### **The Oil Market in 2006** *Observations on Fundamentals and Geopolitics*

Edward L. Morse November 29, 2005





HESS ENERGY TRADING COMPANY, LLC

### **Outline of Issues Covered**

- 1. How did the market get to today's price levels ? A recapitulation
- 2. Supply versus demand fundamentals through 2008
  - Upstream and Downstream Capex vs. Demand
- 3. How dangerous/likely are external shocks?
  - Disruptions from politics and from nature
- 4. What can be done?
  - The central role of the US
  - What can the US do alone? What requires coordination? With whom?



### Prices rose by 225% from Jan. '03 to Aug. '05, 670% since Jan. '99



- Prompt crude prices have fallen by >\$12 since late Aug. peaks, but deferred prices fell less
- Appearance of demand 'destruction' from high prices
- Massive fund liquidation of at well over **300-million bbls**
- Price spike, hurricanes convinced many that underlying demand, global economic growth haves slowed
- Many convinced that a supply bubble is coming

## The upshot: a view that the recent petroleum cycle has peaked



#### The Confusing Big Picture:

## It's winter: analysts are turning "bearish" – as they do every year !

Consensus	Forecast*	Prompt Price**	Average WTI Prices
2000	\$24.36	\$22.49	\$30.20
2001	\$25.45	\$33.26	\$25.92
2002	\$20.87	\$20.39	\$26.08
2003	\$24.22	\$27.13	∖ \$31.02
2004	\$26.27	\$28.90	\$41.39
2005	\$37.33	\$50.13	\$57.36
2006	\$58.13	\$59.85	\ ??
* As of November the	e prior year **As o	f first trading day in N	lovember

2001 is the only exception, saved by 9/11



### **But forward curves remain high**



- With financial institutions, speculators no longer propping prices, these forward curves likely reflect long term conditions
- Even with a market in contango, with relatively soft current fundamentals, today's conditions appear to reflect persistent market tightness for some time to come



### What, if anything has changed?

Demand: undoubtedly high prices have reduced the rate of demand growth

OECD consumers show an unexpected ability to conserve

In some key emerging markets, especially China, price controls have rationed supply, created pent-up demand

So long as global economic growth remains robust (3.5%+), underlying demand for energy should grow

- High prices: needed to curb demand and balance markets
- During 2005, some cushions grew (crude oil and product inventories pre-hurricanes), some were used (strategic stocks in September)
- But the basic story remains the same as in 2003, 2004 and earlier in 2005: The global system remains supply-constrained and vulnerable to upside price risks
- Prices have fallen in part because of a correction, partly because of fears of the unknown (Avian Flu), largely because of an investor sell-off, much of it based on misperceptions of the markets' fundamentals

#### It will take years to overcome the problems of the past

- The global oil industry has been under-investing for a generation, working off surplus capacities generated in the 1970s
- A couple of years of increased capex, upstream and downstream, cannot create ample supply, let along cushions against disruption
- Shortages in terms of skilled manpower, equipment puts a limit on expansions
- Oil companies insist that investments cannot increase beyond long term returns



### A primer on petroleum economics

- Long-term oil prices have been remarkably stable
- But short-term prices have systematically risen and fallen above and below the average, usually rapidly and dramatically
- The long cycle of the petroleum industry has been a recurrent pattern for more than 135 years
- These cycles are an integral aspect of petroleum economics



### How the cycle works:

- The shifts from one stage of the industry cycle to the next are usually sudden, but the conditions responsible for them develop slowly over time
- Long lags in the responses of both supply and demand to price changes induce a recurring pattern of extended capacity shortages and surpluses
- These lags results in markets (and prices) consistently overreacting
- There is a large difference between the price of oil to balance current supply and demand and the price required to maintain long-term reserves and production capacity



### How the cycle has unfolded

- Until the 1970s, there was remarkable consistency of 10 years from peak to peak, trough to trough
- The differences in price of oil to balance market and to spark capacity changes increased dramatically in 1970s
- As a result price increases and decreases in 1970s and 1980s were extremely severe
- Oil supply increases and decreases in an extremely lumpy manner, bearing little relation to current prices, market conditions
- Capacity to produce oil is unstable, rising to a peak and falling rapidly in the absence of continual large-scale reinvestment
  - Opec has acted to prolong the time for adjustment



### Finally, on the theory

- Market concentration increases during periods of low prices
- Competition increases when prices are high
- Ability to control prices strengthens as production capacity is depleted; erodes as industry expands
- Non-price factors like economic growth, per capita income, demographics (urbanization and age distribution) can increase demand even when prices increase



### Measuring the "noise"

- How much will supply grow in a given period of time?
- How much will refining capacity grow over a given period of time?
- How will demand react to prices, economic activity?
- How will weather, seasonality, Opec politics, disruptions impact the market's fundamentals?
- How do financial investments impact near and longer term prices?



