

MEDIUM-TERM OIL & GAS MARKETS

2010

Presented to CSIS

By

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&

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International
Energy Agency

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PART 1

OIL



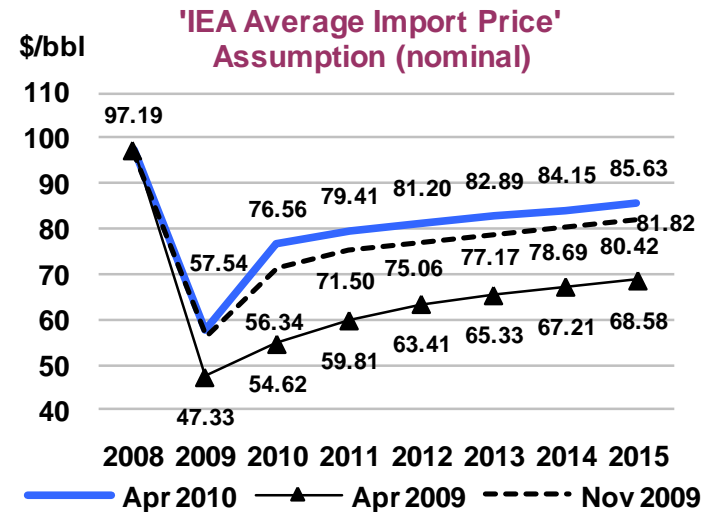
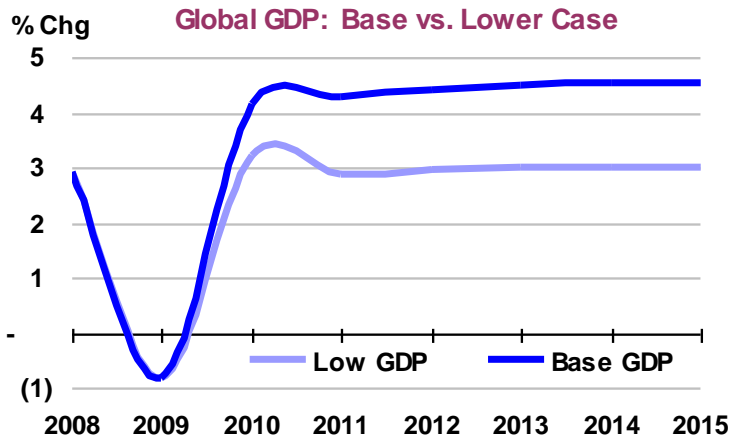
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Plus ça change...

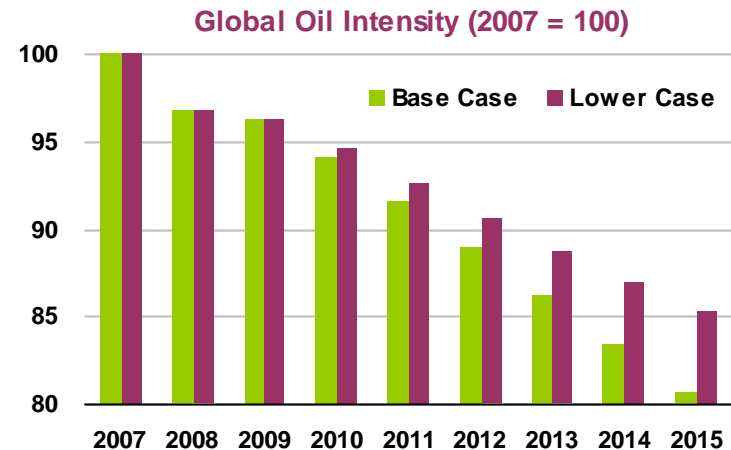
An outlook similar, but different, to 2009's

- Focus remains on **market fundamentals**, acknowledging that macro-economic & financial expectations have also played a role in 2008-2010
- Starting points – **price expectations are higher**, while both demand and supply baselines have been raised
- **Economic recovery is underway**, but uncertainties on the pace of that recovery keep the demand scenario approach in place.
- **Non-OECD remains the driver of demand growth**, bringing the issues of data transparency and end-user price subsidies into sharper focus
- **Supply-side concerns are less intense** than they were for *MTOMR 2009*
- Both mature field decline and progress on new projects have benefited from **higher spend and lower costs**
- **But are costs and lead times about to be stretched once more?**
- **OECD refining** still a difficult business, and more rationalisation to come
- **Market balances** look easier than in 2009, but much depends on sustaining investment & progress in embedding efficiency gains

Key assumptions for the 2015 outlook

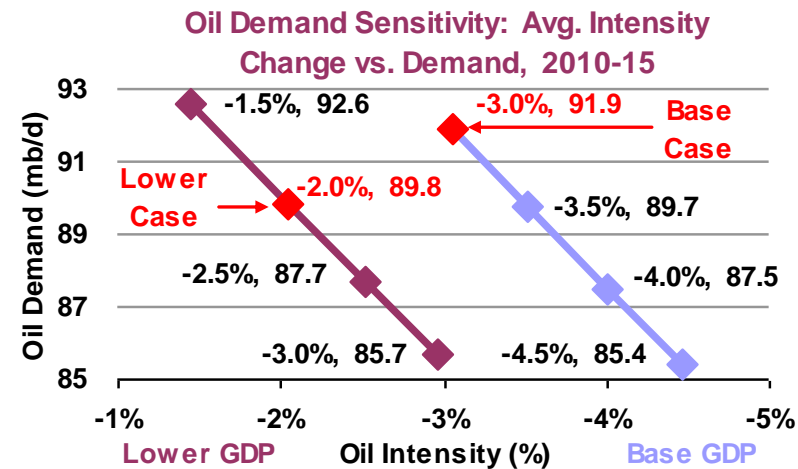
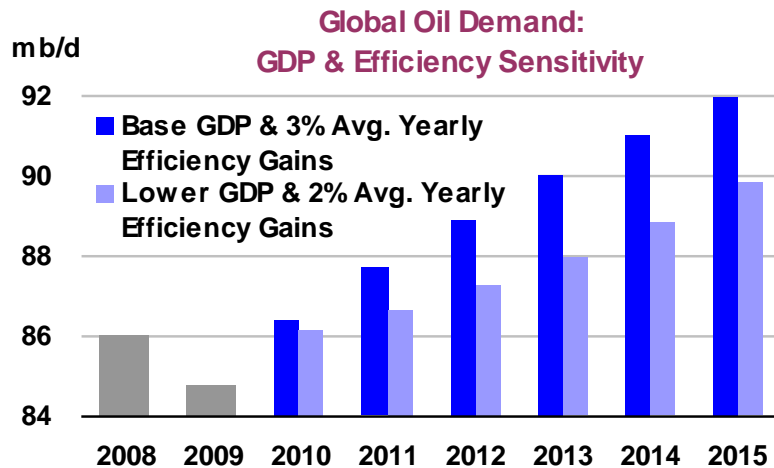


- Price based on the futures strip, averaging \$85/bbl for later years
- In real terms, \$76/bbl on average for the outlook period
- Economic uncertainty, albeit with global recovery now entrenched, sees 2 GDP cases retained
- This year we sensitise the pace of oil intensity reduction to GDP growth
- Lower GDP could weaken reductions in oil intensity to 2% annually versus 3% in base case



Income & oil intensity as key demand drivers

Augmented by price subsidies



■ Base GDP & 3% Avg. Yearly Efficiency Gains

- The global economy recovers fully from the 2008-2009 recession: +3.6% on average over 2009-2015 (+4.4% over 2010-2015)
- Existing efficiency goals are aggressively pursued as oil prices remain high; oil intensity declines by 3% on average over 2010-2015
- **Annual oil demand grows +1.2 mb/d over 2009-2015 (+1.1 mb/d over 2010-2015)**

■ Lower GDP & 2% Avg. Yearly Efficiency Gains

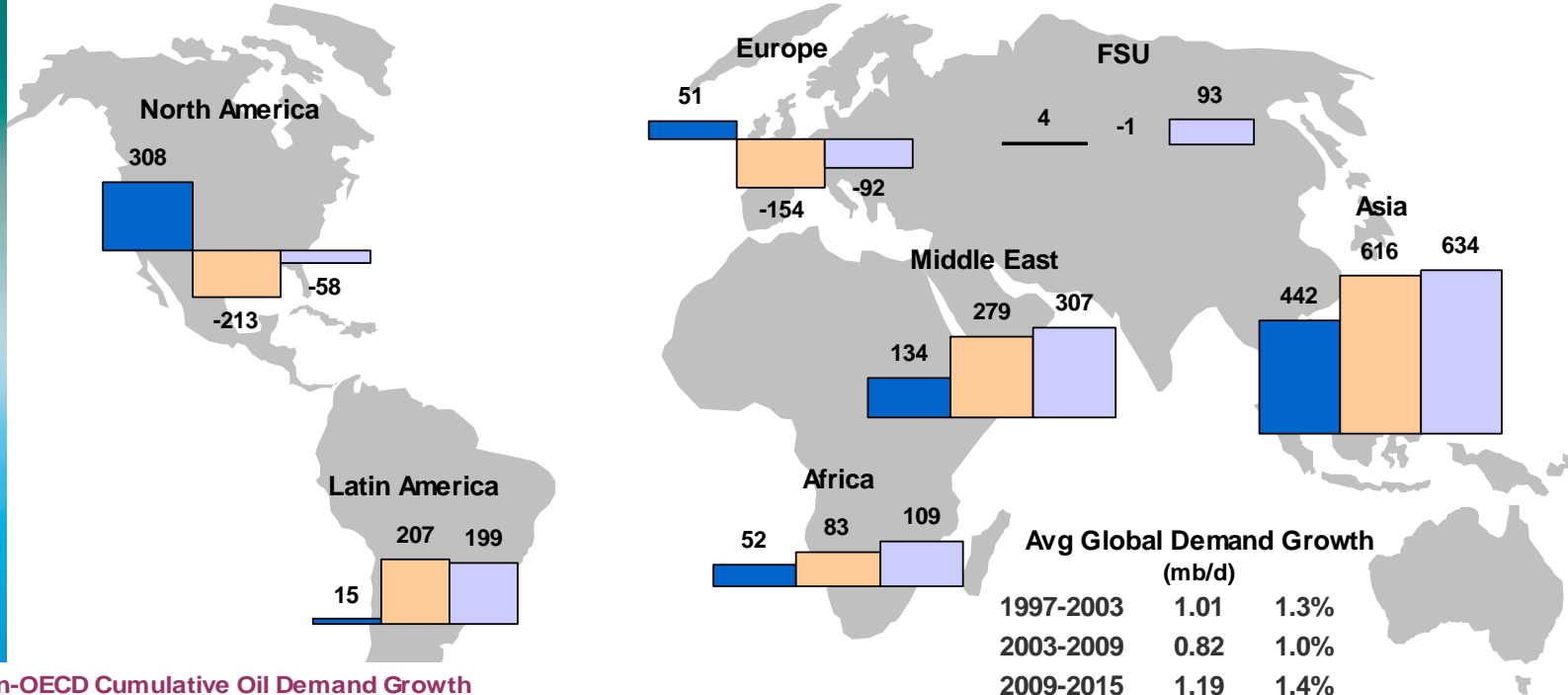
- The global economy fails to return to pre-crisis levels given persistent imbalances: +2.5% over 2009-2015 (+3.0% over 2010-2015)
- Implicitly lower oil prices mean that efficiency improves more slowly; oil intensity declines by 2% on average over 2010-2015, in line with the 15-year average to 2009
- **Annual oil demand grows +0.8 mb/d over 2009-2015 (+0.7 mb/d over 2010-2015)**

The demand big picture: Asia & the non-OECD drive growth

Average Global Oil Demand Growth 1997-2003/2003-2009/2009-2015
thousand barrels per day

