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Tectonic Shifts in Global Energy Geopolitics

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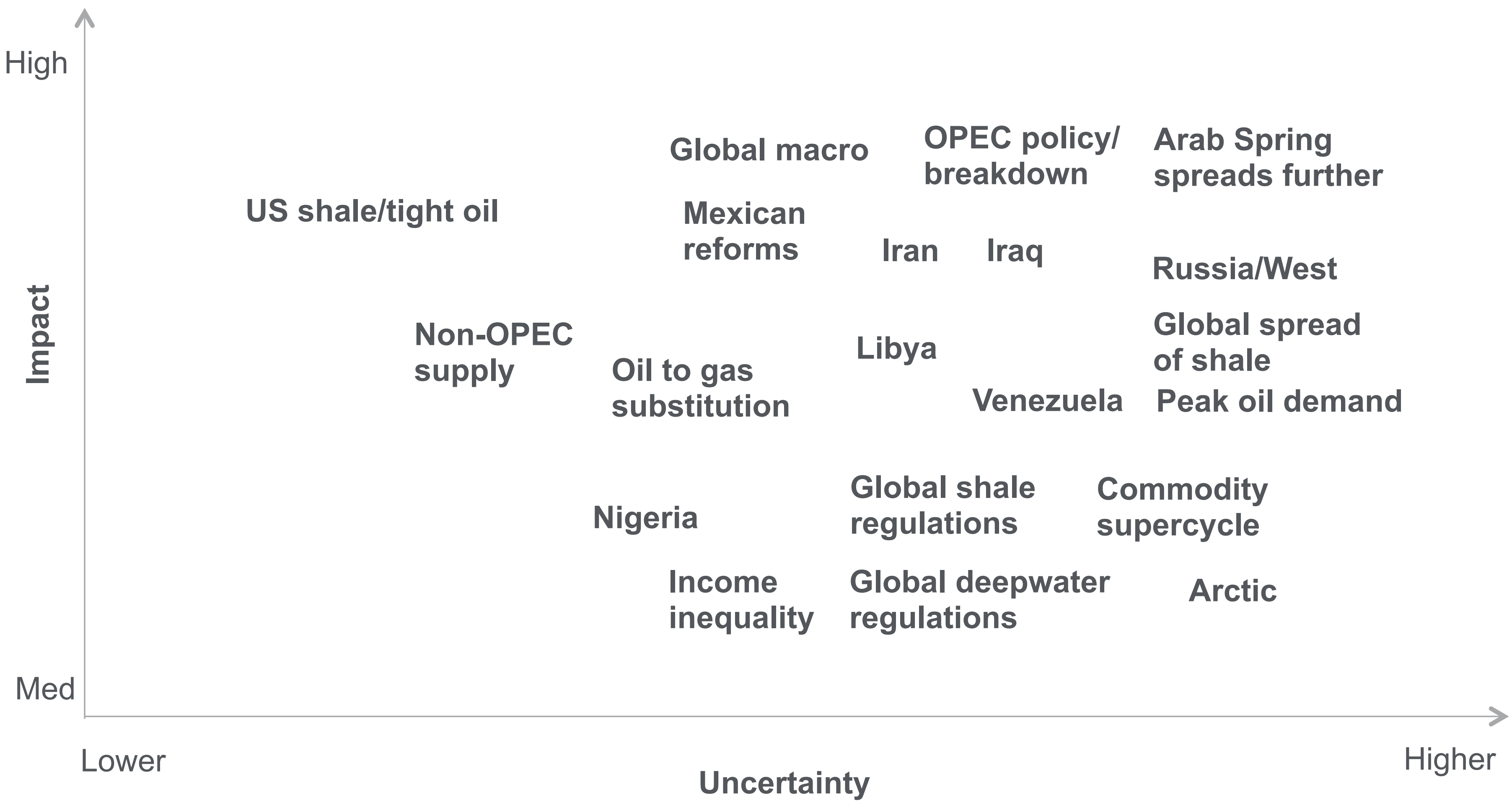
Selected geopolitical risks impacting oil markets

Considering a wide range of risks – from lower to higher uncertainty, and medium to high impact – helps prepare a set of supply-demand scenarios, with their price implications; demand/macro risks are important.