# What we know is that prices, spare capacity are inversely related



HETCO

## Connecting the dots - prices rise exponentially when utilization is over 90%



Annual OPEC Capacity Utilisation 1972-2004

Source: US DOE/EIA; Deutsche Bank estimates



### A word about the weight of the past

- It's relatively easy to measure under-investment in the upstream and downstream post 1981
- It's also relatively easy to measure emergency preparedness (IEA emergency stocks), lack of coordination with China, India, other emerging markets and reasons for it
- It's also gotten easier to understand the relationship between financial flows and oil prices, even though this is a controversial arena
- It has become fashionable to argue that part of the problem is upstream role of national oil companies controlling up to 80% of global reserves and 60% of global production



### Some critical problems in the oil 'business cycle' today

- There is a 'new' complex relationship in the relative weight of financial markets, oil market fundamentals, and governments in determining prices
  - Opec producers have provided an increasing "guaranteed" floor price (free put option)
  - Until this year, US provided a guaranteed riskless bet on high prices in case of tightness
- The big issue of property rights, often confused with NOCs vs IOCs, Opec vs. Non-Opec – for more than a generation US/OECD have not fostered a clear property right regime – is it too late?



### For the shorter term, what do we know about demand and elasticities?



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## There is no doubt that there is a strong correlation between GDP and oil demand





- This is undoubtedly true in the world's largest economy, the US
- It' is also true in key emerging markets – China, India, the oil producers in Opec
- Only in Japan and OECD Europe has the link been broken, largely so because of high consumer taxes on oil products

# No doubt, price spikes can impact demand in the short-term

NYMEX Gasoline, Heating Oil and two aggressive ladies



### But, can demand growth be sustained?

Global Product Demand 2003-2007 (in mmb/d)									
Year	<u>LPG</u>	<u>Naphtha</u>	Mogas	<u>JetKero</u>	<u>Gasoil</u>	<u>Fuel Oil</u>	<u>Others</u>	Total	Change
2003	7.46	5.29	20.35	6.07	21.44	10.08	8.69	79.38	1.46
2004	7.75	5.45	20.81	6.31	22.44	10.35	9.12	82.23	2.85
2005	7.92	5.66	21.42	6.45	23.05	10.10	8.98	83.58	1.35
2006	8.07	5.90	21.95	6.68	23.80	10.00	8.80	85.20	1.62
2007	8.24	6.14	22.40	6.79	24.55	10.00	8.65	86.77	1.57

We assume demand, after slowing in 2005, increases again at a slower pace



### What's Driving Demand?

- <u>Sustained world economic growth</u> Even after the price increases of 2005, IMF, World Bank continue to see 2006/07 global GDP slowing to around 3.5% from just above 4.0%
- Emerging markets should also increase oil demand at around 3.5% in 2006
- Chinese growth projected to settle at 8.5% in 2005 and 8% 2006, translating into + 500-kb/d per annum
- OPEC, other oil exporters continue their boom, with oil demand growing +500-kb/d
- US oil demand growth, after revisions, should see rises of over 200-kb/d, in gasoline and diesel



### Thus far 2005 "apparent" oil demand appears to be falling but set for a rebound

THE IEA'S VIEW OF OIL DEMAND (Actual and Projected, in mmb/d)

