Asia Pacific and the Emerging Bio-Fuels World

By

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Attention Focused on US Market & Bio-Fuel

- Bush energy proposals
- New *greener* Democratic party majority
- Growing concern on global warming

Yet Investors Focusing on Wrong Market

- Overall economic growth will be Asia Pacific.
- Asia Pacific has overtaken EU; Will overtake North America by 2010.
- Greatest transport fuels sector growth potential is in Asia Pacific.

Total Oil Demand

Total Oil Demand (MM B/D) (1)				
	2005	**2006**	**2008**	**2010**
NORTH AMERICA				
All Products	25.515	25.275	25.670	26.029
of which:				
Jet Aviation	1.975	1.917	1.954	2.005
Road Diesel	3.511	3.713	4.136	4.346
Gasoline	10.589	10.731	11.188	11.458
EU EUROPE (2)				
All Products	13.796	13.741	14.284	14.427
of which:				
Jet Aviation	1.155	1.196	1.268	1.317
Road Diesel	3.841	3.995	4.306	4.551
Gasoline	2.456	2.385	2.276	2.313
ASIA PACIFIC				
All Products	22.547	23.246	24.974	26.611
of which:				
Jet Aviation (3)	0.721	0.765	0.880	1.004
Road Diesel	4.388	4.669	5.172	5.573
Gasoline	3.942	4.052	4.282	4.482

Note: (1) Assumption of air travel 'green tax' for EU by 2008. Assumption that US does not change gasoline and diesel tax/tariffs and that alternative fuel vehicles begin to impact mainly gasoline demand.
(2) Excludes Estonia, Latvia, Lithuania, Slovenia, Malta, Cyprus, all non-OECD; excludes marine bunkers.
(3) We have deducted 150 MBD for the average Japanese home heating use of jet/kero from the regional demand numbers for 2005-2010 to reflect a more accurate estimate of jet used solely for aviation transport.

Asia Pacific Will Lead Absolute Volume, Percentage Growth

- As economies mature, demand shifts to the transport sector.
- Transport fuels will gain ever greater share of Asia-Pacific demand.
- *Note:* Not all gas oil is diesel/transport; all gasoline is solely transport.
- Automotive Diesel Oil (ADO), road diesel and land diesel are all synonyms for higher-quality gas oil.

Transport Fuels as % of Overall Demand

Percent Share of Transport Fuels of All Products Demand (1)				
	2005	**2006**	**2008**	**2010**
NORTH AMERICA				
Jet Aviation	7.7%	7.6%	7.6%	7.7%
Road Diesel	13.8%	14.7%	16.1%	16.7%
Gasoline	41.5%	42.5%	43.6%	44.0%
EU EUROPE (2)				
Jet Aviation	8.4%	8.7%	8.9%	9.1%
Road Diesel	27.8%	29.1%	30.1%	31.5%
Gasoline	17.8%	17.4%	15.9%	16.0%
ASIA PACIFIC				
Jet Aviation (3)	3.2%	3.3%	3.5%	3.8%
Road Diesel	19.5%	20.1%	20.7%	20.9%
Gasoline	17.5%	17.4%	17.1%	16.8%

Note: (1) Assumption of air travel 'green tax' for EU by 2008. Assumption that US does not change gasoline and diesel tax/tariffs and that alternative fuel vehicles begin to impact mainly gasoline demand.
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…. And Focusing on Wrong Bio-Fuel

- US is gasoline-focused.
- EU is veering away from gasoline (*Dieselization*).
- Asia-Pacific gas oil growth mainly road diesel
- Bio-diesel will have far greater impact on road diesel balances than ethanol on gasoline balances.

