China's Uncertain Oil Sector: The Future Is Not What It Used to Be

By

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China: Big and Getting Bigger

- Not only for Asia Pacific
- Not only in demand; but in petrochemicals and crude/products trade
- Gas and coal as much as oil
- Perspective: Less than half of US demand; tiny comparative gasoline use
- Arbiter of Asia-Pacific marginal barrel; soon global marginal barrel?

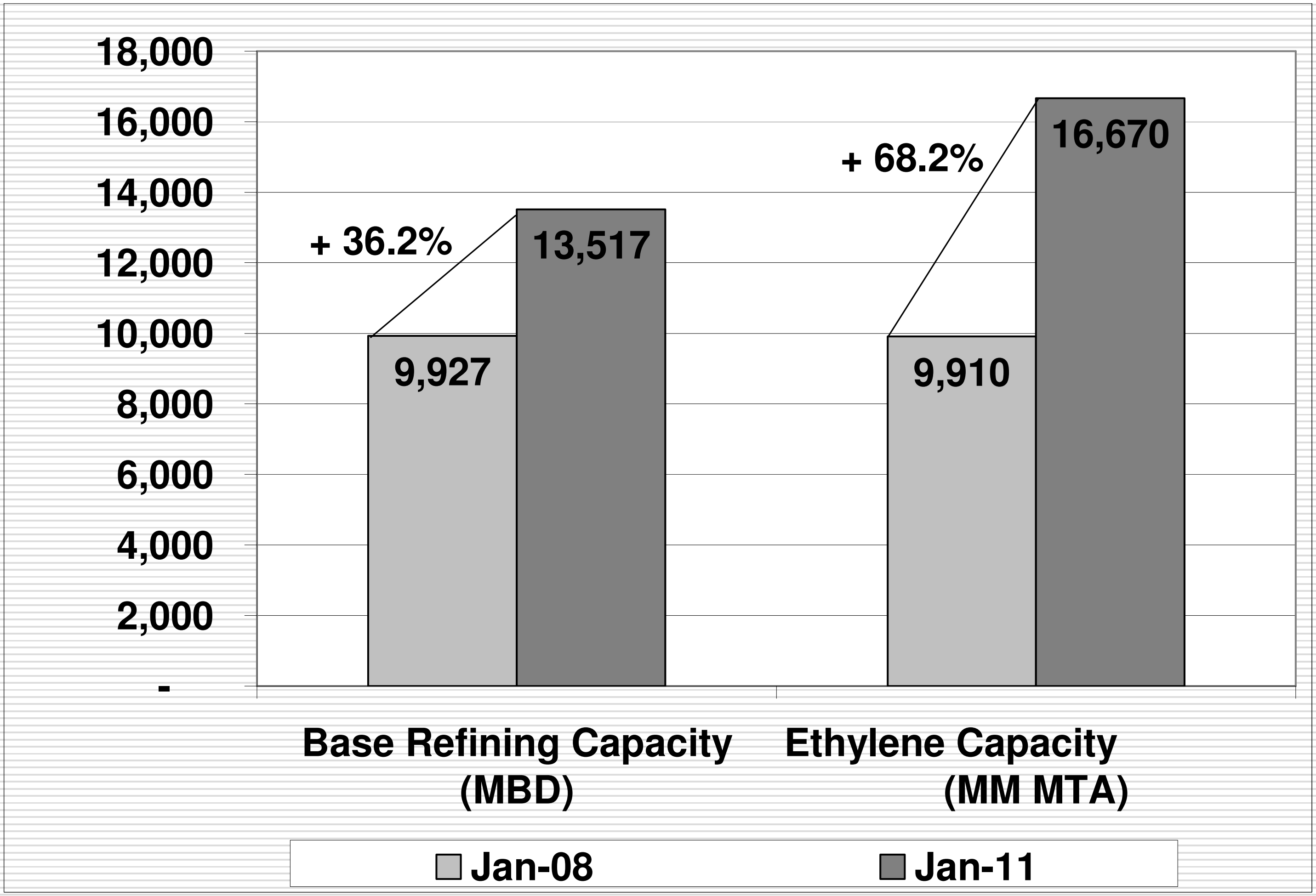
Yet Fundamental Misconceptions Abound

- No timely, accurate, public, comprehensive and coherent statistics
- In particular, lack of official demand and more important – stock figures
- International norms still lacking
- Apparent demand and balances often taken for actual