	2003	2004	1Q05	2Q05	3Q05	4Q05	2005	2006
OECD								
N. America	24.5	25.3	25.5	25.3	25.5	25.8	25.5	25.9
Europe	15.4	15.6	15.6	15.3	15.6	15.9	15.6	15.6
Pacific	8.7	8.5	9.5	8.1	8.1	8.9	8.6	8.7
Total OECD	48.6	49.5	50.6	48.7	49.2	50.6	49.8	50.2
Non-OECD								
FSU	3.6	3.7	3.7	3.6	3.6	4.1	3.8	3.8
Europe	0.7	0.7	0.8	0.7	0.7	0.7	0.7	0.7
China	5.6	6.4	6.5	6.4	6.6	7.0	6.6	7.1
Other Asia	8.0	8.5	8.7	8.9	8.5	8.8	8.7	8.9
Latin America	4.7	4.9	4.8	5.0	5.0	5.0	5.0	5.1
Middle East	5.3	5.6	5.8	5.7	6.1	5.9	5.9	6.2
Africa	2.7	2.7	2.9	2.9	2.8	2.9	2.9	3.0
Total Non-OECD	30.6	32.7	33.3	33.2	33.4	34.5	33.6	34.8
Total Demand	79.2	82.2	83.9	81.9	82.5	85.1	83.3	85.0



## The key growth areas have slowed down, but that's not surprising

- "Apparent" US demand growth this year is affected by strong revisions for 2004, weather, higher prices
  - Total demand up 100-kb/d through August against revised 2004 data, but up 230-kb/d against unrevised 2004 data
  - Gasoline demand up 1.2% through August on unrevised data
  - Hurricanes have affected US demand data significantly but demand growth should increase as prices fall, data are normalized
- Chinese "apparent" demand growth of under 300-kb/d wildly understates current pace of activity; our modeling shows over 500-kb/d (9%) year-on-year growth
- Projected Middle East growth of 300-kb/d may be significantly understated



## What is determining demand growth (besides price)

- ✓ Economic Growth
- ✓ Urbanization
- ✓ Per Capita Income
- ✓ Demographic growth

But, at the extreme, rapid growth accelerates demand for energy, bids up price: for China there is a 1:1 relationship between demand for energy and economic growth until growth reaches ~ 5%, and then the ratio increases rapidly toward 2:1



# Chinese demand growth is set to continue

- Chinese growth will continue, underpinned by urbanization, economic and per-capita income growth
- Total population of cities of more than 1-mm persons: 138-million; total Chinese population is 1.3-billion
- Between now and 2010, China will add 1 Houston sized city a year (2-mm each)
- Between now and 2010, China will add 5-8 new cities of 1-mm persons each
- Shanghai's ring road, 50 miles from city center, is adding, under construction 12 cities over 500,000
- On top of this, there are the Beijing Olympics Don't look for a downturn in Chinese demand until after 2008; Suspect any short-term numbers



## Opec economies matter on the demand side

- A comprehensive forecast of demand has to take into account the set of countries with the fastest economic and demographic growth rates
- In 2004 Opec economies grew by 20%, this year at a higher levels
- This translated into demand growth of 350-kb/d in 2004, and is increasing at a rate of 500-kb/d thus far in 2005



### **Confusing signals on supply**



### The supply picture in a nutshell

- Non-Opec supply is increasing at a much slower rate than demand and most of it is too sour, heavy for refining system
- Opec's shut in capacity has been used up and Opec capacity growth is paltry
- The easy growth in Russia has come to an end and will impact markets this year and next
- Corporate spending has NOT increased in proportion to growth in prices or corporate cash flow
- As production increases, so does depletion, it's misleading to look only at raw increments to supply







### Exc. Opec, 2.65-mmb/d of new output means negligible net new supply

- At 1.3% demand growth, 2005 required net additions of 1.0mmb/d plus another 4.25-mmb/d to replace depleted oil (at 5%), or gross additions of 5.25-mmb/d
- Even with additional flows, net new additions in 2005 are negligible, because of rapid depletion in North Sea, slowdown in Russia, delays in Caspian, hurricanes in Gulf of Mexico. *Total net new additions of <300-kb/d!*
- The problem becomes exacerbated over longer periods of time: to meet 2010 requirements of some 94-mmb/d, requires net new capacity of 8.85-mmb/d plus replaced depletion of 22.12-mmb/d, or a *total of 31-mmb/d of new oil not currently available*, or within five years a total new Opec
- By 2010, on this basis, required gross annual additions amount to 6.4-mmb/d, more than the entire production capacity of all producing countries today except Russia and Saudi Arabia, or the equivalent of adding a new US or North Sea each year