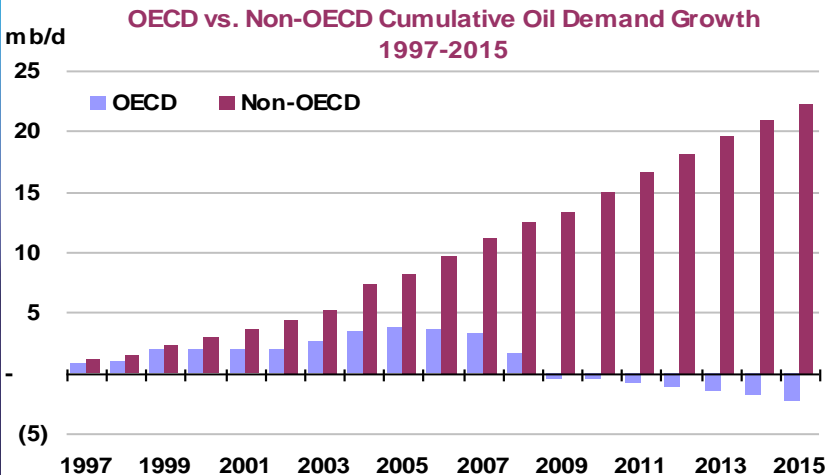
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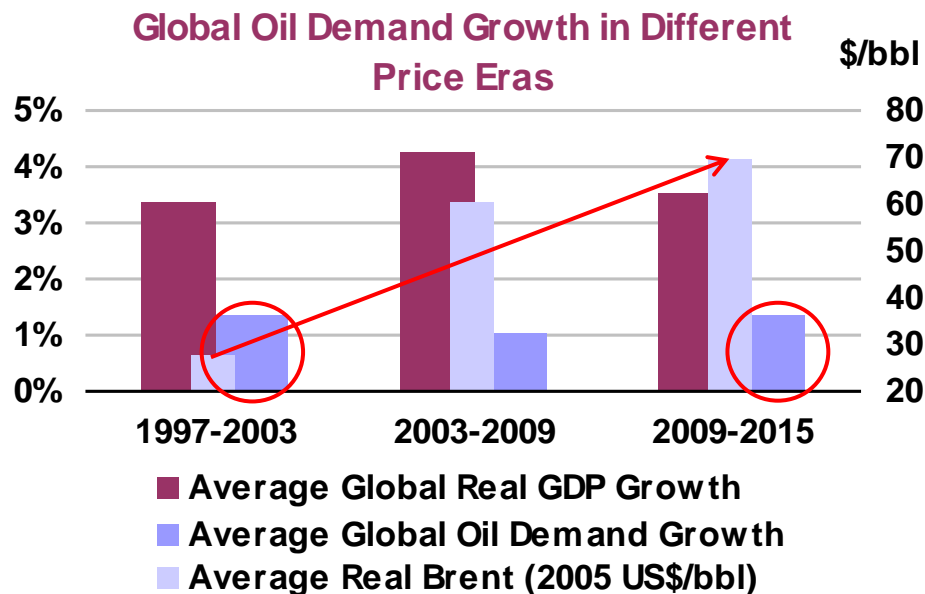
Avg Global Demand Growth (mb/d)

Period	1997-2003	2003-2009	2009-2015
1997-2003	1.01	1.3%	
2003-2009	0.82	1.0%	
2009-2015	1.19	1.4%	



- Demand growth concentrated in three regions: Asia, the Middle East & Latin America – all with heavily subsidised markets
- Asia alone generates two-thirds of growth

Efficiency & subsidies: an obvious link?



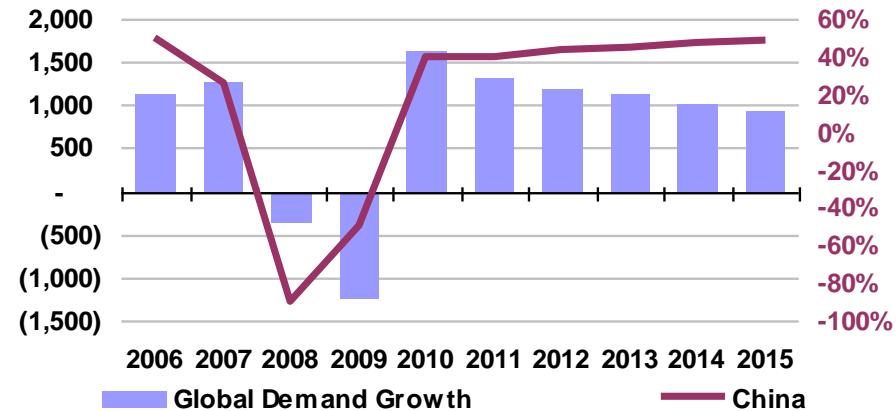
Effect of subsidies in non-OECD countries: oil prices to more than double from 1997-2003 to 2009-2015, yet oil demand growth expected to be quite similar

- End-user fuel price subsidies – social & political imperatives mask a multitude of economic efficiency impacts
 - Rampant domestic oil demand growth
 - Rising fiscal burden – as much as \$550 bn in 2008
 - Stifle demand response when international prices high
 - Fuel adulteration and smuggling
 - Benefit accrue to the rich, rather than the poor
- But widespread policy changes are unlikely before 2015 – full/partial liberalisation fraught with political obstacles

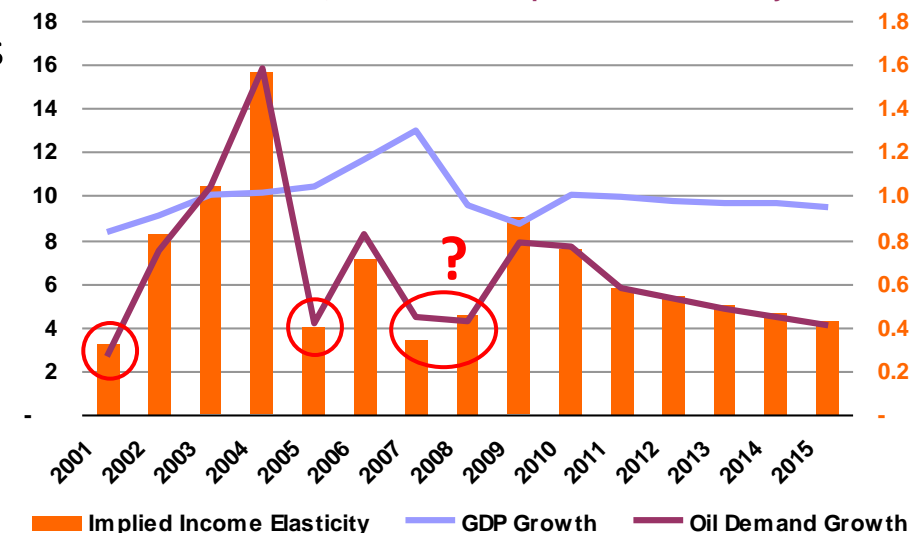
China's contribution remains the big uncertainty

- China alone could contribute almost half of global growth, with middle distillates leading the way
- But estimating demand is problematic
- Lack of data on independent refineries & stocks
- Questions over GDP data and income elasticity
- New price mechanism aligns domestic & international prices – but income remains the key growth driver
- Highlights the need for more and better data for the non-OECD markets
>50% of demand by 2015

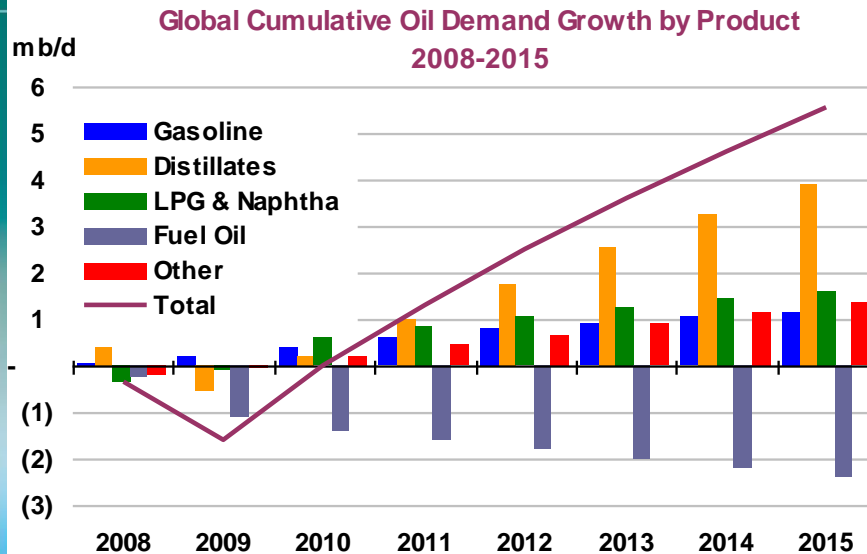
China: Contribution to Oil Demand Growth 2010-2015, kb/d



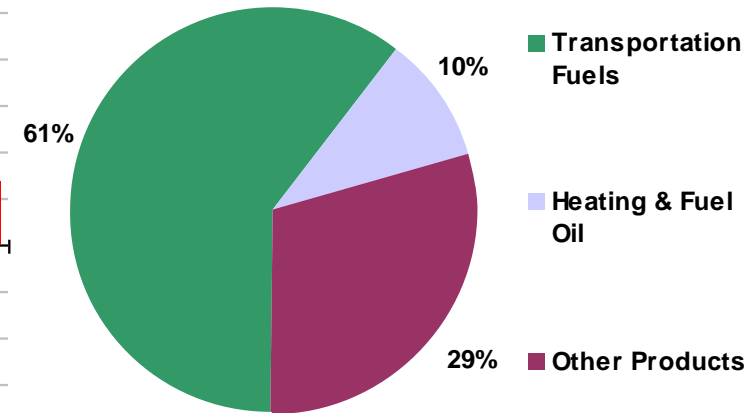
China's GDP, Oil Demand & Implied Income Elasticity



The pre-eminence of transport fuels...

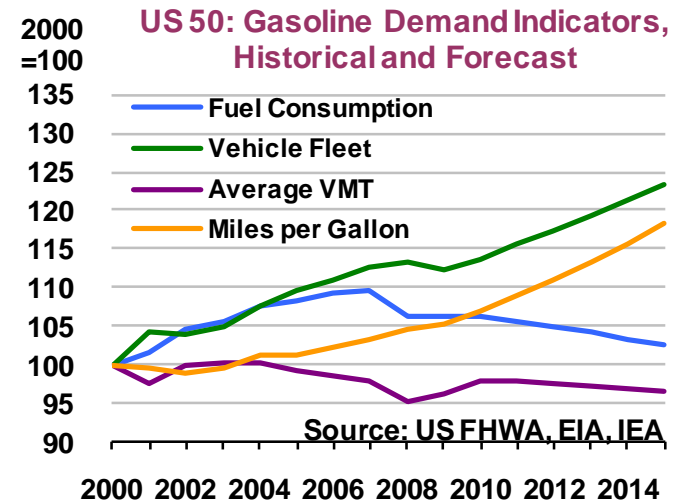
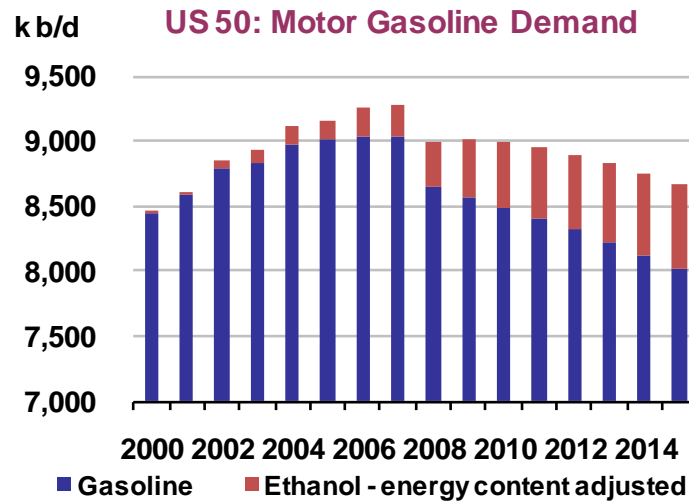


World: Total Oil Product Demand by Type of Product, 2015



- The transportation sector is the most important demand driver
 - A common theme in both cases with different pace
 - Non-OECD: demand for **gasoline and distillates** (jet fuel/kerosene and gasoil) accompanies the rise in burning fuels (heating and residual fuel oils) and industrial feedstocks (LPG, naphtha and 'other products') consumption
 - OECD: **modest transportation fuel demand growth**, insufficient to offset the structural decline in burning and industrial fuels
- The wild card: the adoption of new, disruptive technologies