Super-Themes for the Medium Term

- Continued transition from command to market economy
- Will downstream expansion result in overcapacity?
- Security of supply
- Subsidies and unnatural demand growth
- Backing into sector reform
- The shift to transport fuels

China Refining & Ethylene Cracking Capacity



Oil Products – Medium-Term Trends Through 2014

- Move to transport in mixed-use fuel group, gas oil/diesel; kerosine/jet; fuel oil/bunker
- Significant non-transport consumption in each of above groups
- Diesel a majority of gas oil use only by 2008
- Diesel/gasoline competition crucial
- Naphtha demand ballooning

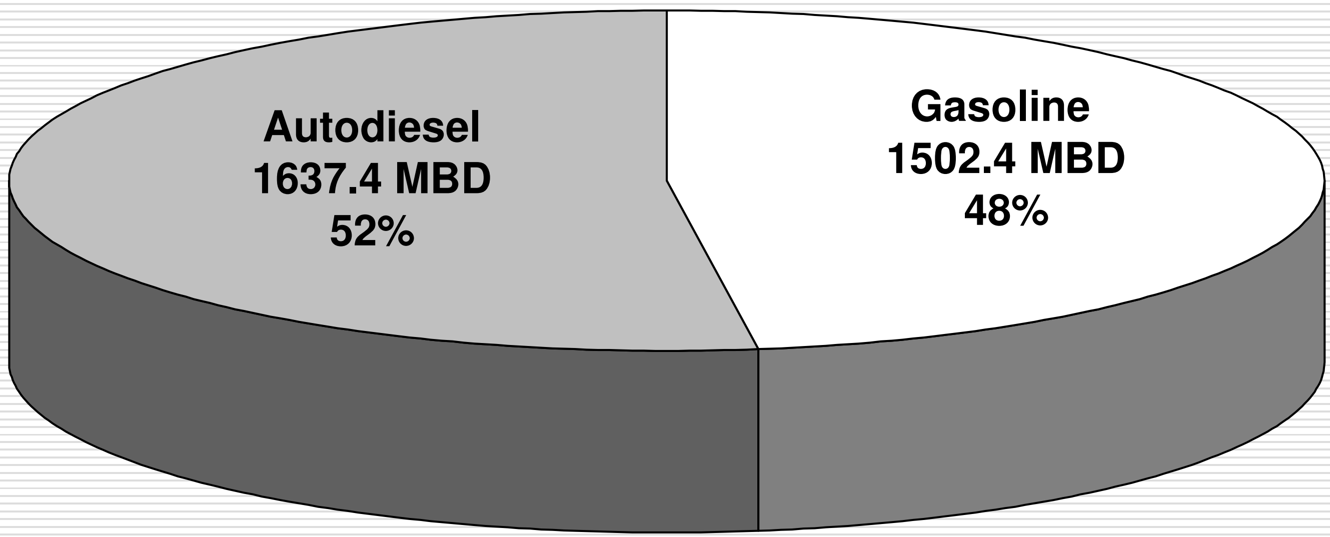
Oil Products – Longer-Term Trends (2015-2020)

- Key difference with India: Internal focus
- Becoming net importer in certain products (naphtha)
- Light ends squeeze as well as gas oil/diesel?
- Forcing increased emphasis on quality and quantity
- Yet increasingly based on foreign, sour crudes