#### **Global crude gross additions 2004-07**



Global crude additions					
	2004	2005	2006	2007	
Non Opec	2400	1924	2316	2280	
Opec	1230	1575	1450	1020	
Total	3620	3499	3766	3300	



### But depletion is a major problem

The Devastating Impact of Depletion and Disruptions					
In Millions of Barrels per Day					
Year	Gross Additions	Net Additions			
2004	3.62	0.92			
2005	3.60	0.04			
2006	3.77	1.28			
2007	3.30	1.16			
2008	3.22	0.92			

- Depletion is dramatically impacting the North Sea, with output down from 6.39-mmb/d in 2000 to under 2.11-mmb/d by end 2005
- It is also playing a major role in Venezuela (down 1-mmb/d since 2002), Indonesia (now a net importer), the US (down 1.7mmb/d since 1990) and Iran (decline rate of 9% per annum)
- Disruptions from politics, weather contribute another 400-kb/d



#### Exxon's makes this point graphically



#### Non-Opec is showing clear signs of under-investment

- The issue is complex, controversial and much discussed
- Most International Oil Companies' CEOs assert that non-Opec crude oil can fill most demand increments
- With Opec spare capacity vanishing, with recent non-Opec output gains lagging, facts seem to tell a different story
- IEA has persistently been overly optimistic about non-Opec supply. And, when it has gotten it right, it has been for the wrong reasons (FSU out-performance)



#### Multiple factors lead to non-Opec under-investment

- Lack of prospects might be real, might be an excuse development expenditures are up a substantial 20% per annum, two years in a row; exploration has been stagnant for a decade
- IOCs have been extremely slow in raising long-term crude oil price benchmarks for investment - many have raised them from \$17 to \$21 per barrel in last two years, some have 'temporarily' lifted them to \$30 and still others to \$40, while current prices, forward curves are 50% higher
- CEOs also remember over-supply, 1998, believe demand surge temporary, see new Opec investment as threatening
- Oil firms are reluctant to give host governments extra bargaining leverage by admitting conditions are getting tighter
- Wall Street expectations loom large emphasis on total return (dividend and share price) - leads to share buy-backs, hoarding of cash, limiting capex
- Despite criticisms of higher profits, price gauging, majors have increased their share buybacks



## Majors are not willing to use their excess returns on capital expenditure

- Majors also learned a lesson from the excess capacity of the late 1990s
- Under pressure from Wall Street, majors are not prioritizing capital expenditure



Source: Deutsche Bank

## Upstream capex has not caught up in real terms to level of early 1980s

- In nominal dollars private firms spent \$100-billion on upstream in 1981
- Upstream involves:
  - Acquiring acreage
  - Conducting geological studies
  - Exploratory drilling
  - Delineation drilling
  - Development of fields and infrastructure
- After 1981, upstream capex collapsed by fifty percent

- Companies have focused on development spending rather than exploration
- Total upstream capex reached nominal \$100-bn again only in 2000.
- Total capex rose by 20% in 2000, at 5-10% through 2003, and now still <20%</li>
- Total capex still less than 50% of what it was in real terms in 1981, expected to reach \$195-billion this year


## Companies still emphasize capital discipline rather than investment

- In 2003, large integrated firms produced 24.5% total return
- In 2004 worldwide net income surged 27% to \$8 per boe, global upstream realization up 23% (\$28.13/boe), cash flow increased 20% to \$240-billion, while upstream capex increased at only 17.8%
- Funds going to development, M&A, and shareholder buybacks (J.S.Herold)





#### IOCs are focusing on Development, Acquisitions (even at high prices)

- JS Herold survey of spending shows clear emphasis on development of existing reserves, commercialization of portfolios
- Exploration remains stagnant (including acreage acquisition) and with costs rising, the result is lower real expenditures
- Proved acquisition outlays up a sharp 31%, also reflecting higher per barrel costs
- Total reserves up marginally; are likely to fall in 2005/06 because of perverse consequences on reserves of production sharing contracts, where costs are being paid back on an accelerated basis with higher prices



#### Share buybacks are increasing

- Stock buybacks doubled in 2004, exceeding spending on exploration
- By end 2005, stock buybacks will reach their highest level ever