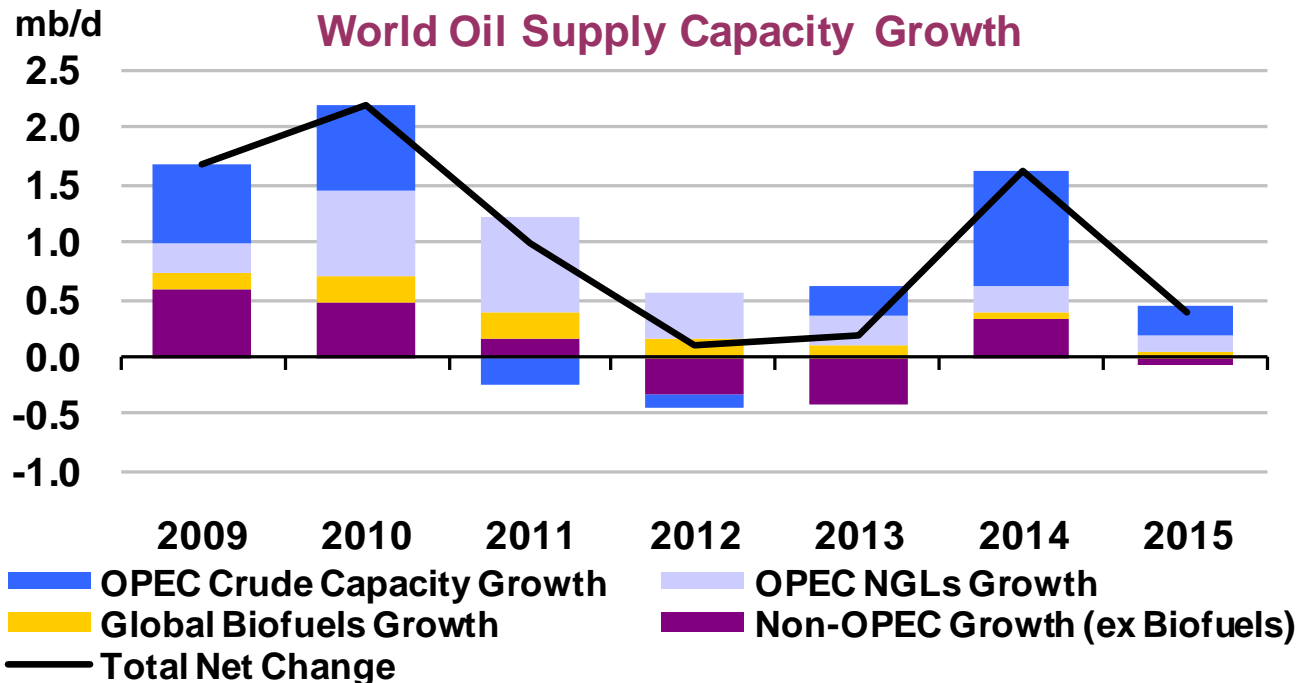
...Despite evaporating US gasoline demand



- US gasoline demand should decline by 0.6% annually from 2009-2015
 - Increasingly stringent 2012-2016 fuel economy rules
 - Further downside cyclical pressure from higher oil prices & potentially persistent long-term unemployment
 - Subtraction of ethanol blending to curb oil-based gasoline consumption
- But demographics and technology developments will play crucial long-term role

Oil supply looks stronger...

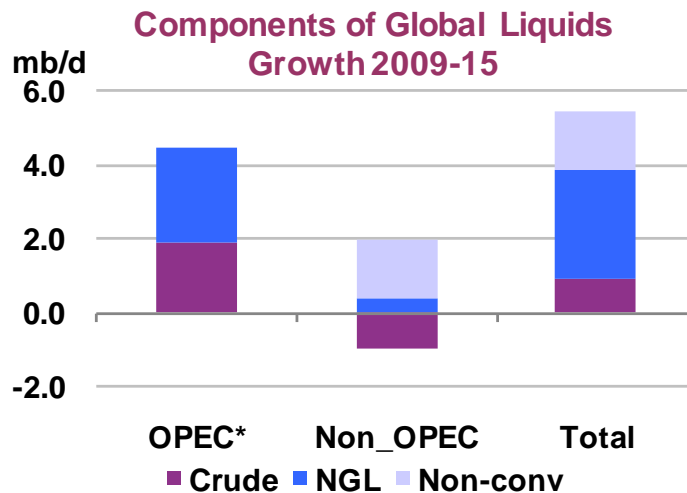
But growth to remain constrained



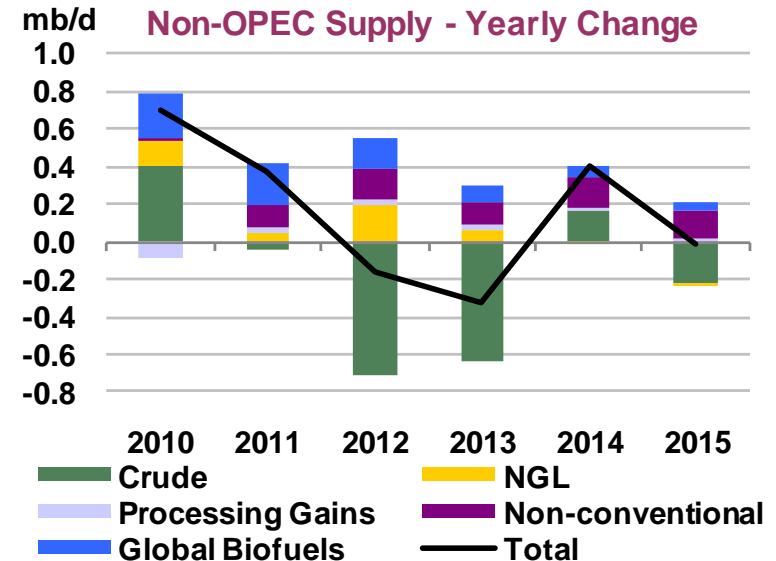
- Higher prices, lower costs & initial signs of increased upstream spending raise both the supply baseline and expected growth
- Global supply grows from 91.0 mb/d in 2009 to 96.5 mb/d in 2015
- Higher baseline due to revised non-OPEC, but increments mainly from OPEC crude (+1.9 mb/d) and NGL capacity (+2.6 mb/d)
- The implied decline of baseload supply is also slightly slower, though this still costs 3.1 mb/d of capacity each year
- Expansion of 1 mb/d annually looks like as much as the sector can do, and *Deepwater Horizon* reinforces the idea of perpetual supply-side risks

NGLs to provide 60% of global supply growth

Non-OPEC: unconventional offset conventional decline



*OPEC crude is capacity additions

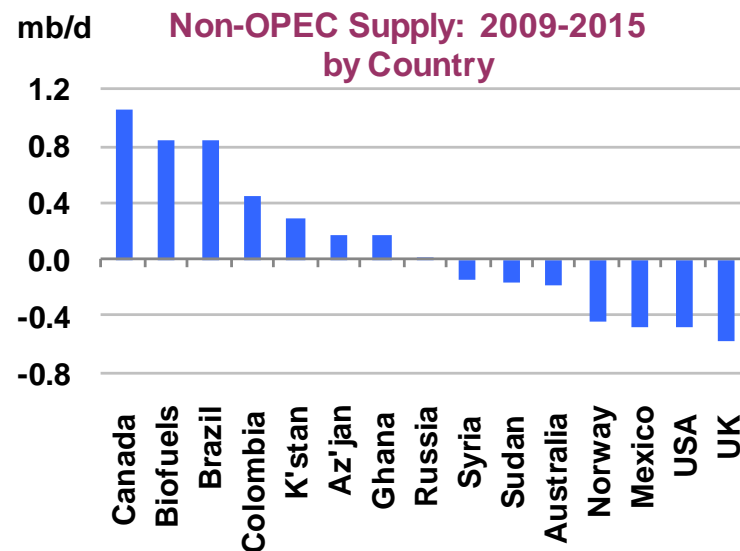
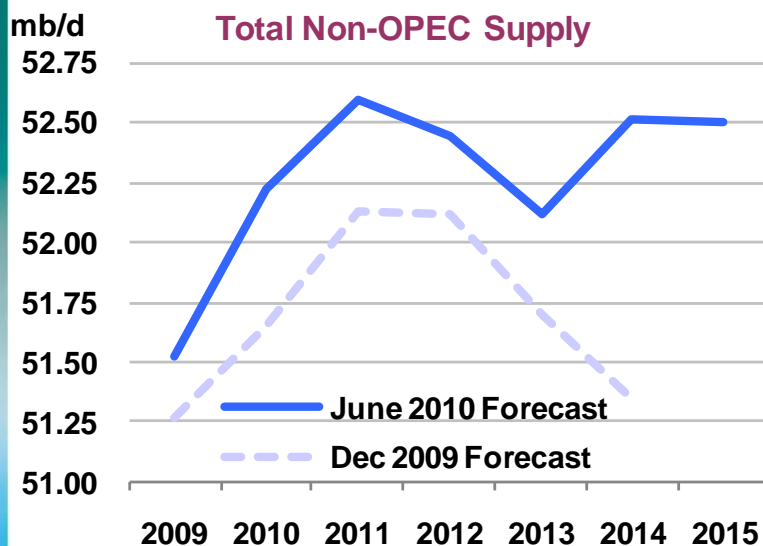


- **Global supply capacity 2009-2015:** NGLs (largely from OPEC producers) grow from 10.8 mb/d in 2009 to 13.8 mb/d in 2015 – contributing a full 55%
- **Driven by large-scale gas and LNG developments,** but also more efficient capture of deeper, wetter formations and incentive to curb flaring
- **Non-OPEC: decline in conventional crude** (-1.0 mb/d) offset by increases in biofuels (+0.8 mb/d), NGLs (+0.7 mb/d), other unconventional oils (+0.5 mb/d)