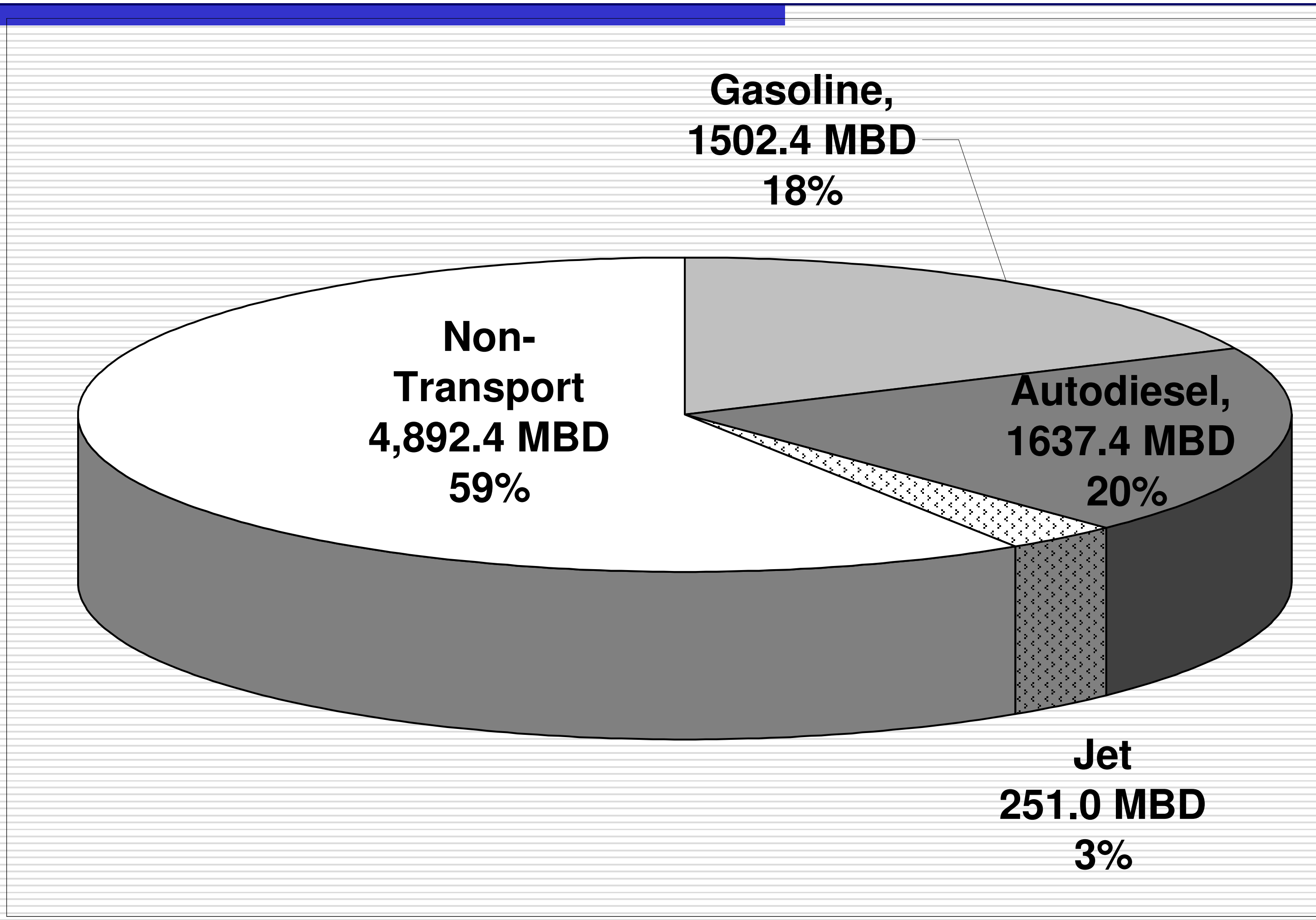
Yet Key Concern Remains Gasoline/Diesel Competition

- Foreign attention was focused on gasoline – easy to track
- Dieselization of transport fuel use due to coal
- Overburdened railroads shifted coal to trucking
- Diesel has overtaken gasoline in absolute volume demand
- Diesel about 55% of gas oil consumption
- Will overtake EU by 2015 in absolute volume; already uses far more gas oil