## If you don't explore, you run out of prospects; if you lag development....













# Meanwhile replacement costs keep increasing, and will not let up soon

- Service companies face manpower, equipment shortages
- Acreage controlled by governments is more difficult to obtain
- Host countries keep raising fiscal terms and conditions





### The numbers have been disguised for a while, with FSU to the rescue...

- Since 1998, non-Opec growth has been distorted by unusual increases in FSU (about half of non-Opec supply increases)
- FSU output getting a boost from CPC pipeline (2003) and BTC line (2006)
- Two problems confront growth of FSU output, especially from Russia: export infrastructure constraints and slowing capital expenditures, partially associated with Yukos, higher taxes
- Continued robust growth of non-Opec output looks dubious



Source: EMC



## There's virtually no non-Opec growth without Russia

Non-Opec Supply Growth, Recent and Projected (in mmb/d)						
Area	2002	2003	2004	2005	2006	
Canada	2.89	2.99	3.06	3.06	3.21	
Mexico	3.59	3.79	3.83	3.77	3.77	
USA	7.63	7.45	7.65	7.31	7.53	
South America	3.72	3.75	3.95	4.12	4.18	
Europe	6.68	6.41	6.16	5.71	5.43	
Middle East	1.98	1.96	1.77	1.72	1.67	
Asia-Pacific	6.62	6.58	6.76	6.87	6.86	
Africa	2.89	2.97	3.35	3.66	4.16	
FSU	9.38	10.37	11.16	11.53	11.61	
(Russia)	7.69	8.54	9.19	9.38	9.35	
Total	45.38	46.27	47.69	47.75	48.42	
Increment		0.89	1.42	0.06	0.67	
Increment w/o Russia		0.04	0.77	-0.13	0.70	



#### The Big Hope is Opec

- But Opec has failed to increase total capacity for the past 1/4 century; indeed, some key members (Saudi Arabia, Iran, Iraq, Kuwait) have lower capacity now
- Matt Simmons has confused the picture by introducing and applying the Hubbert's Curve theory to Saudi Arabia and all of the Middle East
- The issue is not whether the resources exist (they are robust, even if overstated)
- The issue is whether governments want to lift capacity: thus far, except for Saudi Arabia, they have chosen not to do so, except incrementally, or, as in the case of Iraq, have not been able to



#### **OPEC: Testing capacity**

		1983	1990	1998	2000	2001	2002	2003	2004	2005
Saudi Arabia	10.84	11.30	8.00	9.65	9.90	9.90	10.00	10.15	10.68	11.15
Iran	7.00	3.00	3.10	3.70	3.75	3.80	3.80	3.80	3.95	4.00
Iraq	4.00	1.50	3.60	2.30	2.90	2.90	3.05	2.20	2.20	2.00
Kuwait	3.34	2.80	2.40	2.40	2.40	2.40	2.40	2.45	2.50	2.50
UAE	2.50	2.90	2.20	2.40	2.39	2.45	2.45	2.45	2.45	2.55
Qatar	0.65	0.65	0.40	0.71	0.73	0.75	0.75	0.78	0.80	0.85
Venezuela	2.40	2.50	2.60	3.30	2.98	3.10	3.10	2.60	2.60	2.65
Nigeria	2.50	2.40	1.80	2.30	2.10	2.30	2.30	2.30	2.36	2.45
Indonesia	1.80	1.60	1.25	1.40	1.35	1.20	1.10	1.00	0.96	0.96
Libya	2.50	2.00	1.50	1.45	1.45	1.45	1.45	1.45	1.65	1.70
Algeria	1.23	1.10	0.75	0.88	0.88	0.88	1.10	1.15	1.40	1.45
Total	37.76	31.75	27.60	30.49	30.83	31.13	31.50	30.33	31.55	32.26
% Util.	88%	52%	80%	91%	97%	90%	91%	95%	94%	94%

\*End year estimate

Source: HETCO

Average annual utilization >90% implies full capacity, given seasonal changes in demand