Non-OPEC outlook stronger

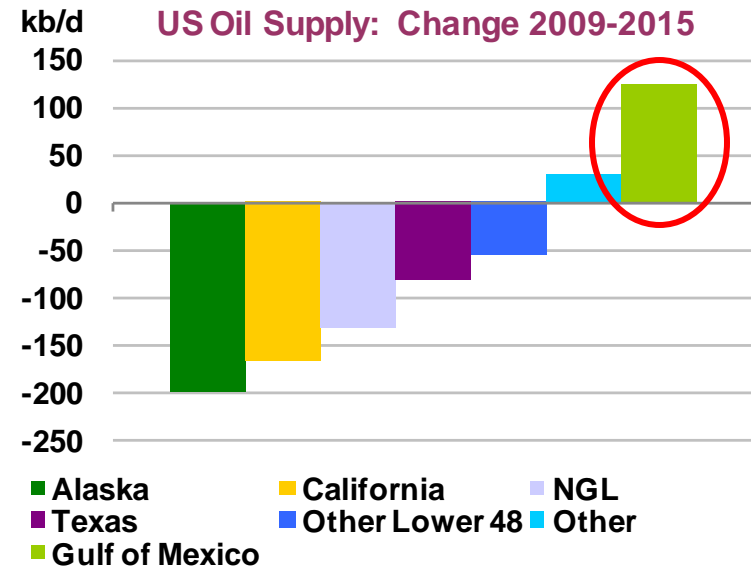
But crude still declining

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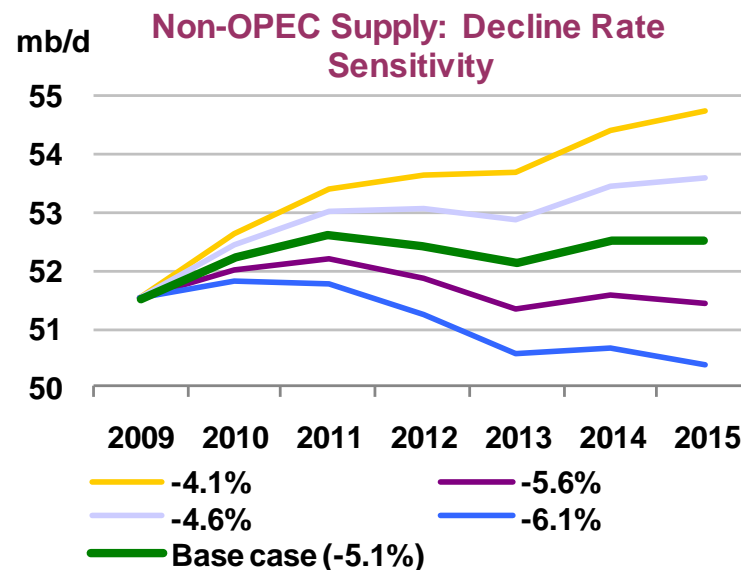
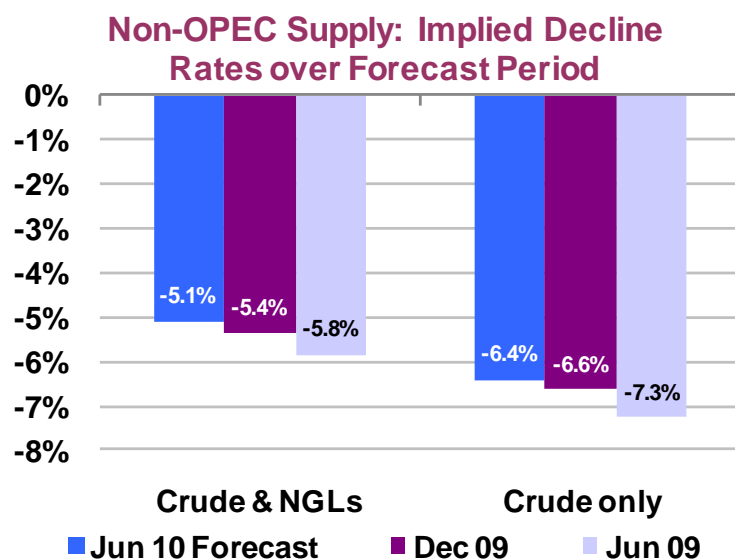
- Non-OPEC supply grows 1.0 mb/d to 52.5 mb/d in 2015
- More optimistic outlook as 2009 supply came in stronger than expected – including Russia, Colombia, North Sea & Mexico
- Future growth comes from Canadian oil sands, biofuels, Brazil, Colombia and Caspian; strong decline in North Sea, US, Mexico
- Decline in crude (-1.0 mb/d) offset by increases in biofuels (+0.8 mb/d), NGLs (+0.7 mb/d), other unconventional oils

Final toll of *Deepwater Horizon* still uncertain



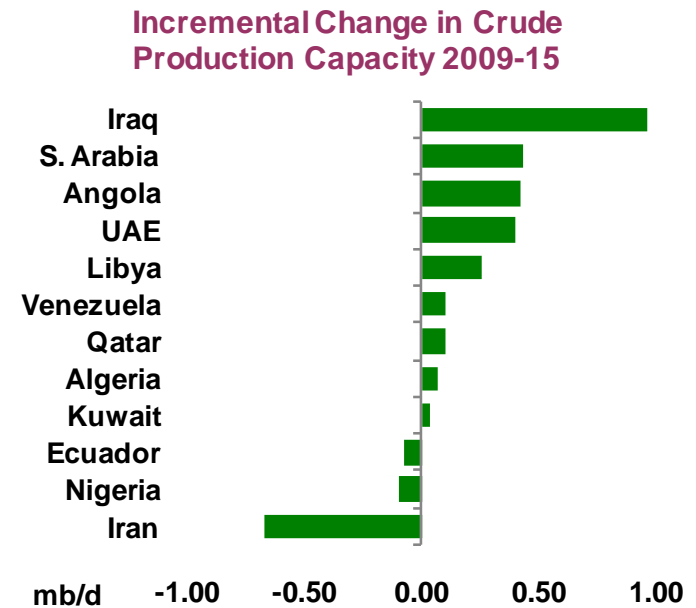
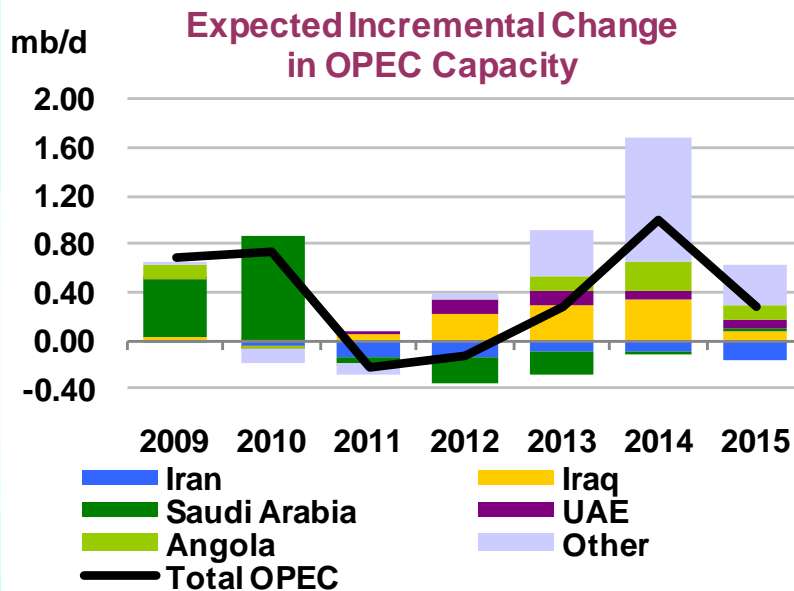
- While disastrous for the environment and regional economy, the short-term impact ***on oil markets*** of Gulf of Mexico oil spill has minimal: minor shut-ins and impact on shipping/refining
- But **potential delays** to new deepwater oil could curb output (1-2 year delay could slash 100-300 kb/d from 2015 US production)
 - **NOT YET FACTORED IN TO OUR BASE CASE OUTLOOK**
- **More widespread delays** to deepwater offshore development (e.g. Angola, Brazil, Nigeria) could curb a further 500-600 kb/d

Non-OPEC: reactivated upstream projects and slower observed decline



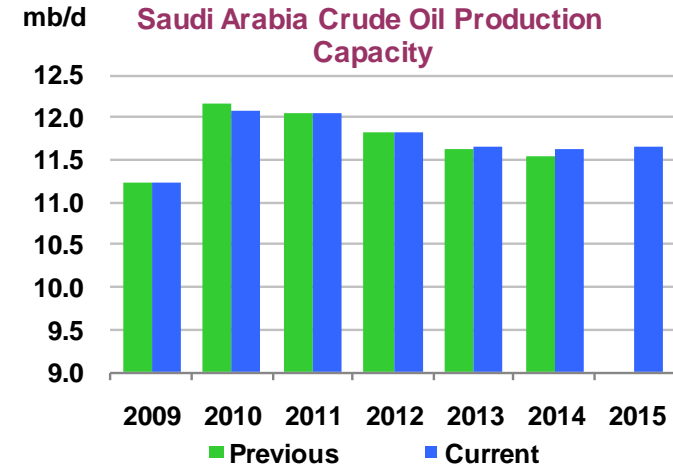
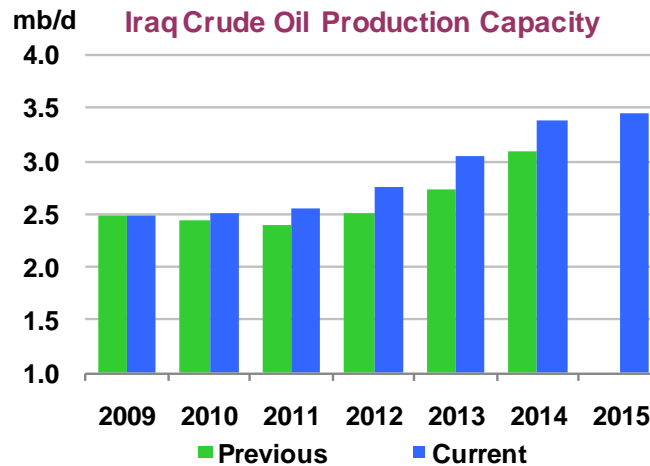
- Oil prices in steady \$65-85/bbl range (and similar outlook for the forecast) has led to **reactivation of upstream projects** put on hold 1 year ago, when recession hit and oil prices slumped
- But **observed net decline** in non-OPEC has also slowed by nearly 1% compared to one year ago
- Overall slowing masks **individual field decline rates** up to -25% and annual net loss of 1.9 mb/d due to decline
- Sensitivity exercise** indicates +/-0.5% shift implies +/-1 mb/d in non-OPEC supply

OPEC crude capacity seen rising 1.9 mb/d



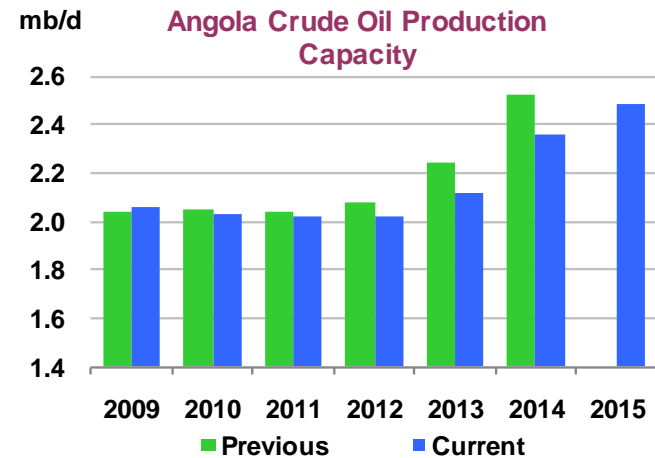
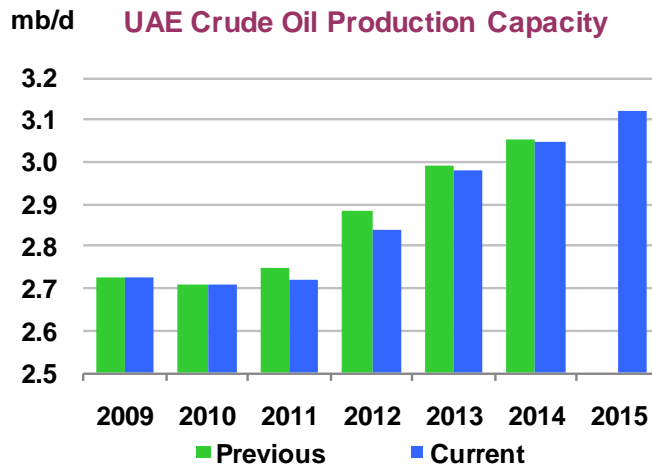
- OPEC crude capacity adds net 1.9 mb/d to reach 36.8 mb/d in 2015
- Headline increases countered by steep decline in some areas – decline of nearly 7 mb/d for 2009-2015 as offshore supply takes greater role
- Middle East drives the increases, as higher prices and contract renegotiation bring stalled projects back on track
- Prospects among African producers weaker than last year, amid political upheaval and unattractive contract terms, particularly in Nigeria
- As ever, outlook is clouded by geopolitical risks among some producers

Iraq to provide 50% of OPEC capacity rise; Saudi Arabia may idle capacity as required



- **Iraqi capacity rises just under 1.0 mb/d, to 3.5 mb/d by 2015**
 - Upward revision of 290 kb/d from previous forecast based on more detailed plans being put forward by the joint venture companies
 - Project plans envisage even sharper increase in the medium term, with capacity, on paper, projected at 6.0 mb/d by 2015
 - But we expect an array of problems to delay official targets and see a more gradual increase in the medium term
- **Saudi Arabia capacity to average 11.7 mb/d by 2015, a net gain of 433 kb/d from 2009 levels**
 - Saudi Arabia expected to shoulder surplus OPEC capacity; we assume operating levels will be held below installed capacity of 12.5 mb/d, of between 11.6-12.1 mb/d