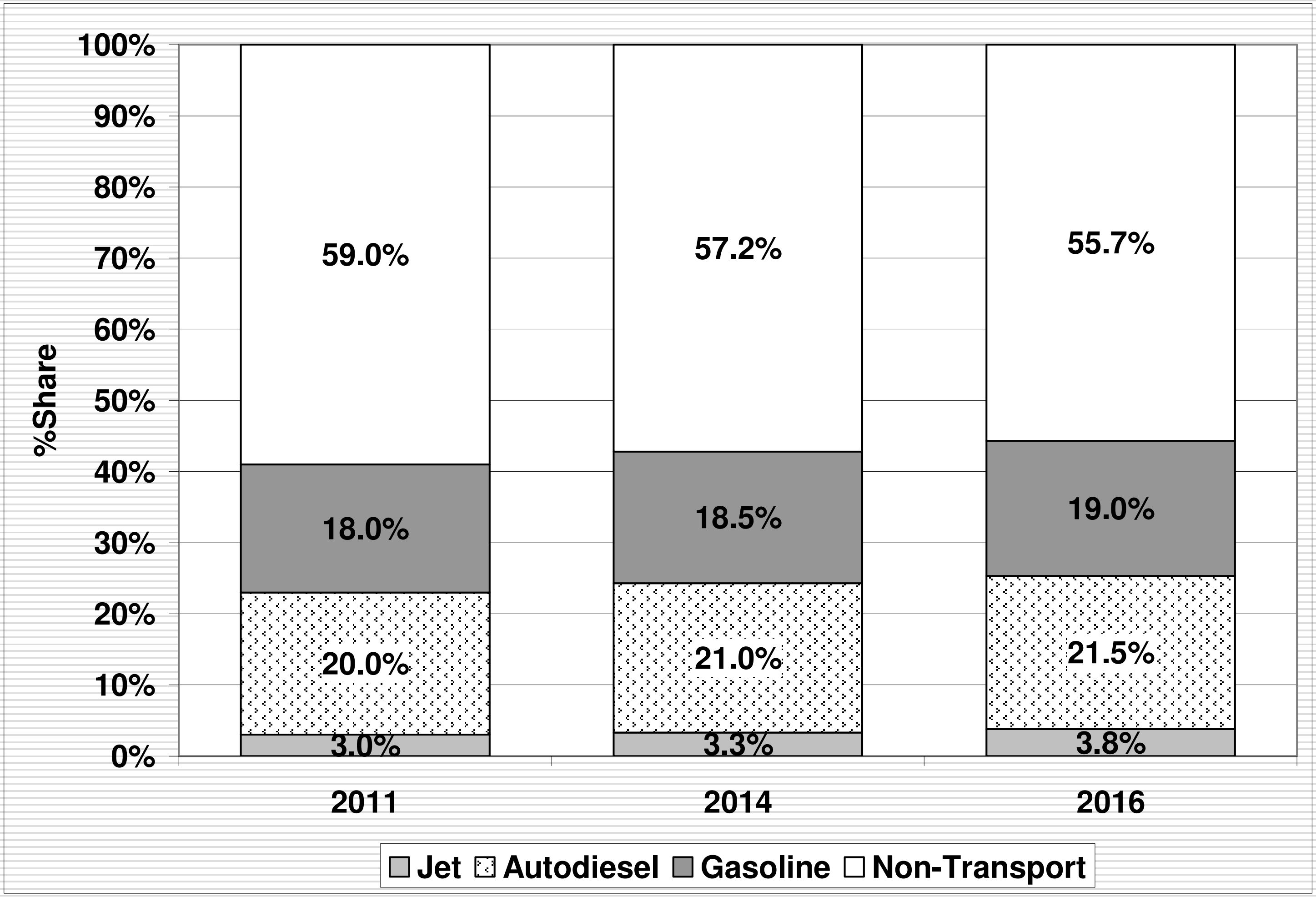
Transport Fuel Demand: Gasoline Vs. Diesel - 2010



Transport Fuel Demand: Gasoline Vs. Diesel Vs. Jet - 2010



Transport Fuel Demand Forecast (MBD; Excl. bunker fuels & LPG)



Gasoline Incremental Demand Still Strong

- Demand growth of about 5.9% in 2010
- Slowing though; Likely 5% or less in 2011
- Lesser demand growth because:
  - Growing restrictions on auto registration use
  - Increased urban congestion
- **BUT**
  - Nearly all cars still use gasoline
  - Subsidized gasoline prices encourage high demand growth

Historical Gasoline Demand (In MBD)

2003	2006	%Growth	2010	%Growth
989.1	1,178.0	19.1%	1,502.4	27.5%

East of Suez Base Petrochemicals

- Concerted drive to add base petrochemical capacity
- Naphtha demand grown even faster than gasoline
- Ethylene cracking capacity doubled 2000-2007; redoubled by 2011.
- Yet petrochemical imports have continued
- By 2009, ethylene cracking capacity equal to South Korea & Japan
- By 2011, greater ethylene cracking capacity than Saudi Arabia and Qatar together.

Ethylene Cracking Capacity/Petrochemical Naphtha Demand Forecast

	2011	2014	2016
Ethylene Capacity (MM MTA)	16.67	21.80	23.50
Naphtha Demand (MBD)	950-970	1,340-1,390	1,470-1,520

Note: Assumption of no major shift to alternate feedstock; maximizing propylene over ethylene.

