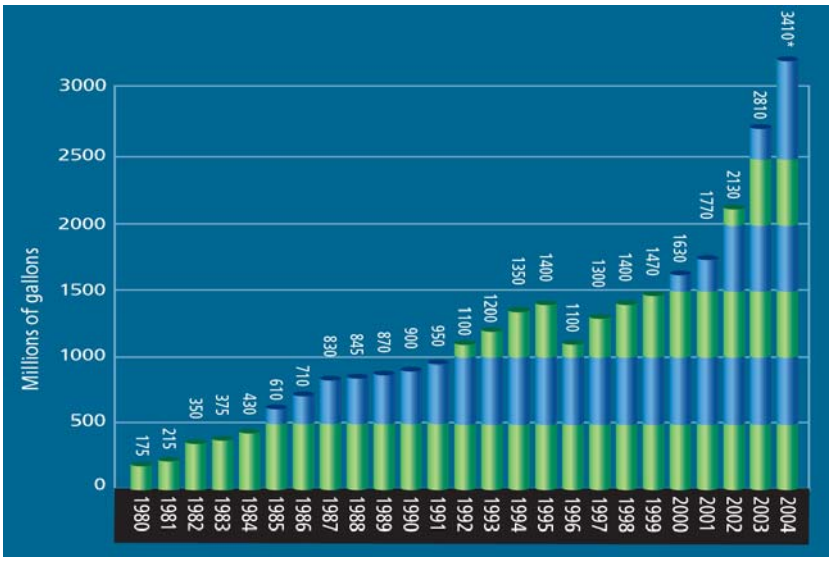
	Renewable Fuels Standard
2006	**4.0 billion gallons**
2007	**4.7 billion gallons**
2008	**5.4 billion gallons**
2009	**6.1 billion gallons**
2010	**6.8 billion gallons**
2011	**7.4 billion gallons**
2012	**7.5 billion gallons**

US Ethanol Demand (Billion Gallons Per Year)

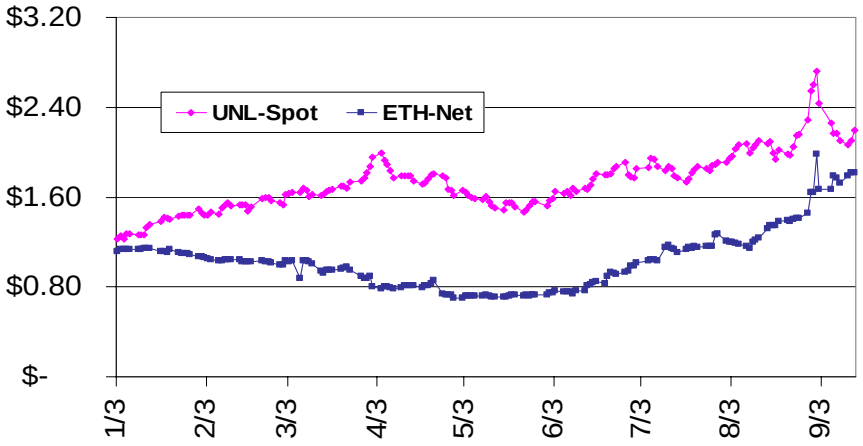


Source: Stillwater, 2003

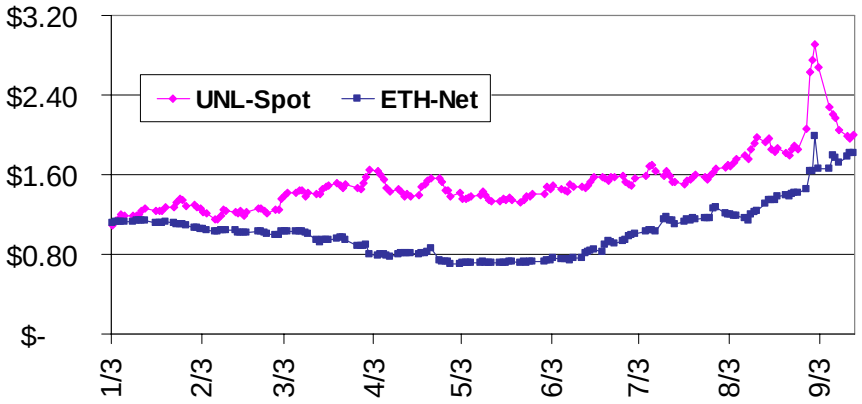
Supply is Keeping Up with Demand



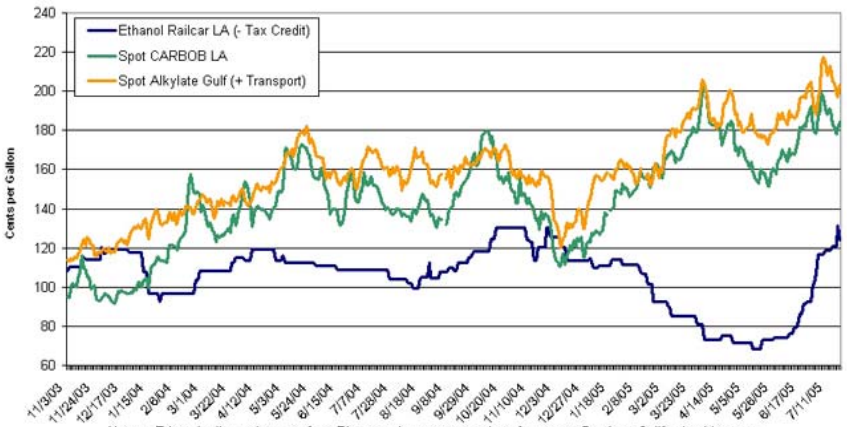
Gasoline Spot & Ethanol Net Prices Los Angeles, 2005



Gasoline Spot & Ethanol Net Prices
New York Harbor, 2005



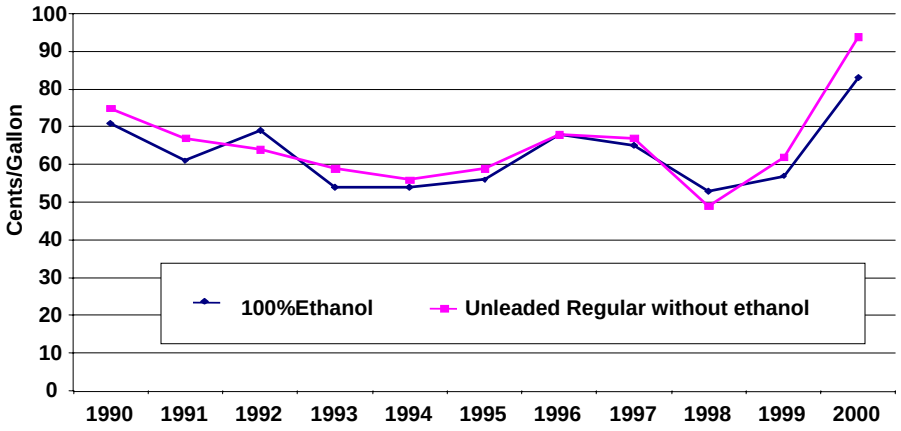
Gasoline Component Prices
California, Nov. 2003 – Aug. 2005



Notes: Ethanol railcar prices are from Platts, and are average prices for prompt Southern California shipments including 52 c/gal federal tax credit (51 c/gal after 1/1/05). California alklylate prices are calculated from Platts and include 20 c/gal transportation & distribution cost from Gulf Coast to California. Spot wholesale prices for regular-grade California reformulated gasoline blendstock for oxygenate blending (CARBOB) are from US Department of Energy. Data from 11/3/03 to 7/20/05.