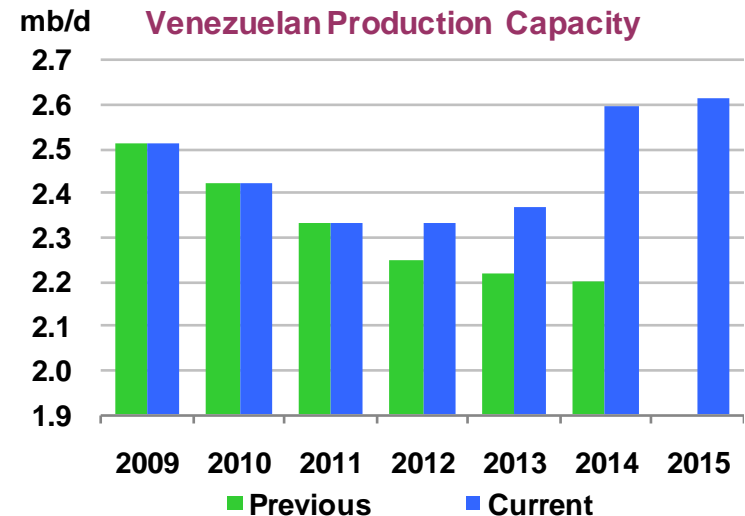
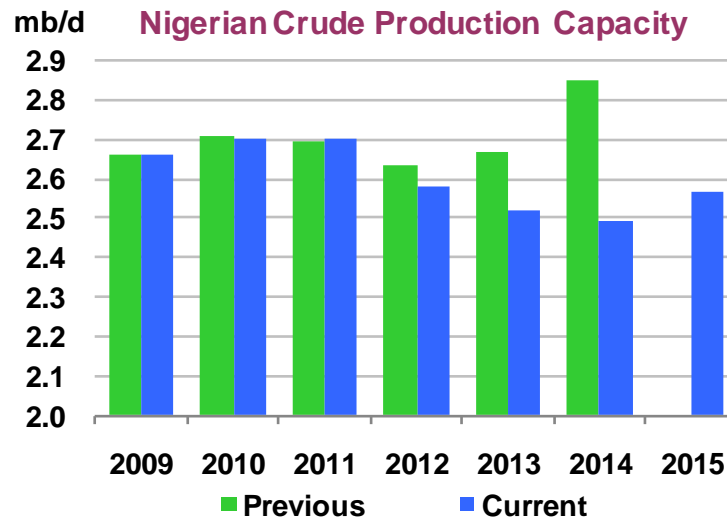
UAE and Angola each provide 20% of OPEC capacity growth



- **The UAE is on course to ramp up production capacity by a net 395 kb/d to an average 3.1 mb/d by 2015**
 - Expansion of the offshore Upper Zakum field, from 550 kb/d to 750 kb/d, will provide 65% of the UAE's total increase in capacity by 2015
 - Production increases will also come from EOR projects at mature fields and re-commissioning of production facilities mothballed in the 1980s at Lower Zakum
- **Angola's production capacity is forecast to increase by 420 kb/d to 2.5 mb/d over the 2010-2015 period**
 - Downward revision of around 160 kb/d since our forecast at end 2009
 - Delays in final investment decisions coupled with IOC concern over OPEC quota constraints are behind the slightly lower capacity view for 2015

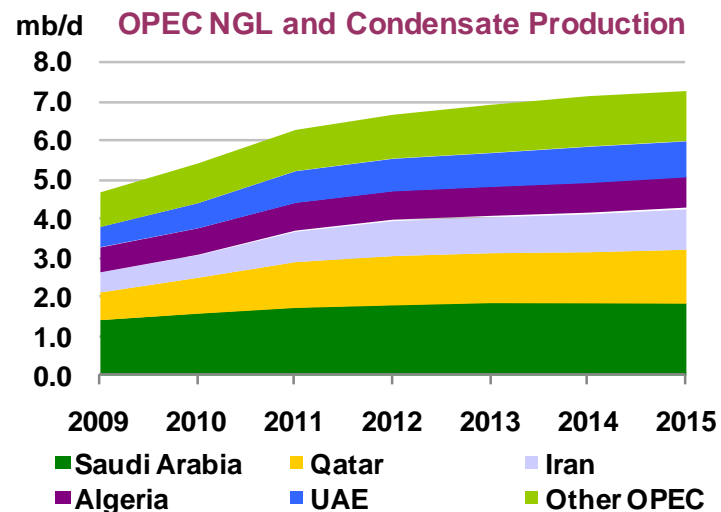
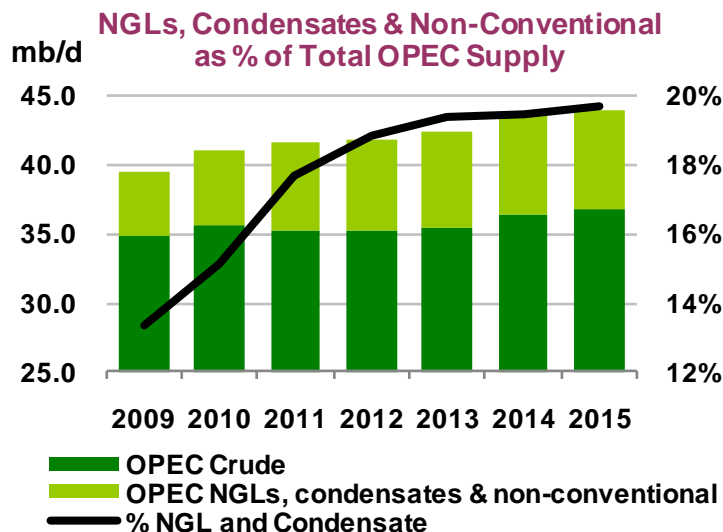
Nigeria's fortunes reversed;

Venezuela Orinoco expansion offsets decline elsewhere



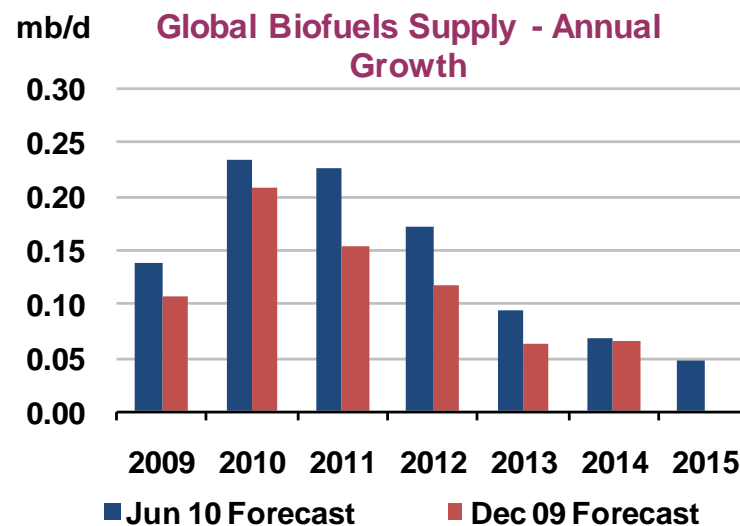
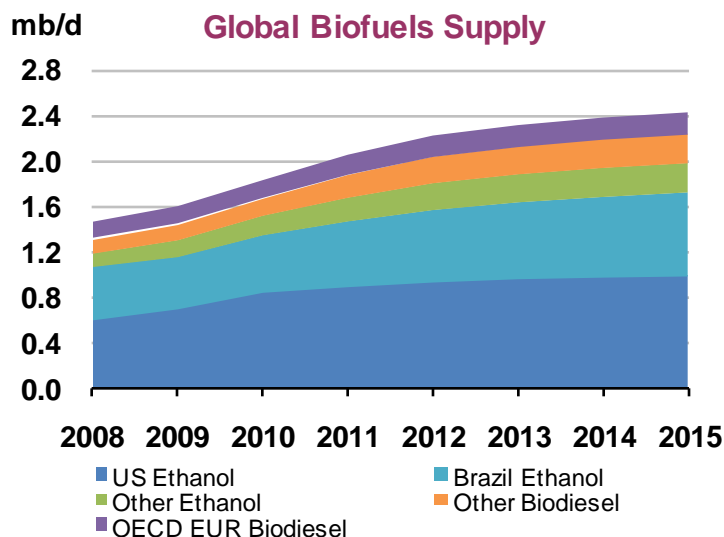
- **Nigeria's capacity declines by 100 kb/d, from 2.7 mb/d to 2.6 mb/d by 2015**
 - Downward revision of around 360 kb/d from the December's forecast
 - Production outlook marred by militant activity, political turmoil and uncertainties about IOC operating environment (proposed 'Petroleum Industry Bill (PIB)')
 - Projects totaling more than 500 kb/d are still awaiting final investment decisions and therefore expected beyond our current forecast period
- **Venezuela outlook raised by 425 kb/d, shows net +100 kb/d to 2.6 mb/d by 2015.**
 - Six contracts aim to boost heavy crude output by 2.1 mb/d, two contracts for Carabobo area & four projects in Junin
 - Technical complexity and long lead times for upgraders to process extra heavy oil
 - Production from new Venezuelan projects assumed to start in 2013 and build up to 400 kb/d on average in 2015

OPEC NGLs & condensate growth outpaces crude



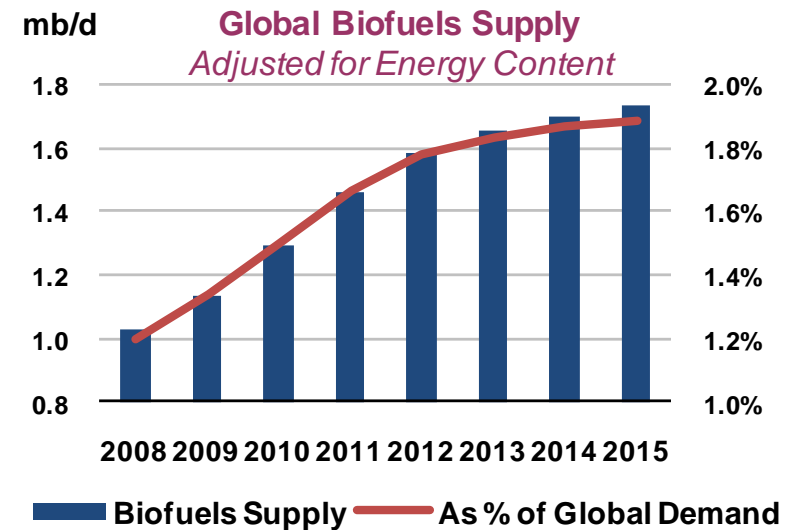
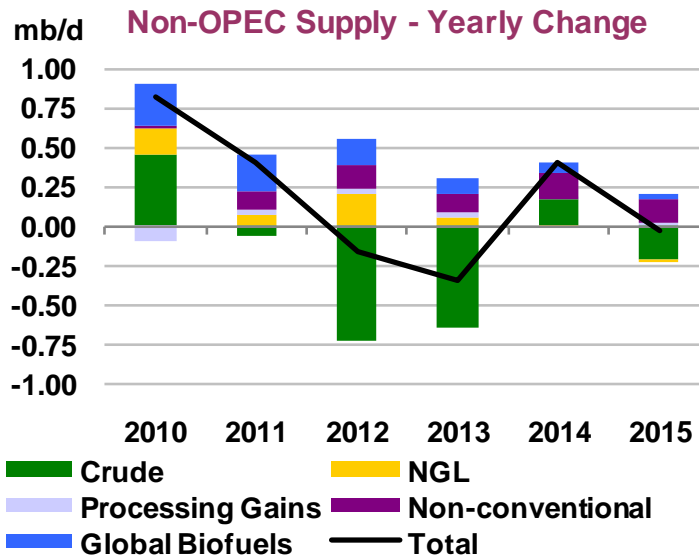
- **OPEC NGL and condensate capacity on track to rise by 2.6 mb/d** over the 2009-2015 forecast period, increasing from 4.7 mb/d in 2009 to 7.2 mb/d by 2015
 - Gas liquids component in OPEC's supply profile seen rising from 13% in 2009 to 20% by 2015
 - NGLs expansion driven by growing domestic demand for gas to power utilities, water desalination plants, industrial use and reinjection at mature oil fields
- **Middle East producers will provide 85% of the growth** at 2.2 mb/d, attaining production of 5.6 mb/d by the end of the forecast period
 - Saudi Arabia remains OPEC's single largest producer of NGLs over the forecast period, with production expected to rise by around 425 kb/d to 1.8 mb/d by 2015
 - Most growth comes from projects already launched but scheduled to build up slowly; 310 kb/d Hawiyah and the 210 kb/d Khursaniyah reach peak in 2013