The Emerging Light Ends Squeeze

- Gasoline/naphtha emerging as second pressure point
- Despite expansion, refiners hard-pressed to meet demand
- Must meet much better gasoline quality standards
- Yet gas oil/road diesel demand pressure remains
- Parallel road diesel quality standards also rise
- LPG demand at base inelastic

Gasoline & Naphtha as % of Total Demand Barrel (In MBD)

	2003	2006	%Change	2010	%Change
Naphtha	386.3	633.0	63.9%	924.7	46.1%
Gasoline	989.1	1,178.0	19.1%	1,502.4	27.5%
Naph/Gasoline Demand	1,375.4	1,811.0	31.7%	2,427.1	34.0%
%Share of Total Demand	25.0%	26.5%		29.3%	

Measures to Avoid Light Ends Squeeze

- Increase the pump price of gasoline, taxation
- Restrict vehicle ownership, urban use
- Produce diesel engine cars
- Promote alternative, renewable fuels
- Encourage alternative petrochemical feedstocks
- In particular, use of NGLs

Biofuel's Transport Impacts

- Based on non-foodstuffs
- Emphasis on ethanol
- Ethanol volumetric replacement
- Biodiesel rescues poor quality gas oil; prompts geometric rise in quality diesel avails.
- Impact, if any, only in 2nd generation biofuels

Why Biodiesel *Could* Have Impact

Primary Autodiesel Specifications

	2011		2014		2016	
	Urban	Rural	Urban	Rural	Urban	Rural
Cetane (min. #)	51	49	51	51	52 or >	51 likely
Sulfur (%Wt.)	0.005	0.035	0.005	0.005	0.001	0.005 likely
PAH Cap (%Wt.)	11		11		7-8 likely	

Q U A L I T Y

GTL, CTL, CNG as transport fuels

- GTL produces diesel, not gasoline
- China unwilling to use gas as GTL
- CTL has long-term future
- But water, distance from consumers big problems
- Compressed Natural Gas (CNG) makes sense in large cities
- Gas supply worries; tremendous infrastructure investment

China Coal-Based Oil and Petrochemical Plants (in MM MTA)

Company	Site	Technology	Capacity	Startup	Products
China Datang Corp.	Mongolia	MTO	0.400	12/2010	Polyproylene
Shenhua Coal Chemicals	Batou, Mongolia	MTO	0.600	8/2010	Polyproylene + Polyethylene
Shenhua Coal Chemicals	Ningxia	MTO	0.500	10/2010	Polypropylene
Tongliao Gold Coal	Tongliao, Mongolia	MTP	0.150	12/2009	Polypropylene
Qinghua Group	Yining, Xinjiang	SG	0.137	3Q-2011	Glycol
Xinmen Mining	Yining, Xinjiang	SG	0.200	4Q-2012	Mixed
Yintai Group & Petrochemical Products	Ordos, Mongolia	CTL	0.160	3/2009	Mixed oil
Projects Proposed but Pending					
China Power/total	unknown	MTO, Total Patent Technology	1.000	4Q-2015	Mixed Polypropylene, Polyethylene
Shenhua/Dow	Yunlin, Shaanxi	CTO	4.200	4Q-2014	1 MM MTA Olefins, 3.2 MM MTA Other Chemicals
Celanese	unknown	CTE	0.400	2013	Ethanol only; Can expand to 1 MM MTA

Notes: (1) MTO = Methanol-to-Olefins; MTP = Methanol-to-Polypropylene; SGN = Sythnetic Gas; CTL = Coal-to-Liquids; CTO = Coal-to-Olefins; CTE = Coal-to-Ethanol

Source: ICIS Data Petrochemical Database

Many Petrochemical Feedstock Choices

- Naphtha: Competition with gasoline
- NGLs: Must be removed from gas; price inelasticity
- Ethane: Large volumes needed in one place
- CTL, GTL: Could become supply supple-ments, not baseload
- Feedstocks compete on: price, conversion efficiency, availability & supply security

The Shape of Things to Come: China & Asia Pacific

- Like to export minimal low-quality product
- Increasing vulnerability to net product imports
- Regional crude import leader
- Crude import volume will only rise
- Refinery investment to shift to quality