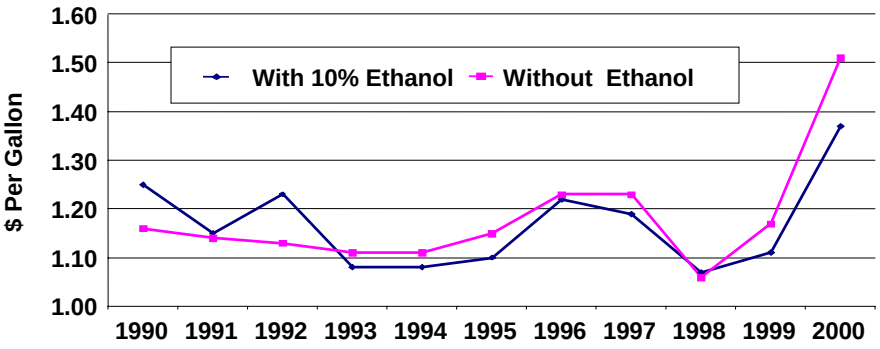
CEC/TFO, July 20, 2005

Wholesale Prices, U.S. City Average 1990-2000



Source: Clean Fuels Development Coalition

Retail Prices of Unleaded Regular Gasolines, U.S. City Average



Source:
Clean Fuels Development Coalition,
Energy Information Administration

Case study: Minnesota

Practically all (97%) of Minnesota's gasoline is E10 Unleaded.

1995: Minneapolis/Saint Paul

1997: Statewide

Minnesota's gasoline prices tend to be lower than the US average – and MN is NOT an oil state.

Minnesota's air quality improved – from "non-attainment" in 1995 to attainment in 1999.

Driving Blends

Minnesota's transition to ethanol

Fuel Blends Webcast

March 16, 2005

American Lung Association of Minnesota

Outdoor Air Programs – Tim Gerlach

clean air choice

AMERICAN LUNG ASSOCIATION of Minnesota

Clean Cities

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MN E10 Requirement

- **"Gasohol" effort in Midwest of 1970s**
- **Viewed as rural & ag economic development**
- **Oxygenated fuels requirement**
  - **2.7% O_2 met with min. 7.8 vol% ethanol**
  - **Initially to combat CO in nonattainment areas**
  - **Expanded to statewide, year-around in 1997**
  - **Replaces 10% of gasoline needs**
  - **97% market penetration (some non-oxy premium)**

MN: 13 plants; ethanol exporter; $1.3B; 5,300 jobs

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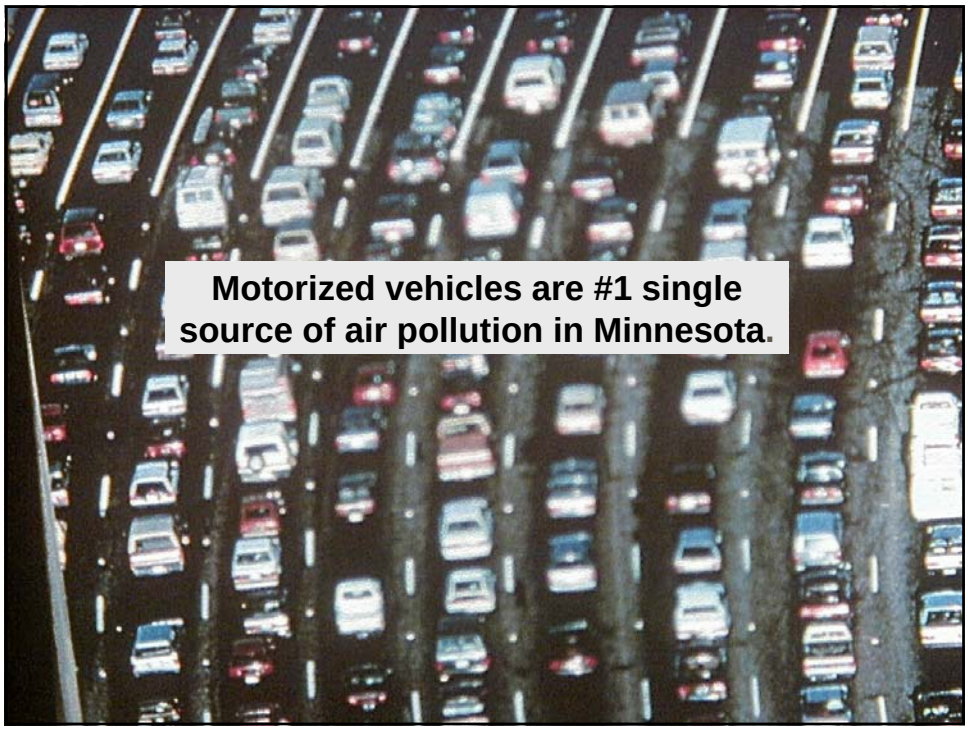