Medium-term biofuels production outlook remains robust



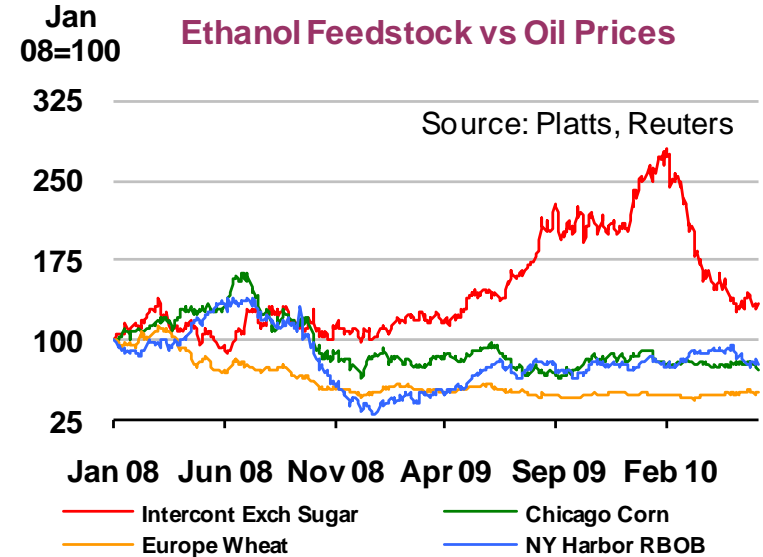
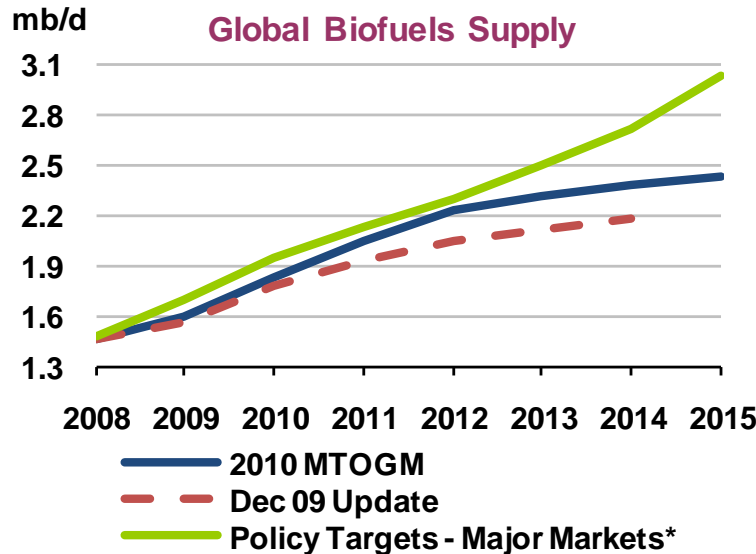
- Biofuel economics took a hit in 2008/2009, forcing rationalisation
- Leaner industry, improving economics & persistence of mandates have enhanced growth prospects in the medium term
- 2009 global biofuels supply at 1.6 mb/d rising to 2.4 mb/d in 2015

Small volumes, but biofuels an essential marginal source of supply

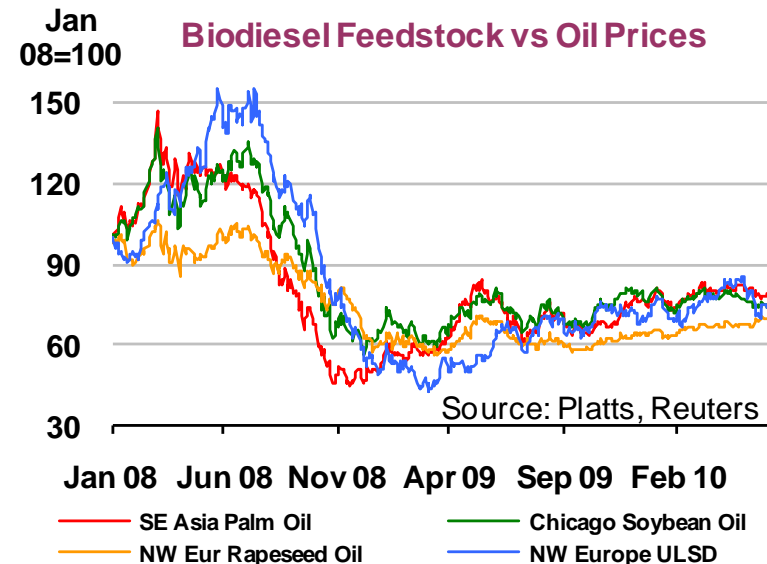


- 140 kb/d annual output growth from 2009-2015, partially offsetting otherwise sluggish non-OPEC growth
- New biofuels production should satisfy, on an energy content basis, around 13% of gasoline and gasoil demand growth over the next five years
- Still, biofuels as component of total global oil demand remain small, about 1.9% of consumption on energy equivalent basis

Improved supply prospects, though hurdles remain

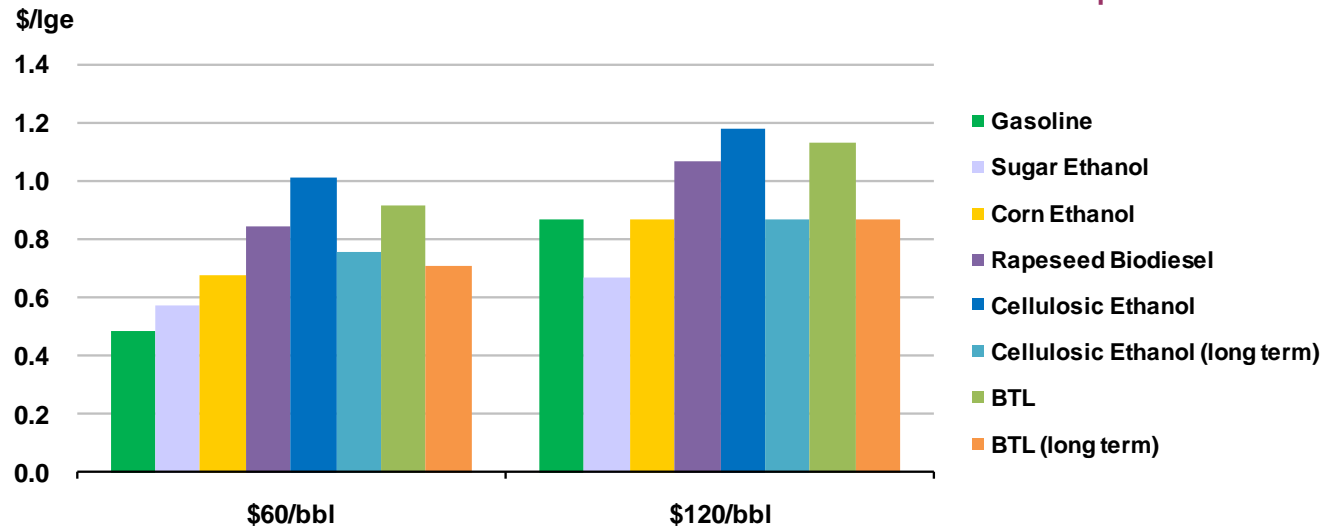


- Improved financial position for the industry versus last year
- Overcapacity, feedstock prices and weather remain risks
- Government blending mandates/targets provide a growth floor...
- ...but sustainability criteria, trade barriers, technical specs and infrastructure act as the ceiling



Will second-generation supplies help biofuels industry overcome barriers?

Biofuels: Estimated Production Costs Under Different Oil Price Assumptions

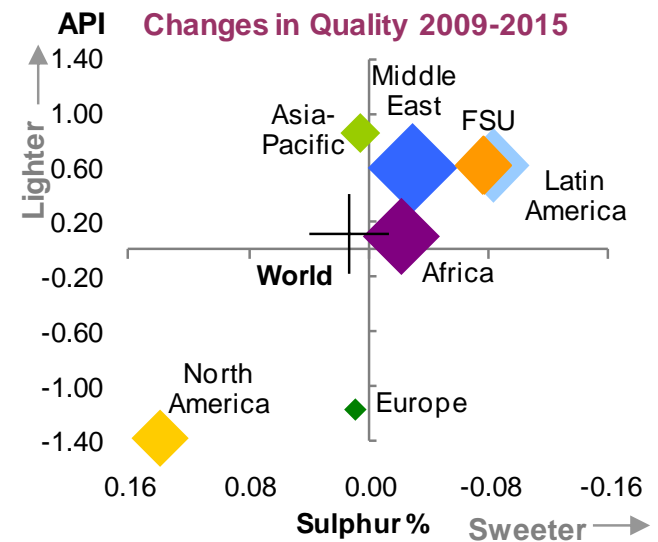
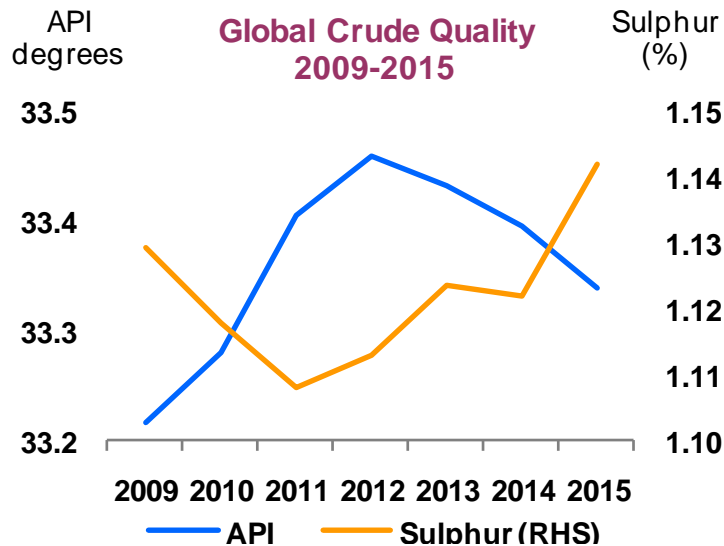


Source: IEA Mobility Model
lge = litre of gasoline equivalent

- Second-generation biofuels from cellulosic (non-food) sources provide greater GHG savings than most first generation supplies
 - Activity should increase
 - US cellulosic mandate
- 2015 global capacity at 150 kb/d, 55% from second-generation ethanol and 45% from second-generation biodiesel
- Yet technology development delays and difficult economics may keep production lower
- High oil prices may provide scaling mechanism in the long-term

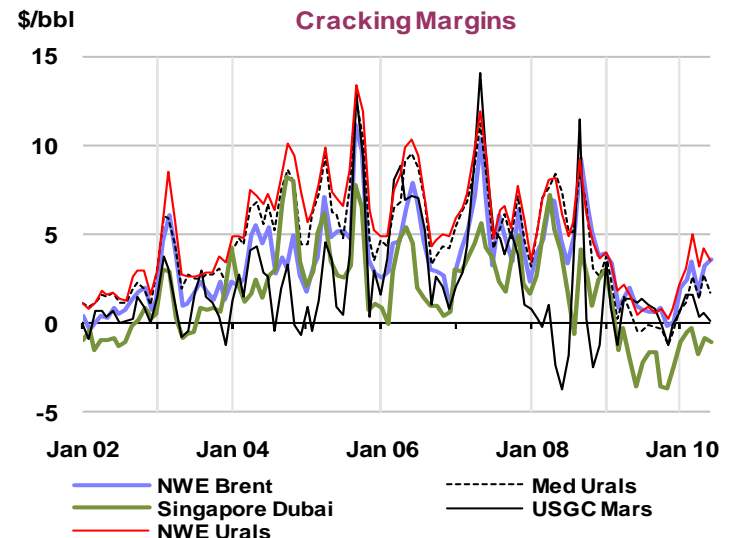
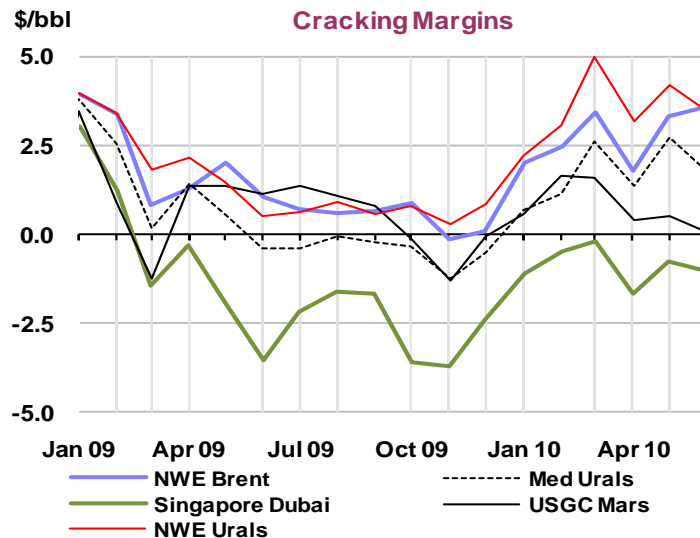
Oil supplies slightly lighter, sourer by 2015