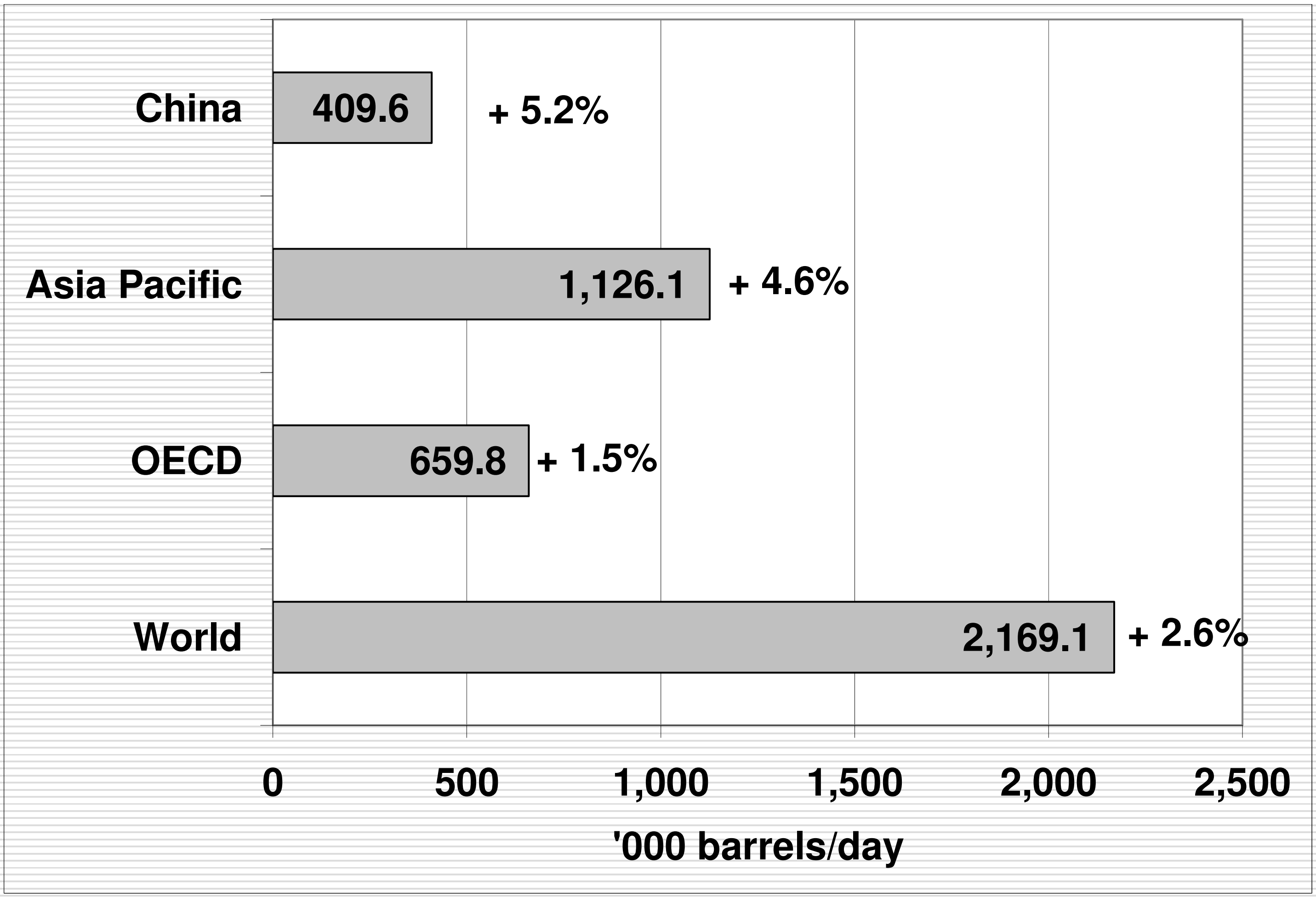
China as Products Exporter

- Focus will remain internal; minimal export ambitions
- New refining sufficient first for home market
- China will not import incremental crude just to increase product exports.

China & Geopolitical Issues

- Pipelines key to energy security
- Realize sellers can become captive
- Unwilling to challenge West in Mideast Gulf - Yet
- Focused on stable oil supply for steady growth
- Still searching for its role in world oil

Global Incremental Demand - 2010



The Shape of Things to Come: China & Global Energy

- Will demand growth slow as prices move to world levels?
- Maturing economy; better sense of proportion
- State companies as fully commercial firms?
- The growing importance of Eurasian crude and gas pipelines
- A challenge to Mideast Gulf crude exporters
- Pipelines driven by growing supply security concerns

Conclusions

- Transition to market economy long-haul process
- Realization that controlled prices encourage cancerous oil demand growth
- Coal will remain the *Big Daddy* of base energy supply
- Expect to back into price reform through energy efficiency
- Growing concerns about future supply security
- Aim for international energy sector norms; still a long way to go