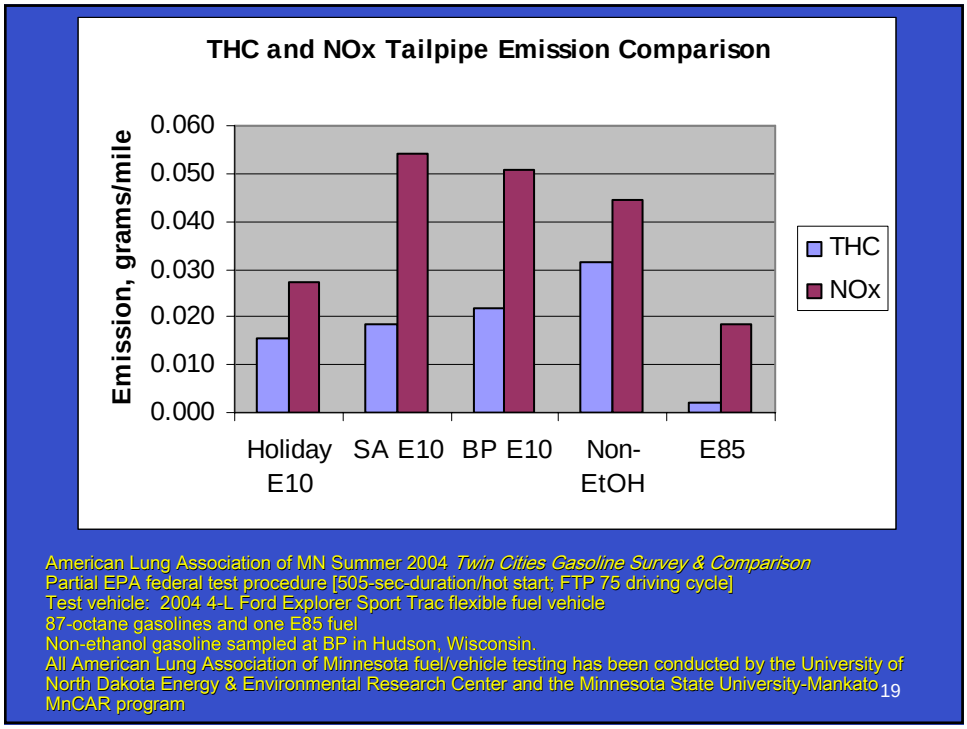
THC and NOx Tailpipe Emission Comparison
Emission, grams/mile
0.060
0.050
0.040
0.030
0.020
0.010
0.000
Holiday E10
SA E10
BP E10
Non-EtOH
E85
THC
NOx
American Lung Association of MN Summer 2004 Twin Cities Gasoline Survey & Comparison
Partial EPA federal test procedure [505-sec-duration/hot start; FTP 75 driving cycle]
Test vehicle: 2004 4-L Ford Explorer Sport Trac flexible fuel vehicle
87-octane gasolines and one E85 fuel
Non-ethanol gasoline sampled at BP in Hudson, Wisconsin.
All American Lung Association of Minnesota fuel/vehicle testing has been conducted by the University of North Dakota Energy & Environmental Research Center and the Minnesota State University-Mankato MnCAR program
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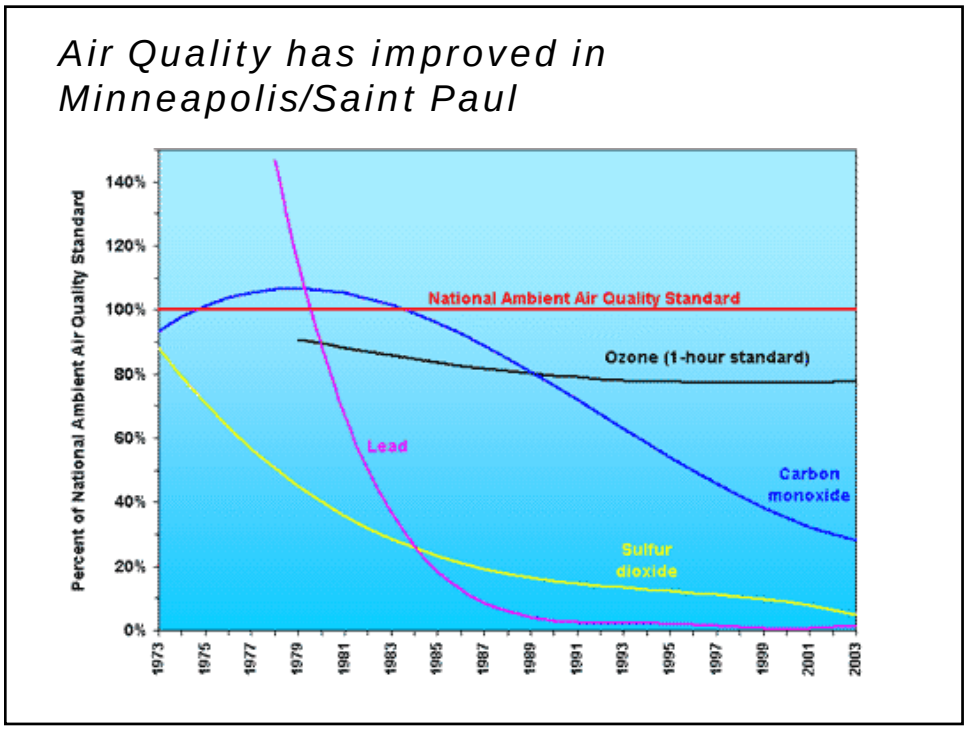
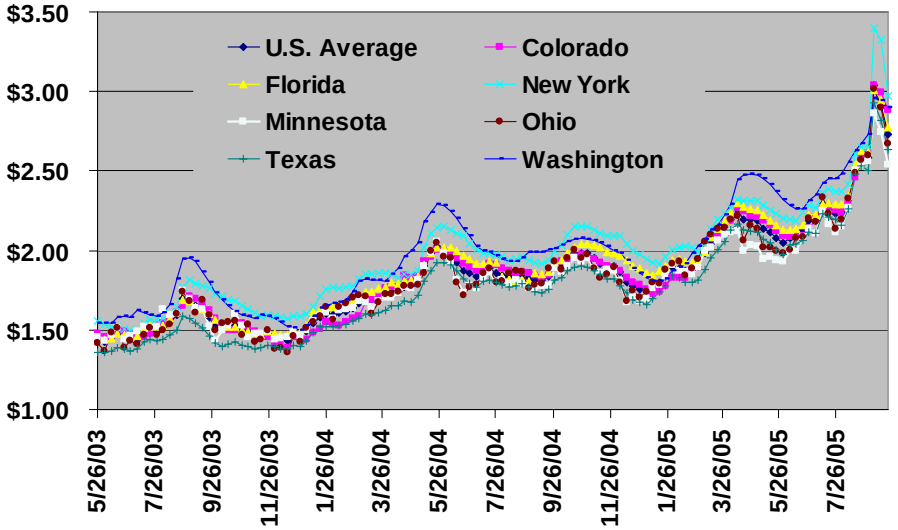
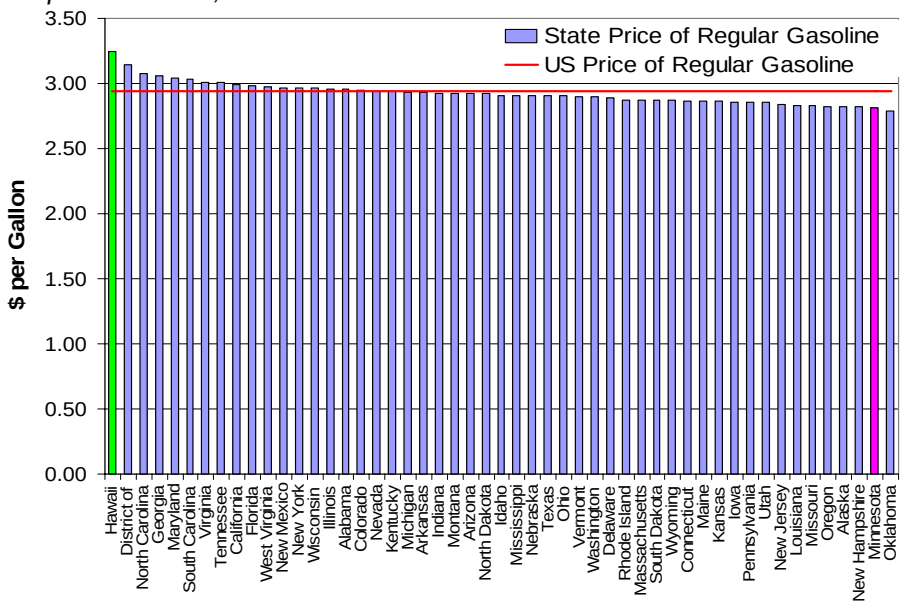