2010



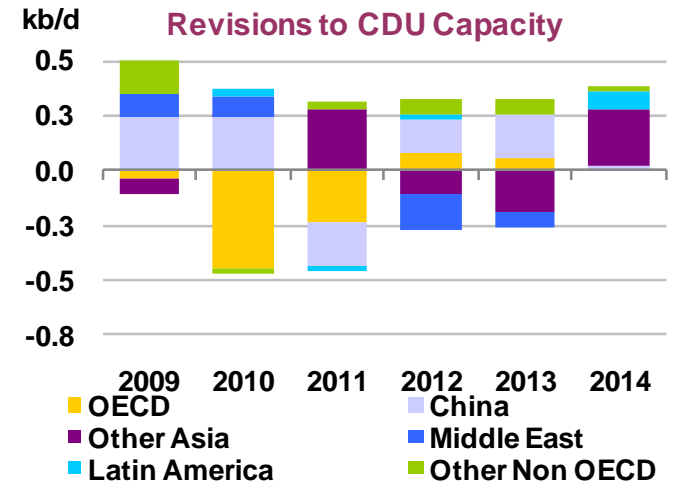
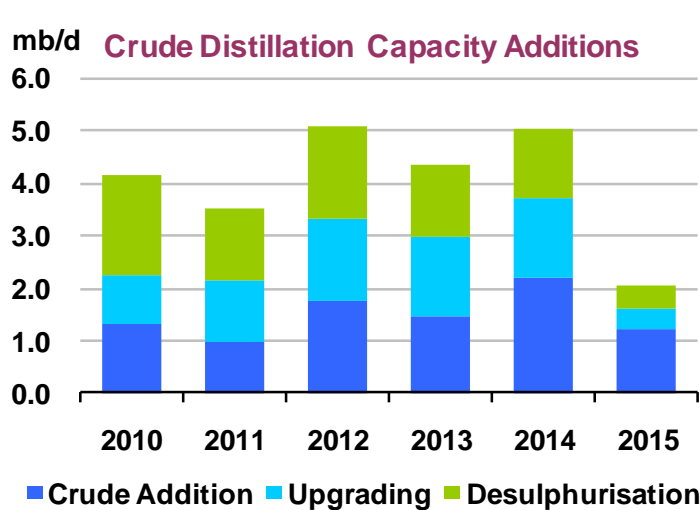
- By 2012 feedstock slate will become lighter and sweeter
- Higher volumes of condensate and lighter crude production mainly in the FSU, Latin America and the Middle East
- Between 2012-2015 output gets heavier and sourer again
- Declining North Sea production, increase in heavier Latin American crude supply and higher output of Canadian un-upgraded bitumen

Despite recent gains, refining margins are low



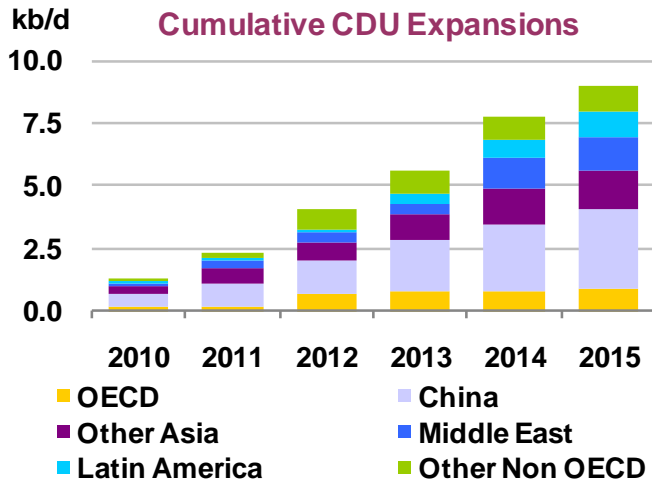
- Cracking margins improved significantly since the end of 2009...
- ...but remain low on a historical basis
- Margins & throughputs to remain under pressure through 2015...
- ...unless further capacity is shut, or expansions cancelled/delayed
- Refiners with higher complexity, economies of scale and greater efficiency, as well as those with integrated petrochemical plants, will enjoy better-than-average profitability

Refinery investment continues apace, OECD operational rates under pressure

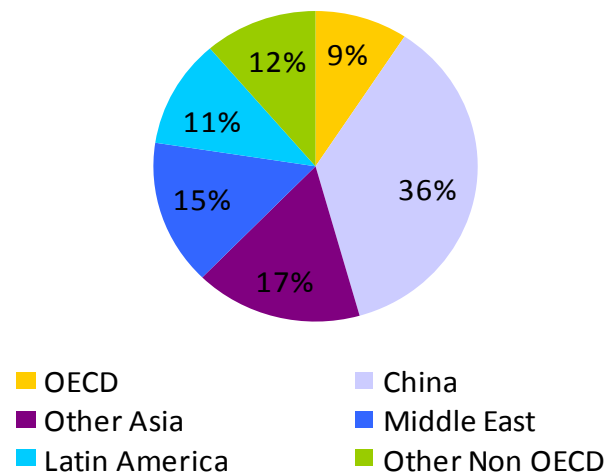


- Global crude distillation capacity growth: 9.0 mb/d by 2015, or 1.5 mb/d annually from 2009-2015
- Upgrading and desulphurisation investments to account for 7.0 mb/d and 8.2 mb/d, respectively
- Global upgrading ratio (cracking/distillation) rising from 41% to 47% over the forecast period
- Refinery closures in the OECD unable to offset higher capacity additions in the non-OECD => +670 kb/d in 2009-2014 additions versus the December update

Capacity expansions dominated by China

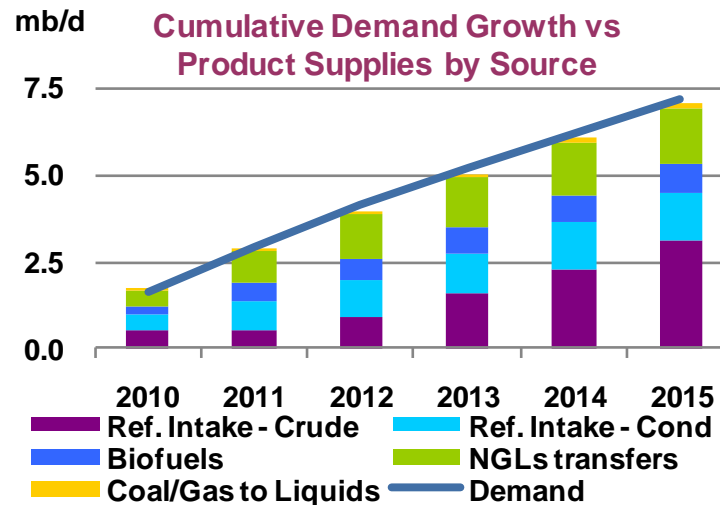
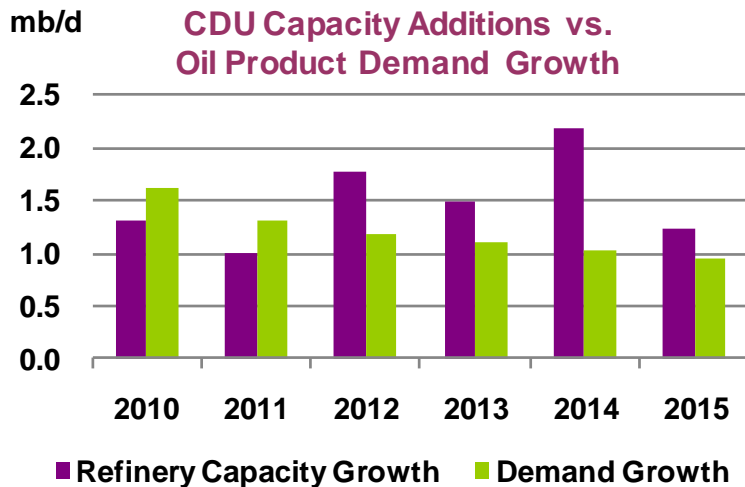


Share of Capacity growth



- In China alone, 3.3 mb/d of new capacity additions are expected (36% of global additions), even though project uncertainty remains
- Significant additions in Other Asia, driven by India (71% of regional expansions), the Middle East (two mega projects expected in 2014), and Latin America (mostly Brazil)
- Capacity still seen growing overall in the OECD
 - A few projects still outweigh modest capacity closures
 - 720 kb/d closures are included for 2010/2011, more to follow as plans firmed up

Additions exceed forecast demand growth and increasing supplies from outside refinery sector

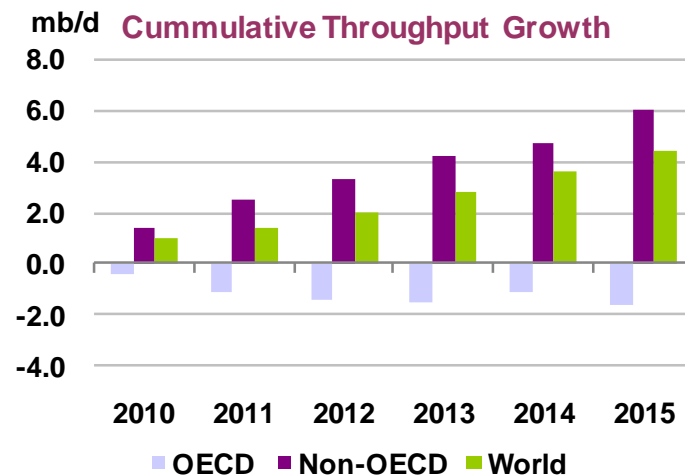
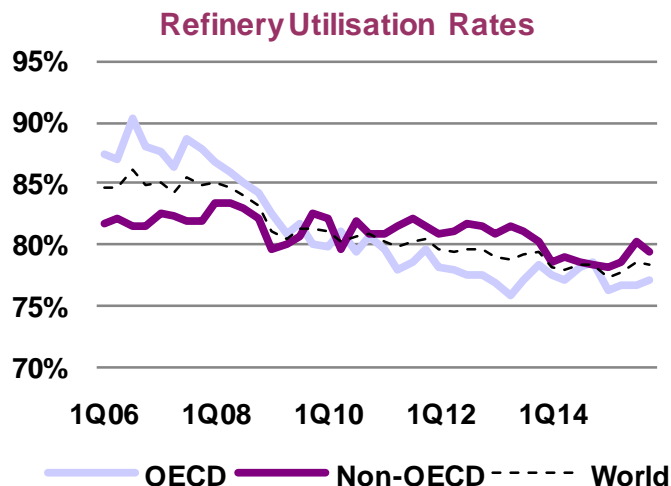


- Surplus refinery capacity will rise in medium term as additions largely exceed projected demand growth
- Furthermore, refinery throughputs (crude and condensates) will only account for 62% of demand growth over the period, as NGLs bypassing the refinery system, biofuels and coal- and gas-to-liquids add to product supplies
- Global spare refinery capacity could rise by 4.8 mb/d by 2015 from 2009, putting further pressure on margins

Utilisation rates fall over the forecast period

Unless capacity is shed or projects cancelled

2010



- Global utilisation rates are expected to decline to an average 78% of capacity in 2015, compared to 84% in 2008
- OECD rates are seen higher than in previous reports, as some refinery capacity has been shut-in, but fall nonetheless
- Non-OECD will be able to operate at higher rates, especially in strong demand-growth regions...
- ...although less complex refiners will likely face tough competition for crude oil and product markets
- If a 85% utilisation rate was targeted, 7 mb/d of capacity would have to be shed