#### Opec has pledged capacity growth....eventually (but when??)

<b>Opec Production Capacity and</b>								
Expansion Plans (mmb/d)								
Country	2005	2006	2007	2008				
Saudi Arabia**	11.00	11.30	11.80	12.05				
Iran	3.95	3.85	3.95	4.05				
Iraq*	1.90	2.00	2.20	2.40				
Kuwait**	2.50	2.70	2.80	2.90				
UAE	2.55	2.65	2.85	2.95				
Qatar	0.80	0.80	0.85	0.85				
Venezuela	2.65	2.60	2.55	2.50				
Nigeria	2.50	2.76	2.95	3.15				
Indonesia	0.95	0.90	0.95	1.05				
Libya	1.65	1.70	1.70	1.95				
Algeria	1.35	1.45	1.55	1.65				
Total	31.80	32.71	34.15	35.50				

- If all goes well, Opec can add 3.7-mmb/d by 2008
- Many open questions, doubts
- Costs are slowing Saudi expansion
- Depletion impacting Kuwait
- How much capacity can Iraq restore?
- How rapid will Venezuela decline (another 200-kb/d?)
- Can Nigeria really raise capacity to 3.15-mmb/d?
- Is this too much of a stretch for Iran
- A more realistic number may be 2.0-mmb/d, barely enough to keep pace with demand

#### For key Opec countries the risks of overinvestment still loom large

- It's not what state companies want to do, it's the preference of their shareholders
- <u>The lessons of the past</u>: Crude oil is perpetually in oversupply, Opec needs to reduce supply to put a floor under prices
- <u>The lessons of 1998</u>: demand is fickle; non-Opec supply can be robust; it's hard to increase revenue by boosting output; *but, a 10% shared reduction in output can double income*



## Bottom Line: Opec will be able to continue managing the floor price well



Source: HETCO



#### And geopolitics are bound to play a critical role

- Supply disruptions are a fact of life
- 2002-2003 had two major and one minor supply disruption, with the strike in Venezuela, the attack on Iraq and internal strife in Nigeria
- Iraqi output has been slow with no exports out of the north. It will continue to follow a bumpy, unpredictable path, with intermittent severe supply shortages and intermittent excess supply
- How plausible are disruptions from Venezuela, Nigeria, Saudi Arabia? The Caspian? For how long?
- Key new suppliers are sensitive to political instabilities, Azerbaijan, Angola, Sudan
- Iran, Syria loom on the near-term horizon as well



# Downstream supply additions are limited and slow



#### **Downstream capacity limitations**

- Refinery capacity was rapidly expanded in the 1980s in pace with demand growth in the 1960s-70s
- Investments were profitable and the regulatory environment favorable
- Reduced demand in the 1980s left a lot of spare refinery capacity
- Return of capital for 20 years was very low, around 1%, average gasoline crack 1987-2000 was \$4.54
- Limited capacity investments failed to keep up with demand growth after 1999
- Investments have in part been guided by regulations
- Spare capacity in 1987 was 9.9-mmb/d, in 2004 it was less than 1-mmb/d



#### **Downstream capacity limitations**

#### Demand vs. refining capcaity spare capacity





#### As in upstream, capacity limitations affects prices





#### KatRita illustrate downstream limitations

- Hurricanes Katrina and Rita hit at the heart of the US refinery industry
  - US Gulf Coast states have 8.05-mmb/d of refining capacity, or 46% of US distillation capacity, and the highest concentration of upgrading capacity
  - 75 days after the hurricanes, over 90mmbbls of crude oil and over 175mmbbls of products have been removed from the market
- At its peak the hurricanes closed down 30% of the US refinery capacity, at the turn of the year 775-kb/d of capacity is likely to still be affected
- Hurricanes have put pressure on policy makers remove limitations, but companies are still reluctant to invest in an industry with poor investment returns



#### Lost refinery output due to KatRita





#### **Product loss due to KatRita**



![](_page_55_Picture_2.jpeg)

# How did the market solve the supply challenge? – Price and government

- The limited physical shortages, (in Georgia, Houston, some airports and local service stations) – illustrate the importance of two factors – Government and markets
- Markets helped balance the market through large price increases
  - Price increases affected demand and attracted record import volumes
  - Prompt premiums attracted products out of storage
- Government acted to make strategic reserves available and increase the potential supply pool
- <u>But;</u> spare capacity is required to work out the vulnerability of the system and related price premium
  - Significant shift in demand or substantial capacity additions