Air Quality has improved in Minneapolis/Saint Paul
Percent of National Ambient Air Quality Standard
140%
120%
100%
80%
60%
40%
20%
0%
1973
1975
1977
1979
1981
1983
1985
1987
1989
1991
1993
1995
1997
1999
2001
2003
National Ambient Air Quality Standard
Ozone (1-hour standard)
Lead
Carbon monoxide
Sulfur dioxide

Minnesota's Gas Prices are pretty good, for a state with no oil wells.

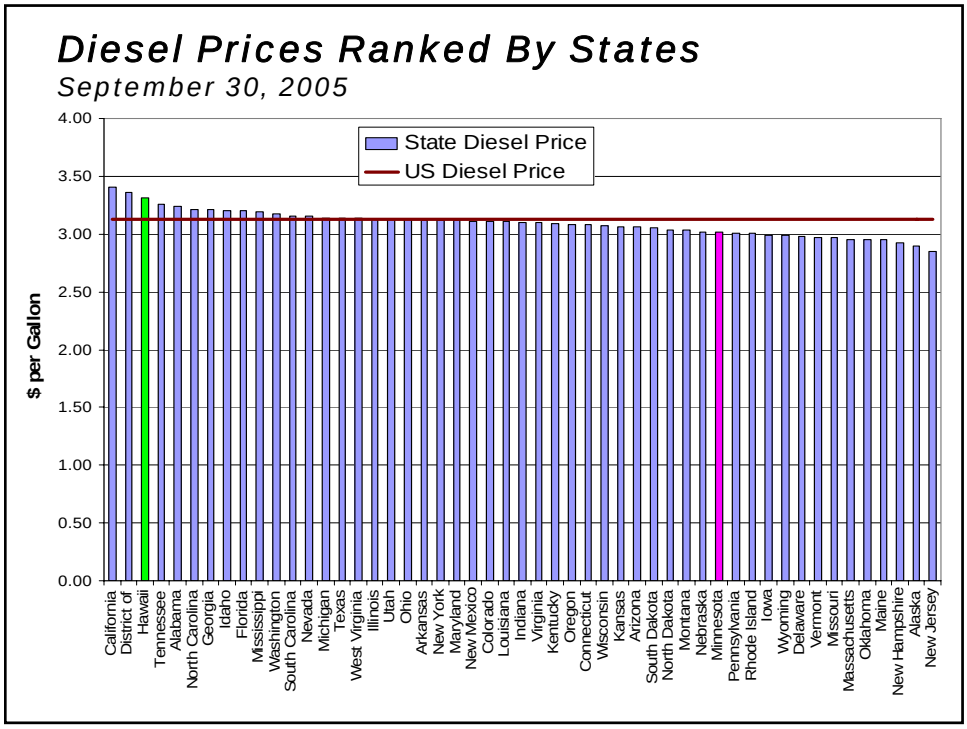


Regular Gasoline Prices Ranked by States

September 30, 2005



Source: American Automobile Association - Daily Fuel Gauge Report



MN Governor Tim Pawlenty:

"I've found criticism of good public policy ideas comes in three stages:

1. **It'll never work;**
2. **It'll cost too much; and**
3. **I thought it was a good idea all along."**

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Holiday Label - Minnesota

Super America Label - Minnesota

PDQ Label - Minnesota

Summary of Marketing Approaches

- Cleaner air / clean burning
- High octane
- American-made
- Support local jobs / agriculture
- Renewable / environmentally sustainable
- High tech
- Used in racing
- Costs less per gallon / less per mile

E10 Unleaded - Nebraska

E10 Unleaded – Nebraska

E10 Unleaded - Kansas

The benefits of E-10 Unleaded are clear.

Cleaner air: The use of E-10 Unleaded reduces toxic emissions in engine exhaust —helping keep Kansas' air clean.

Higher octane: The ethanol in E-10 Unleaded adds two to three points of octane to ordinary unleaded gasoline—helping improve engine performance.

Every major automaker in the world approves its use: From Chrysler to Volvo, every car maker says E-10 Unleaded is a good fuel choice—and many recommend its use for its clean air benefits.

Cleaner fuel injectors: E-10 Unleaded helps prevent the build-up of power-robbing deposits in fuel injection systems—keeping important engine parts cleaner.

Kansas-made product: The ethanol in E-10 Unleaded is made right here in Kansas from Kansas corn and grain sorghum —helping Kansas agriculture and boosting our economy.

Reduced dependence on foreign oil: Since E-10 Unleaded is made with renewable resources we grow right here, we help reduce our reliance on foreign oil.

Prevents gas line freeze up: The ethanol in E-10 Unleaded suspends moisture in your fuel system—eliminating the need for gas tank additives in cold weather.

Here's what a State Motor Pool official has to say about E-10 Unleaded with Ethanol:

"We have been using E-10 Unleaded with Ethanol at our facility since 2000. On average, we're using more than 250,000 gallons of E-10 Unleaded in our vehicles every year.

"That equates to millions of trouble-free miles powered by E-10 Unleaded with Ethanol. It's a fuel that's good for Kansas and good for America—and we use it every day with confidence."

Ed Spiess

Ed Spiess
Central Motor Pool

Let's get with it, Kansas! E-10

E-10 UNLEADED With 10% Ethanol

The world's automakers agree.

E-10 Unleaded is good for your car.

See inside for actual Owner's Manual statements from major automakers regarding the use of E-10 Unleaded!