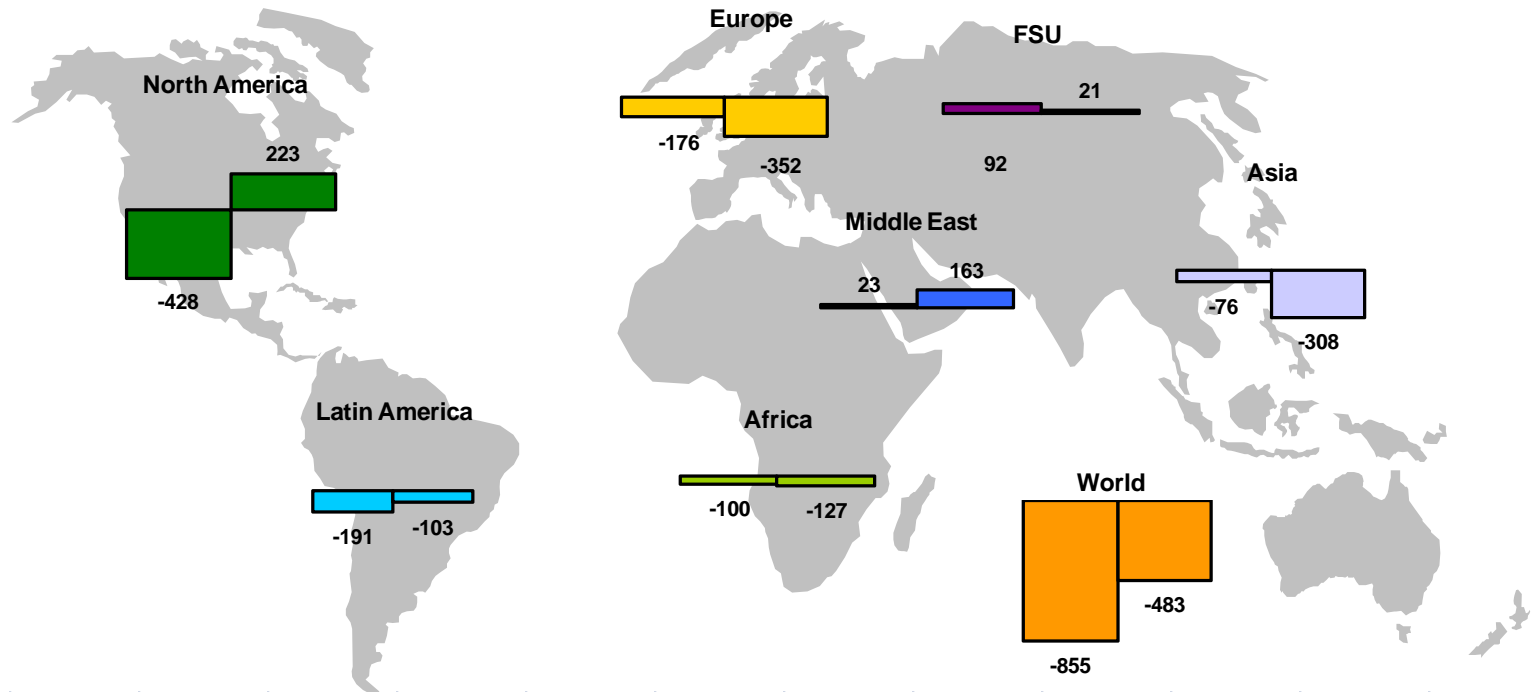
Product supply: distillate markets tighten

2010

Product Supply Balances - Gasoil/Kerosene

Change in Supply vs. Demand 2009-2012, 2012-2015

Thousand barrels per day



- Global demand growth is heavily biased towards middle distillates, accounting for 62% of total growth by 2015, again creating a bottleneck for refiners
- North American balance will tighten in the near-term, but region retains export potential; Europe's import needs will further increase, as will Latin America and Asia (tail end of forecast)

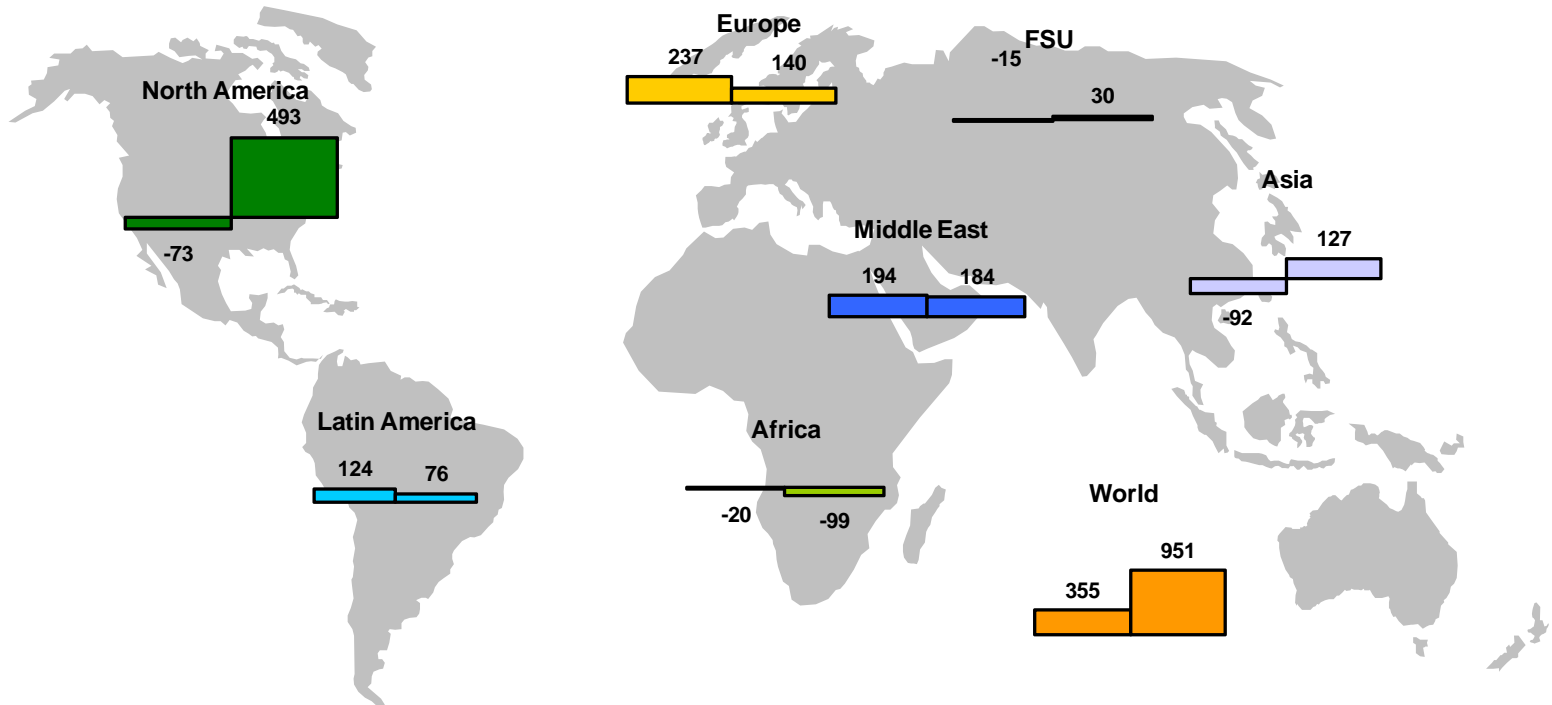
Product supply: naphtha/gasoline surplus

2010

Product Supply Balances Gasoline/Naphtha

Change in Supply vs. Demand 2009-2012, 2012-2015

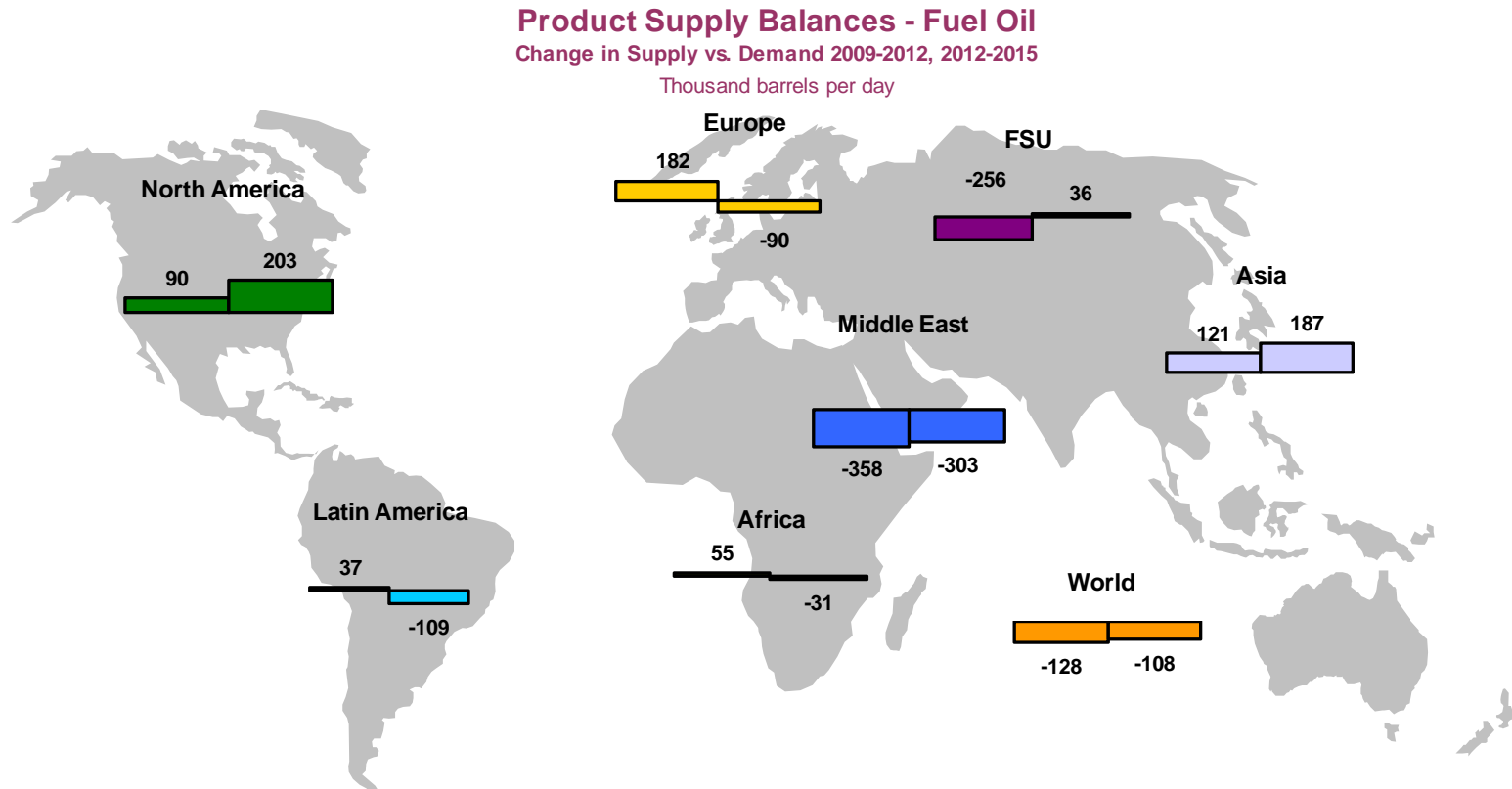
Thousand barrels per day



- Naphtha and gasoline markets will increasingly tend to over-supply in the medium term, as demand remains weak and is increasingly met by biofuels
- Demand in North America, in particular, is expected to decline due to new fuel efficiency standards and biofuels mandates; Europe struggles to find markets for surplus material

Product supply: fuel oil imbalance gone

2010



- The huge imbalance in global fuel oil markets featured in last year's MTOMR, all but vanished.
- Refinery feedstock slate is significantly heavier than that seen a year ago, due to higher Canadian, Venezuelan and Colombian production
- While total demand is seen 2 mb/d higher, fuel oil demand is lower by 1.2 mb/d globally

2010

Summing up

Tightening or stable markets ahead?

It's partly about economic growth

- Post-2009 report, higher prices, recovering economy, robust supply, easier oil balance
- But questions persist – economic uncertainty (Eurozone, China), subsidies, supply risk, boom & bust refining
- Demand migration to non-OECD, & shift to more difficult oil, requires better data for better forecasts
- Market tipping point may be +/- 1 mb/d annually, so stable markets need sustained impetus for oil use efficiency & ongoing investment in supply