#### Will investments come to the rescue?

They will; but not in the near term

![](_page_57_Picture_2.jpeg)

## Global refinery additions - spec change and new distillation

Refinery Expansions - Annual capacity additions							
Net Additions in '000 b/d	2003	2004	2005	2006	2007	2008	
Crude Distillation	361	253	710	1191	1650	3024	
Vacuum Unit	350	285	323	425	175	154	
Hydro Crack	217	190	218	719	432	234	
Cat Crack	132	295	167	583	328	120	
Reformer	144	66	79	228	281	45	
Alkization	16	5	1	22	3	9	
Isomerization	95	40	86	87	100	0	
Desulf (all types)	409	647	293	2045	1145	703	
Coker	43	129	118	196	79	236	
Upgrading	N/A	N/A	N/A	110	224	311	
Condensate	200	11	30	32	167	311	
Vis Breaker	76	75	36	135	16	89	

### Distillation growth will at best take place towards the end of the decade

Global Distillation Growth 2003-2011 4,000 Net additions **Gross additions** 3,500 3,000 2,500 **p**(2,000 1,500 1,000 500 0 2003 2004 2005 2006 2007 2008 2009 2010 2011

![](_page_59_Picture_5.jpeg)

### And when it does it is mainly outside the OECD

**Regional distillation growth 2003-11** 

![](_page_60_Figure_2.jpeg)

![](_page_60_Picture_6.jpeg)

### **Key issues for distillation capacity**

- Growth is dominated by large scale projects, some of which are in China and India, and others that are based on increasing export capacity (principally Mid-East and in South East Asia)
- Lead times are increasingly getting longer for all projects
- A bulk of distillation growth was thought to be completed first by 2006, then 2007, now 2008
- Desulfurization units continue to crowd out other investments – but cat- and hydro- cracker investments are slowly returning
- Investments will not provide a capacity cushion until the end of the decade in the near term

![](_page_61_Picture_6.jpeg)

## The building a new refinery in the OECD is a huge challenge

- Investments in OECD refining has been limited by the lack of returns to investments
- Regulatory environment has made investments harder and more costly
- For the only new US refinery that has been approved for construction, it took 4 years to get the pollution permitting
  - In addition 18 months are needed for detailed engineering work, and 3 years for construction
  - Even with strong political pressure the will take at least 7 years

![](_page_62_Picture_6.jpeg)

# Spec changes are still dominating investments and blur the picture

![](_page_63_Picture_1.jpeg)

# Product spec change also investments, blur the picture – in the Atlantic Basin...

USA

	2006	2010E	2015E				
Sulfur Diesel (Hwy)	15ppm (2006); allow 20% at 50 Refinery, Corp. & per gallon g	0ppm level until 2009 Full implementation (incl radual requirements offroad) 15ppm required (20	15ppm – railroad 10) and marine use (2012)				
Sulfur Gasoline							
MTBE (Bans)	MTBE liability waiver remov	ved nationwide (May 2006)					
Ethanol	Renewable fuels standard, Minnesota 20% requirement (2007) MTBE removal						
Europear	n Union						
	2006	2010E	2015E				
Sulfur:		Gasoline: 10ppm sulfur (Euro V, 2009/10)					
		Diesel: 10ppm sulfur in diesel (Euro V, 2010)					
CO2:	Target: 140g/km (2008)						
<i>Marine Fuels - Sulfur</i>	1.5%limit for all fuels in the Baltic and Passenger Ferries between EU ports (2006)	1.5%limit for 0.1% for seagoing vessels a North Sea and E. birth in EU ports (2010), Gree Channel (2007) exception till 2012	t :k				

![](_page_64_Picture_3.jpeg)

#### And elsewhere...

Canada Sulfur:	2006 Gasoline:15ppm (2006) Diesel: 15ppm (mid 2006)	2010E	2015E
Australia Sulfur:	Gasoline:15ppm (2006) Diesel: 15ppm (mid 2006)		
Japan Sulfur	Gaso Dies	ne: 10ppm (2008) el: 10ppm (2007)	
China: Fuel 5 Standards <sup>(L</sup>	00ppm max Diesel: Euro II Jrban 2005) ppm (Beijing,	– 350 Gasoline: Euro IV Gasoline (150ppm) and 2007) 150ppm Diesel (350ppm) (Beijing, 2008) (Nationwide, 2010)	
China: Fuel efficiency goals	Improve fuel efficiency Imp s by 5-10% (2005)	rove fuel efficiency by 15% (2008)	
India: Gas Sulfur 500p 2005) 3	oline & Diesel: om (Nationwide, 850ppm Big Cities	Gasoline: 10ppm (2010) Diesel: 10ppm large cities, 350ppm elsewhere	
Singapore: Sulfur	50ppm (2006)		