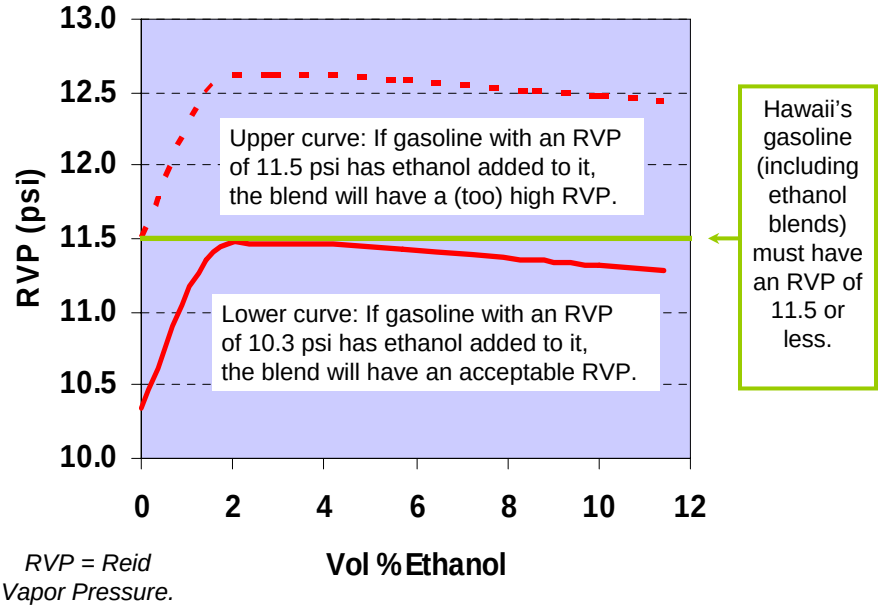
Printed with Corn/Soy Ink recycled paper

E10 Unleaded - Kansas

Why no fuel ethanol in Hawaii?

- According to ASTM specification D4814, Hawaii is volatility class “C” all year: gasoline may not have a RVP (Reid vapor pressure) greater than 11.5 psi.
- Gasoline testing report in 1989 showed that vapor pressures ranged from 9.7 to 11.4 psi.
- Ethanol raises vapor pressure. Adding ethanol to gasoline near the 11.5 psi limit would result in out-of-spec fuel.
- To blend ethanol in Hawaii, **refiners** would have to produce a suitable blendstock.

Vapor Pressure



RVP = Reid Vapor Pressure.

E10 Unleaded in Hawaii: April 2, 2006

- Hawaii Revised Statutes §486J-10
  - "Ethanol Content Requirement"
  - Enacted in 1994
- Hawaii Administrative Rules Title 15 Chapter 35
  - "Ethanol Content in Gasoline"
  - Rulemaking completed October 2, 2004
  - Blending to start April 2, 2006

Ethanol Content Requirement

- At least 85% of all gasoline in the state of Hawaii shall contain 10% ethanol.
- Exemptions may be granted:

  (1) To the extent that sufficient quantities of competitively-priced ethanol are not available; or

  (2) In the case of undue hardship.

§486J-1 - Definitions

"Competitively priced" means fuel-grade ethanol for which the wholesale price, minus the value of all applicable federal, state, and county tax credits and exemptions, is not more than the average posted rack price of unleaded gasoline of comparable grade published in the State.

Calculation of "competitively priced" ethanol

Wholesale "competitive price" for ethanol		$3.67	per gallon
value of Federal blenders credit		($0.51)	per gallon
value of exemption from State excise tax		($0.97)	per gallon
Regular (87 octane)	gasoline	$ 2.20	per gallon
Wholesale "competitive price" for ethanol		$3.80	per gallon
value of Federal blenders credit		($0.51)	per gallon
value of exemption from State excise tax		($1.00)	per gallon
Premium (91 octane)	gasoline	$ 2.29	per gallon

§486J-10 (e) - Reporting

(e) Each distributor... shall file with the commissioner, on forms prescribed, prepared, and furnished by the commissioner, a certified statement showing:

(1) The price and amount of ethanol available;

(2) The amount of ethanol-blended fuel sold by the distributor;

(3) The amount of non-ethanol-blended gasoline sold by the distributor; and

(4) Any other information the commissioner shall require for the purposes of compliance with this section.

§486J-10 (f), (g) and (h)

(f) Provisions with respect to confidentiality of information shall be the same as provided in section 486J-7.

(g) Any distributor or any other person violating the requirements of this section shall be subject to a fine of not less than $2 per gallon of nonconforming fuel, up to a maximum of $10,000 per infraction.

(h) The commissioner, in accordance with chapter 91, shall adopt rules for the administration and enforcement of this section.

Fuel price impact - caveats

- How much the consumer is expected to save, if anything, depends on the assumptions used in the calculations. Unfortunately we don't have a way to predict the price of oil or gasoline.
- What we can do is use current numbers to hopefully illustrate how the various inputs and taxes might contribute to the final fuel price of a gallon of fuel, with and without ethanol.
- If the price of oil goes up it could be more; if the price of oil goes down, it could be less. If ethanol prices are higher than those used here, the potential savings could be less; if lower, potential savings could be more.
- It could be zero; there is no guarantee that all, or any, potential savings will be passed through to the consumer. There is also no way to accurately predict the price of oil, gasoline, or ethanol.

Potential fuel price impact – 87 Octane

	REGULAR (87 Octane)					
	100% Gasoline			With 10% Ethanol		
Fuel cost	Gal.	$/gallon	$	Gal.	$/gallon	$
Gasoline Used	1.00	$2.198	$2.198	0.90	$2.188	$1.969
Alcohol Used	0.00	n/a		0.10	$2.094	$0.209
Federal Blenders Tax Credit				0.10	$0.510	$0.051
Net Fuel Cost per gallon			$2.198			$2.128
Retailing Cost/Overhead			$0.120			$0.120
Cost Before Taxes			$2.318			$2.248
Fed Excise Taxes			$0.184			$0.184
State Fuel Tax			$0.160			$0.160
State Retail Excise Tax			$0.097			$0.000
County Fuel Tax (Honolulu)			$0.165			$0.165
Cost With All Taxes			**$2.923**			**$2.757**

Regular (87 octane) gasoline with 10% ethanol could be $0.17 less per gallon

Values are based on OPIS spots for August, 2005, using price cap formula

Potential fuel price impact – 91+ Octane

	PREMIUM (91+ octane)					
	100% Gasoline			With 10% Ethanol		
Fuel cost	Gal.	$/gallon	$	Gal.	$/gallon	$
Gasoline Used	1.00	$2.288	$2.288	0.90	$2.273	$2.046
Alcohol Used	0.00	n/a		0.10	$2.094	$0.209
Federal Blenders Tax Credit				0.10	$0.510	$0.051
Net Fuel Cost			$2.288			$2.204
Retailing Cost/Overhead			$0.120			$0.120
Cost Before Taxes			$2.408			$2.324
Fed Excise Taxes			$0.184			$0.184
State Fuel Tax			$0.160			$0.160
State Retail Excise Tax			$0.100			$0.000
County Fuel Tax (Honolulu)			$0.165			$0.165
Cost With All Taxes			**$3.017**			**$2.833**

Premium (91+ octane) gasoline with 10% ethanol could be $0.18 less per gallon

Values are based on OPIS spots for August, 2005, using price cap formula

Participation / Information

- **Workshops, Feb. 8 and 9, 2006**
- **Ethanol Working Group**
- **Website: new-fuel.com**
  - Includes a “contact us” page to send questions or comments.
  - Plus, an “in depth” section with reports and presentations.