Non-Marine Transport Demand by Share

Non-Marine Transport Demand by Share (1)				
	2005	2006	2008	2010
NORTH AMERICA				
Jet Aviation	12.3%	11.7%	11.3%	11.3%
Road Diesel	21.8%	22.7%	23.9%	24.4%
Gasoline	65.9%	65.6%	64.8%	64.3%
EUROPE (2)				
Jet Aviation	15.5%	15.8%	16.2%	16.1%
Road Diesel	51.5%	52.7%	54.9%	55.6%
Gasoline	33.0%	31.5%	29.0%	28.3%
ASIA PACIFIC				
Jet Aviation (3)	8.0%	8.1%	8.5%	9.1%
Road Diesel	48.5%	49.2%	50.0%	50.4%
Gasoline	43.6%	42.7%	41.4%	40.5%

Note: (1) Assumption of air travel 'green tax' for EU by 2008. Assumption that US does not change gasoline and diesel tax/tariffs and that alternative fuel vehicles begin to impact mainly gasoline demand.
(2) Excludes Estonia, Latvia, Lithuania, Slovenia, Malta, Cyprus, all non-OECD; excludes marine bunkers.
(3) We have deducted 150 MBD for the average Japanese home heating use of jet/kero from the regional demand numbers for 2005-2010 to reflect a more accurate estimate of jet used solely for aviation transport.

Non-Marine Transport Demand (In MM B/D)

	2005	2006	2008	2010
North America	**16.075**	**16.361**	**17.278**	**17.809**
Jet Aviation	1.975	1.917	1.954	2.005
Road Diesel	3.511	3.713	4.136	4.346
Gasoline	10.589	10.731	11.188	11.458
Europe	**7.452**	**7.576**	**7.850**	**8.181**
Jet Aviation	1.155	1.196	1.268	1.317
Road Diesel	3.841	3.995	4.306	4.551
Gasoline	2.456	2.385	2.276	2.313
Asia Pacific	**9.051**	**9.486**	**10.334**	**11.059**
Jet Aviation (3)	0.721	0.765	0.880	1.004
Road Diesel	4.388	4.669	5.172	5.573
Gasoline	3.942	4.052	4.282	4.482

Note: (1) Assumption of air travel 'green tax' for EU by 2008. Assumption that US does not change gasoline and diesel tax/tariffs and that alternative fuel vehicles begin to impact mainly gasoline demand.
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Tax/Tariff System is the Key

- US tax/tariff policy favored gasoline.
- EU, Asia-Pacific tax/tariff policy favored diesel.
- Will they always?
- US prejudice against diesel is outdated.
- Ultimately more diesel can be squeezed out of an oil barrel than gasoline.
- Why not level the playing field?

Ethanol Vs. Bio-Diesel – Supports & Subsidies

- Current US ethanol has a $22/BBL subsidy; 55% tariff protection.
- Lesser subsidy support for bio-diesel, mainly mandated minimum use.
- Ethanol is based on grain; bio-diesel on a range of vegetal matter.
- Will ethanol raise US food prices; political support?

Ethanol Vs. Bio-Diesel – Technical Issues

- Gasoline is assembled now, no longer manufactured.
- Ethanol acts as a volumetric substitute for other oxygenates.
- There will always be more middle distillate than light ends yield
- Gasoline quality is fragmenting into boutique grades.
- Bio-diesel's greatest value is in upgrading low-quality gas oil.
- Bio-diesel is a supply multiplier; ethanol only adds supply marginally.
- One barrel of bio-diesel can upgrade up to 4 barrels of gas oil.
- Bio-diesel addresses three major quality issues; ethanol only one.

Gas Oil/Road Diesel Quality Specifications

- Cetane Value (Number or Index): A measure of combustion quality
- Sulfur Content (%S): A measure of pollutant in product
- Polyaromatics (PAH)/Aromatics: A measure of pollutant in product. PAH is more difficult to eliminate.
- Bio-diesel improves quality for all three.

Gasoline Quality

- Octane: A measure of ignition quality.
- MTBE: An octane enhancer used after phase-out of lead.
- Sulfur Content: A measure of pollutant in product.
- Ethanol: Only substitutes for MTBE; Ethanol replacement only mandated in US.