![](_page_65_Picture_5.jpeg)

## The tightening sulfur specs delineate near term global investments

#### **Desulfurization growth 2003-09**

![](_page_66_Figure_2.jpeg)

![](_page_66_Picture_6.jpeg)

### Can the US do anything about this ?

### ... Yes, the US remains pivotal

- Enormous impact on global markets since 1990 US imports up 6-mmb/d (consumption up 4-, production down 2-) increment is larger than total consumption of all countries in world except China and equal to China
- In the geopolitics of energy, "all roads lead to Washington" – only the US is positioned to orchestrate multi-issue energy policy, regional and global energy policy; the US is a unique global, regional, systemic player

![](_page_67_Picture_4.jpeg)

### Yet US policy is problematic

- The US is mostly 'brawn' and limited 'brain,' so has limited strategic role *unless* someone at center wants to change things
- No one is in charge: Decision-making split among departments, between federal, state and local governments, and among regulatory authorities
- Internal diversity as a hydrocarbon superpower, huge consumer, importer <u>and</u> exporter, creates more noise
- At times someone "takes charge" and affects the whole system (recently the neo-cons and Iraq; in the 1990s "sanctions"; in 1980s reducing price and earnings of Russia, Iran (and Iraq)

![](_page_68_Picture_5.jpeg)

### Where the US might start

- The short term issues are obvious use strategic stocks and delineate a modern, coherent strategic stock management program
- Recognize that change is inevitable internationally with two emerging energy powerhouses that don't like the status quo – China and Russia
- Use position with China and Russia to create win-win solutions, not antagonistic solutions
- Press property rights issues as the only way out of the mess, both with the anti-status quo powers (China, Russia) and the status quo powers (mainly Saudi Arabia)

![](_page_69_Picture_5.jpeg)

# What could a changed US policy achieve?

- Market enhancing scenarios could emphasis win-win solutions, downplay win-lose conditions, with China and Russia, with impacts on Korea, Japan, others in Asia, with partners in Europe, with suppliers in the Middle East
- ✓ Full integration of China into energy security nets of OECD could modulate nascent Chinese resource nationalism (e.g. shared strategic stocks, with Japan, Korea, or in APEC or IEA contexts), alleviate pressures on others
- Understanding, facilitating Russia's energy ties to West, emphasizing market conditions, could create win-win solutions (vs. current 'transaction' oriented policy)
- ✓ Working with Russia, Japan, to solve E. Asian energy insecurity could benefit all

#### But is a changed US policy on the horizon? Not likely.

![](_page_70_Picture_6.jpeg)

#### HESS ENERGY TRADING COMPANY LLC

#### A PROFILE

HETCO is a proprietary trading company and market maker focusing exclusively on the energy business, created in mid-1997 as a joint venture between Amerada Hess Corporation and Stephen Hendel and Stephen Semlitz, two former partners of Goldman Sachs & Co., who built the J. Aron trading group in the 1980s and 1990s. It has rapidly become a major presence in both the paper and physical markets, especially in the Atlantic Basin, with offices in New York, London and Boston. HETCO has the ability to create an array of derivative market instruments to

satisfy customers' needs. At the same time, the link to Amerada Hess Corporation and the Amerada Hess system provides the group with a presence and understanding of the physical markets as well as the full credit support of the Fortune 100 company.

HETCO's professional trading team undertakes transactions in international and US-domestic crude oils, natural gas, and petroleum products. It is also active in energy swaps and derivatives,

and in weather risk management. It is one of the largest participants on both the London International Petroleum Exchange and the New York Mercantile Exchange.

HETCO works with complete discretion with its clients and partners, which include independent refiners and producers, pension funds, endowments, hedge funds, and sovereign entities.

![](_page_71_Picture_10.jpeg)
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