Workshops, Feb. 8 and 9, 2006

- **Gasoline Retail Station Training**
  2/8/06, 9:00 a.m. - 10:30 a.m.
- **Automotive Industry Training**
  2/8/06, 1:30 p.m. - 3:30 p.m.
- **"Ethanol Progress Report" Workshop**
  2/9/06, 9:00 a.m. - 3:00 p.m.
- **Public Recap of the "Progress Report"**
  2/9/06, 6:30 p.m. - 8:00 p.m.

Ethanol Working Group

- Formed in 2002
- Representation includes: Akana Petroleum; Alexander and Baldwin; Aloha Petroleum; ChevronTexaco; City & County of Honolulu; ConocoPhillips; County of Kauai; County of Maui; Delta-T Corporation; Department of the Attorney General; EA Engineering Inc.; ED & F Man Alcohol Inc.; Garden Island RC&D; Gay and Robinson; Hawaii Agriculture Research Center; Hawaii Lending Specialists; Hawaii Natural Energy Institute; Hawaiian Commercial and Sugar; Hawaiian Electric Company, Inc.; Honolulu Clean Cities; JN Automotive; Leeward Petroleum Inc.; Oahu Ethanol Corporation; Regent International; Shell Oil Products; State Department of Agriculture; State Department of Health; Sustainable Kauai; Tesoro; The 'Aina Institute; U.S. Postal Service Pacific Area Operations; UH/HNEI; WEG-Kauai LLC; Western Pacific Biofuels
- Three sub-groups: 1. Production; 2. Distribution; 3. Use
- Provides a forum for discussion of issues
- Next meeting: early November
- Website: www.hawaii.gov/dbedt/ert/ewg/

Gasoline Ethanol Blends

Coming to Hawaii

An Informational Workshop
For
The Motoring Public

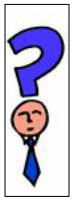
Presented by:

Robert E. Reynolds
President
Downstream Alternatives Inc.
2259 Harwood Street
South Bend, IN 46614
phone: (574) 250-2811
fax: (574) 231-8975
email: rreynolds-dai@earthlink.net

Downstream Alternatives Inc.

Ethanol Related Questions

- What is ethanol?
- Gasoline quality
- Materials compatibility
- Engine performance
- Fuel economy
- Oxygen enleanment
- Solvency effect
- Water tolerance
- Marine & power equipment use



Gasoline + Ethanol

- Ethanol raises octane about 2.5-3.0 numbers
- Increases volatility slightly
- Refiners adjust base fuel for volatility change
- Energy content drops about 2.5 to 3.0%
- Water tolerance changes
- Increased solvency effect

Gasoline Specifications & Properties

- ASTM D 4814
  Standard Specification for Automotive Spark-Ignition Engine Fuel
- Federal regulations
- State regulations
- Petroleum company standards

WHY WAIT?
CLEANER GASOLINE IS HERE TODAY.

AND EVERY GM CAR OR TRUCK
ON THE ROAD CAN USE IT. WITHOUT EVER MISSING A BEAT.

We led the advance to unleaded gasoline and gasoline blended with MTBE and ethanol to reduce carbon monoxide emissions. And we're out in front on other fuel alternatives, like alcohols, compressed natural gas, and electricity. In the past we've recommended improved fuels far in advance of federal regulations. Now we're doing it again.

GM
MARK OF EXCELLENCE

Auto Manufacturer Warranty Excerpts

Ford: Cleaner air - Ford endorses the use of reformulated "cleaner-burning" gasolines to improve air quality.

GM: Gasolines containing oxygenates, such as ethers and ethanol, and reformulated gasolines, may be available in your area to contribute to clean air. General Motors recommends the use of such gasolines, particularly if they comply with the specifications described previously.

Chrysler: Gasoline/Oxygenate Blends - Some fuel suppliers blend unleaded gasoline with oxygenates such as 10% ethanol, MTBE, and ETBE. Oxygenates are required in some areas of the country during the winter months to reduce carbon monoxide emissions. Fuels blended with these oxygenates may be used in your vehicle.

Auto Manufacture Warranty Excerpts Con't.

BMW: Fuels containing up to and including 10% ethanol or other oxygenates with up to 2.8% oxygen by weight (i.e. 15% MTBE or 3% methanol) plus an equivalent amount of co-solvent) will not void the applicable warranties with respect to defects in materials or workmanship.

Honda: ETHANOL (ethyl or grain alcohol) - You may use gasoline containing up to 10 percent ethanol by volume.

Hyundai: Gasohol (a mixture of 90% unleaded gasoline and 10% ethanol or grain alcohol) may be used in your Hyundai.

Mazda: Gasoline blended with oxygenates such as alcohol or ether compounds are generally referred to as oxygenated fuels. The common gasoline blend that can be used with your vehicle is ethanol blended at no more than 10%.

Auto Manufacture Warranty Excerpts Con't.

Mercedes: Unleaded gasoline containing oxygenates such as Ethanol, IPA, IBA, and TBA can be used provided the ratio of any one of these oxygenates to gasoline does not exceed 10%, MTBE not to exceed 15%.

Toyota: Toyota allows the use of oxygenate blended gasoline where the oxygenate content is up to 10% ethanol or 15% MTBE. If you use gasohol in your Toyota, be sure that it has an octane rating no lower than 87.

VW/Audi: Use of gasoline containing alcohol or MTBE (methyl tertiary butyl ether): You may use unleaded gasoline blended with alcohol or MTBE (commonly referred to as oxygenates) if the blended mixture meets the following criteria: Blend of gasoline and ethanol (grain alcohol or ethyl alcohol) -Antiknock index must be 87 AKI or higher. -Blend must not contain more than 10% ethanol.