Quality Standards 2007/2009 – Road Diesel

Quality Standards 2006/2010 - Road Diesel			
	Sulfur	Min. Cetane	Poly Aromatics (1)
Region/Year	**Max. % Wt.**	**Number**	**PAH % Wt.**
North America (2)			
2006	0.0015	40	35
2010	0.0010	40	35
Europe			
2006	0.005	51	11
2010	0.001	51	11
Japan			
2006	0.001	52	11
2010	0.001	52	4

Notes: (1) European Commission proposed PAH of 9%Wt. for 2010.
(2) California cetane indexaverages 50 or more and CARB officials consider product specs for each refiner on a case-by-case basis.

Quality Standards 2007/2009 – Gasoline

Quality Standards 2006/2010 - Gasoline				
	Octane (1)	Sulfur	Benzene	Aromatics
Region/Year	Max. % Wt.	% Wt.	Max. % Vol.	
North America				
2006	87/92/95	0.003	0.97	25
2010	87/92/95	0.003	0.63	25
Europe				
2006	95/85	0.005	1	35
2010	95/85	0.001	1	35
Japan				
2006	89/96	0.001	1	20-25
2010	89/96	0.001	1	20-25

Notes: (1) Octane rating in North America is RON + MON/2; in Europe is RON/MON and in Japan is RON. Thus there are three octane grades in North America, one grade in Europe and two grades in Japan.

Asia Pacific Will Be Epicenter of Bio-Diesel - Supply Side

- Large number of ex-plantation economies
- Large number of continental countries with wasteland
- Substantial and growing pool of lower-quality gas oil
- Need to stretch out refinery investment

Malaysia and Bio-Diesel (As of 2/2007)

Plants/#	Capacity (MM MTA)	MBD	Gas Oil Min. Blending (MBD; 2 X)
Operating/5	1.25-1.50	9.2-11.0	18.4-22.0
Planned/86	10.50	77.2	144.4
Probable Additonal/12 (Gov't Estimate)	3.00-3.50	22.1-25.7	44.2-51.4
Capacity by 2011	4.25-5.00	31.2-36.8	62.4-73.6

Asia Pacific Will be Epicenter of Bio-Diesel - Demand Side

- Malaysia is typical of the region.
- Gas oil makes up 32% of demand barrel; Diesel 26% in 2006.
- By 2007, bio-diesel could account for nearly 12% of ADO demand.
- By 2011, bio-diesel is mandated to make up 10% of ADO blend (i.e. all ADO sales in Malaysia will have to have 10% bio-diesel content); surplus for export.

Malaysia Impact of Bio-Diesel (In MBD)

Year	Demand		Bio-Diesel Blend	As % Diesel Use
	Gas Oil	ADO		
2007	195	189	18.2-22.0	9.6-11.6%
2011	233	226	62.4-73.6	27.6-32.7%

- Road Diesel Demand 2006 – 181 MBD
- Road Diesel Demand 2011 – 224 MBD

In Regional Terms

- Asia Pacific already is the largest gas oil consumer.
- By 2010, Asia Pacific will overtake the EU.
- Diesel's share in total gas oil demand increases steadily.
- While product specifications tighten, bio-diesel is part of the solution.

Asia-Pacific Gas Oil/Diesel Demand (In MBD)

Year	Total Demand	Gas Oil Demand	% Share ADO of Gas Oil	% Share ADO of Total Demand
2005	22,732	6,943	65.1%	19.9%
2006	23,732	7,262	65.2%	21.0%
2010	26,710	8,414	65.4%	20.6%
2011	27,540	8,785	65.5%	20.9%

Why Do You Rob Banks?

- ….. “That’s where the money is!”

(Willy Sutton, Three-Times Felon, before sentenced to Ossining State (Sing Sing) Prison)

Therefore, If You Invest in Bio-Fuels

- Invest in the right fuel.
- Invest in the right place.
- Invest at the right time.

Therefore, Focus on Bio-Diesel, Not Ethanol

- Bio-diesel is less dependent on tariffs and subsidies.
- Europe increasingly is *dieselized.*
- Asia-Pacific gas oil use increasingly will be diesel.