Non-automotive Warranty Excerpts

Marine

Honda: ETHANOL: ethyl or grain alcohol; 10% by volume -You may use gasoline containing up to 10% ethanol by volume. Gasoline containing ethanol may be marketed under the name "Gasohol".

Outboard Marine: Using alcohol-extended fuels is acceptable ONLY if the alcohol content does not exceed: 10% ethanol by volume or 5% methanol with 5% cosolvents by volume.

Yamaha: Gasohol - There are two types of gasohol: gasohol containing ethanol and that containing methanol. Gasohol containing ethanol can be used if ethanol content does not exceed 10% and the fuel meets minimum octane ratings.

Non-automotive Warranty Excerpts Con't.

Motorcycles

Harley Davidson: ETHANOL is a mixture of 10% ethanol (Grain alcohol) and 90% unleaded gasoline. Gasoline/ethanol blends can be used in your motorcycle if the ethanol content does not exceed 10%. Reformulated gasolines use additives to "oxygenate" the gas. Your motorcycle will run normally using this type of gas and Harley-Davidson recommends you use it when possible, as an aid to cleaner air in the environment.

Honda: ETHANOL (ethyl or grain alcohol) 10% by Volume - You may use gasoline containing up to 10% ethanol by volume. Gasoline containing ethanol may be marketed under the name "Gasohol".

Kawasaki: Gasoline/Alcohol Blends – Gasoline containing up to 10% ethanol (alcohol produced from agricultural products such as corn), also known as "Gasohol" is approved for use.

Non-automotive Warranty Excerpts Con't.

ATV

Kawasaki: Gasoline/Alcohol Blends – Gasoline containing up to 10% ethanol (alcohol produced from agricultural products such as corn), also known as "Gasohol" is approved for use.

Non-automotive Warranty Excerpts Con't.

Power Equipment

Honda: ETHANOL - (ethyl or grain alcohol) 10% by volume - You may use gasoline containing up to 10% ethanol by volume. Gasoline containing ethanol may be marketed under the name "Gasohol".

LawnBoy: Use only clean, fresh, lead-free gasoline (including oxygenated or reformulated gasoline) with an octane rating of 87 or higher.

Kohler: Gasoline/Alcohol blends - Gasohol (up to 10% ethyl alcohol, 90% unleaded gasoline by volume) is approved as a fuel for Kohler engines. Other gasoline-alcohol blends are not approved.

Tecumseh: Reformulated gasoline that is now required in several areas of the United States is also acceptable.

Ethanol and Gasoline Ethanol Blends Coming to Hawaii

An Informational Workshop for The Petroleum Industry

Presented by:

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Retail Facility Operator Checklist

Investigative/Preparatory

- ❒ Verify tank material compatibility. Also submersible pumps.
- ❒ Investigate tank water problems and correct. Review history of water problems and initiate any necessary corrective action.
- ❒ Tight seals on fill caps and proper water run off from man hole covers.
- ❒ Remove water bottoms (if present). Check for tilted tanks.
- ❒ Clean tank bottom, if necessary.

Retail Facility Operator Checklist

Conversion Plan (before first delivery)

- ❒ Equip pump or dispenser with 10 micron filter. (or "water slug" filter) (Remember - SAFETY FIRST - SHUT OFF BREAKER)
- ❒ Recheck for water bottoms and remove any present.
- ❒ Issue alcohol compatible paste. Discard any old incompatible pastes.
- ❒ Confirm any applicable accounting procedures.

Retail Facility Operator Checklist

First Delivery

- ❒ Check for water. Water bottoms must be removed before first delivery of ethanol blends.
- ❒ Follow normal delivery procedures and ensure that accurate tank gauge and dispenser readings are taken.
- ❒ Verify (with transport driver) correct compartment for correct tank.
- ❒ Pumps should be shut down during initial delivery. (check company policy)
- ❒ Purge lines from tanks to dispensers. (check company policy)
- ❒ Repaint manhole covers to proper color code (e.g., API color code).
- ❒ Fill tanks to at least 80% of capacity. Keep as full as possible for 7 to 10 days.
- ❒ Test for water bottoms at the beginning of each shift for the first 48 hours after initial delivery.
- ❒ Check for water bottoms daily.
- ❒ Notify designated personnel if water is detected and have it removed at once.
- ❒ Replace filters if pump/dispenser is running slow.
- ❒ Check pump calibration two weeks after initial conversion.

Retail/Fleet Operator Checklist

Ongoing Maintenance

- ❒ **Check for water. No level is acceptable.**

Summary of

HAWAII ETHANOL ALTERNATIVES

draft report

by Stillwater Associates
Thomas Gieskes, David Hackett

Prepared for the State of Hawaii, Department of Business, Economic Development & Tourism, Strategic Industries Division

Draft report revised October 17, 2003

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EXECUTIVE SUMMARY

- The overall conclusion is that Hawaii has significant potential to economically produce ethanol from sugarcane. Large scale ethanol production could add as much as $300 million to the local economy in direct and indirect value.

- However, in the near to midterm future, it will be more beneficial for consumers, producers, the existing petroleum industry and the State of Hawaii's public finances if locally produced ethanol is not used in Hawaii but exported to California.

Hawaii's Ethanol Potential (p. viii)

- Ethanol could be produced in Hawaii at a large scale (up to 90 million gallons per year) at a competitive cost ($1.25 -$1.30 per gallon).

- Although ethanol could be produced from waste, it is likely to be more economical to use waste biomass for electricity production.

- With the federal excise tax credit, a blender of ethanol is projected to enjoy a cost advantage over base gasoline blendstock.

Considerations for Local Use (p. ix)

- For each gallon of ethanol, local refiners will lose market share and be required to modify operations and construct facilities.
- Such cost increases are offset... the price per gallon at the rack will not increase.
- Hawaii consumers' fuel expenditures would increase by 3%, due to 3% lower energy content of E10. (Note: assumes oil at $25 per barrel.)

Table 1.3 - Ethanol Potential by Island (p. 9)

Energy Crops		Hawaii	Maui	Oahu	Kauai	Total
Available Land	acres	27,000	26,000	25,500	7,000	85,500
Sugarcane	t/year	486,000	468,000	459,000	126,000	1,539,000
	MMGPY	55.9	53.8	52.8	14.5	177.0
Irrigated grass	t/year	594,000	572,100	561,000	153,900	1,881,000
	MMGPY	41.6	40.0	39.3	10.8	131.7
Unirrigated grass	t/year	486,000	468,000	459,000	126,000	1,539,000
	MMGPY	34.0	32.8	32.1	8.8	107.7
Trees	t/year	270,000	260,100	255,000	69,900	855,000
	MMGPY	20.3	19.5	19.1	5.2	64.1
Organic Waste						
Newspaper	t/year	40,200	69,900	283,600	14,300	408,000
	MMGPY	4.4	7.7	31.2	1.6	44.9
Other MSW	t/year	50,000	111,900	444,900	29,800	636,600
	MMGPY	3.0	6.7	26.7	1.9	38.2
Max Ethanol	**MMGPY**	**63.6**	**68.2**	**110.7**	**18.0**	**260.1**

Table 5.1 - Infrastructure Requirements (p. 28)

	Prod MMGPY	Usage MMGPY	Tanks Req. # x bbl	Terminal $MM	Blending $MM	Distribution cpg
Maui	40	5.3	2 x 20,000	-	0.5	-
Oahu		25.2	2 x 20,000	2.0	5.0	10
Hawaii		6.7	2 x 5,000	0.5	1.0	10
Kauai		1.7	1 x 5,000	0.1	0.2	10
Lanai		0.3	1 x 150	0.1	0.2	11
Molokai		0.1	1 x 150	0.1	0.2	11
Total	40	40	155,300	2.8	7.1	10

Table 6.1 - Hawaii Refinery Products (p. 33)

	Chevron	Tesoro	Supply	Demand	Exports
	bpd	bpd	bpd	bpd	bpd
Propane	1,500	1,500	3,000	3,000	-
Gasoline	14,000	14,000	28,000	28,000	-
Naphtha	6,000	7,000	13,000	7,000	6,000
Jet Fuel	13,000	26,000	39,000	45,000	-6,000
Diesel	5,000	14,000	19,000	19,000	-
Fuel Oil*	14,000	23,000	37,000	37,000	-
Asphalt	500	500	>1,000	>1,000	-
	54,000	86,000	140,000	140,000	-

While short on jet fuel, which is imported on a regular basis, the refineries produce more material in the gasoline boiling range than the State of Hawaii consumes. Excess gasoline type material, generally naphtha, is exported by tankers to other markets, mostly to Japan as feedstock for the petrochemical industry.

6.2.3 - Summary of Price Changes *(p. 39)*

	Gasoline	**E10**
	cpg	cpg
Base gasoline price, rack price at $25/bbl crude	**98.0**	
Volume loss effect, net of effect reduced mileage	1.7	
RVP effect	1.0	
Lower octane requirement	-1.5	
Base gasoline price for use in ethanol blending	99.2	
Gasoline component of E10 @90% blending rate		89.3
Ethanol price ex plant	127.0	
Average delivery cost to rack	10.2	
Excise tax credit	- 52.0	
	85.2	
Ethanol component of E10 @10% blending rate		8.5
Rack price for E10 gasohol blend		**97.8**

Summary of

Economic Impact Assessment for Ethanol Production and Use in Hawaii

draft report

by BBI International Consulting Division
Mark Yancey, Brian Duff

Prepared for the State of Hawaii, Department of Business, Economic Development & Tourism, Strategic Industries Division

Draft report revised November 14, 2003

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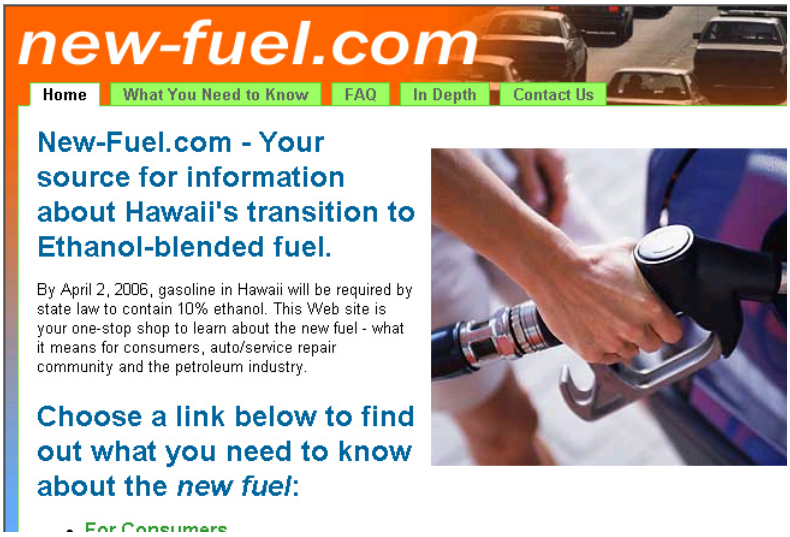
EXECUTIVE SUMMARY

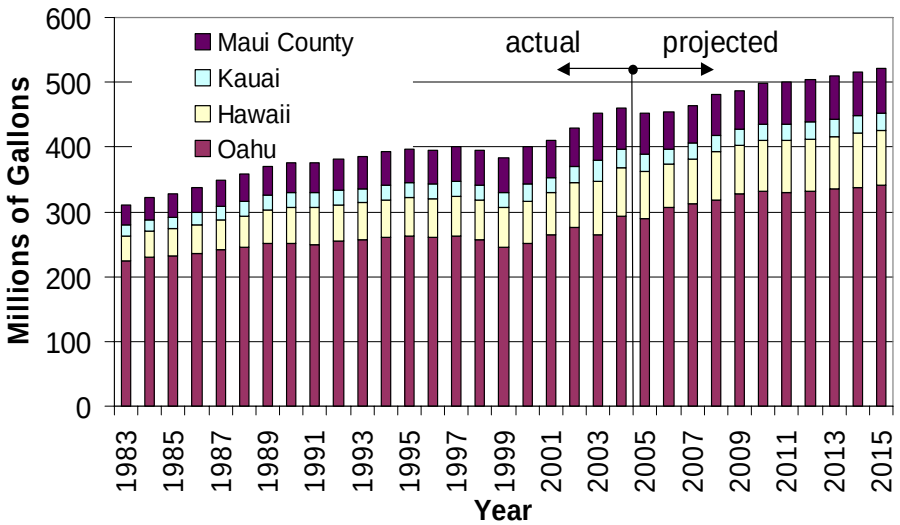
- Feedstocks are available for commercial-scale ethanol production.
- The potential in-state market potential for ethanol is approximately 41 million gallons per year (MMGY), projected to increase at an annual rate of 1.05% per year.
- A feasible scenario is 40 MMGY statewide, from three ethanol production facilities:
  - Oahu: 15 MMGY from municipal solid waste
  - Maui: 15 MMGY from molasses and sugar
  - Kauai: 10 MMGY from molasses and sugar
- Economic impact during construction is estimated to be $253 million, with an increase in personal income of $82 million.
- Annual economic activity following construction is $112 million.

Website: new-fuel.com



Reports / Presentations / Links available on new-fuel.com website

Hawaii's Gasoline Demand



Thank you!

Thank you for your time and attention.