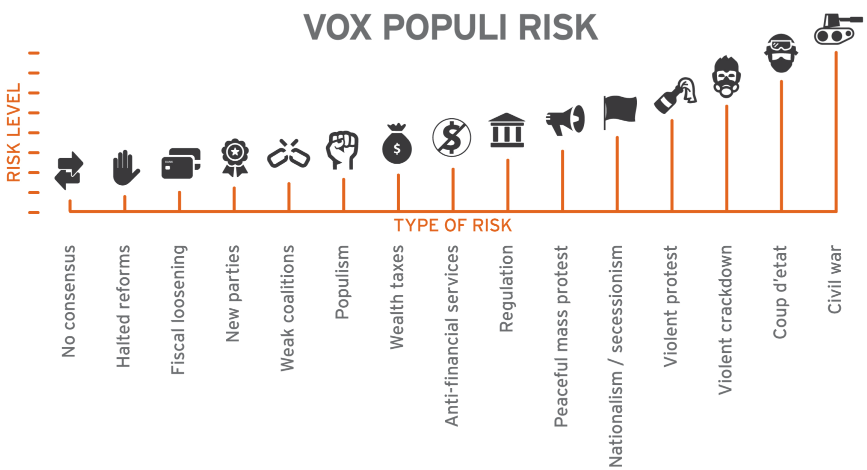


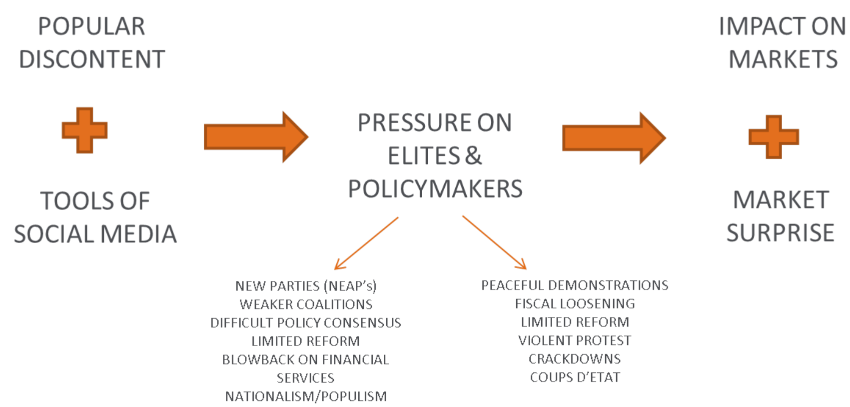
1. “Vox Populi” risk

Shifting and more volatile public opinion – Vox Populi – is an increasingly important structural risk that generates uncertainty, including for oil markets

Date	%Change in VIX	%Change in S&P	Political Events	Financial/Macro Events
2/25/2013	38.7%	-1.83%	Italian election	
8/8/2011	30.1%	-6.59%	US downgrade	
8/4/2011	28.9%	-4.77%		ECB, BoJ actions, slowdown fears
5/6/2010	26.7%	-3.11%		Flash crash
4/27/2010	25.8%	-2.17%		Greece downgrade
1/28/2011	25.7%	-1.79%	Tahrir Square	Japan downgrade
5/7/2010	25.0%	-1.43%	UK election, Greece riots	
10/30/2009	23.9%	-2.74%		End of month
1/22/2010	22.6%	-2.13%	US policy uncertainty, Fed	
1/24/2014	21.3%	-2.01%		China fears, US earnings miss
1/21/2010	19.8%	-1.95%	Obama calls for bank regulations	
3/16/2011	19.3%	-1.76%		US housing data, Fukushima disaster continues
3/1/2011	19.2%	-1.68%	Libyan civil war	
2/20/2013	19.2%	-1.24%		Fed communication

- Yearly average of elections, government collapses, mass protests have increased over 50% since 2011, compared to the 2000s
- Large scale protests, facilitated by social media, civil conflict, post-protest new leaders can be weaker, with less political capital; this is particularly affecting resource economies like petrostates
- In middle-income and industrialized countries too: more vocal middle classes, slow economic recovery and austerity, corruption, income inequality, falling trust in elites and public institutions, more fragmented outcomes



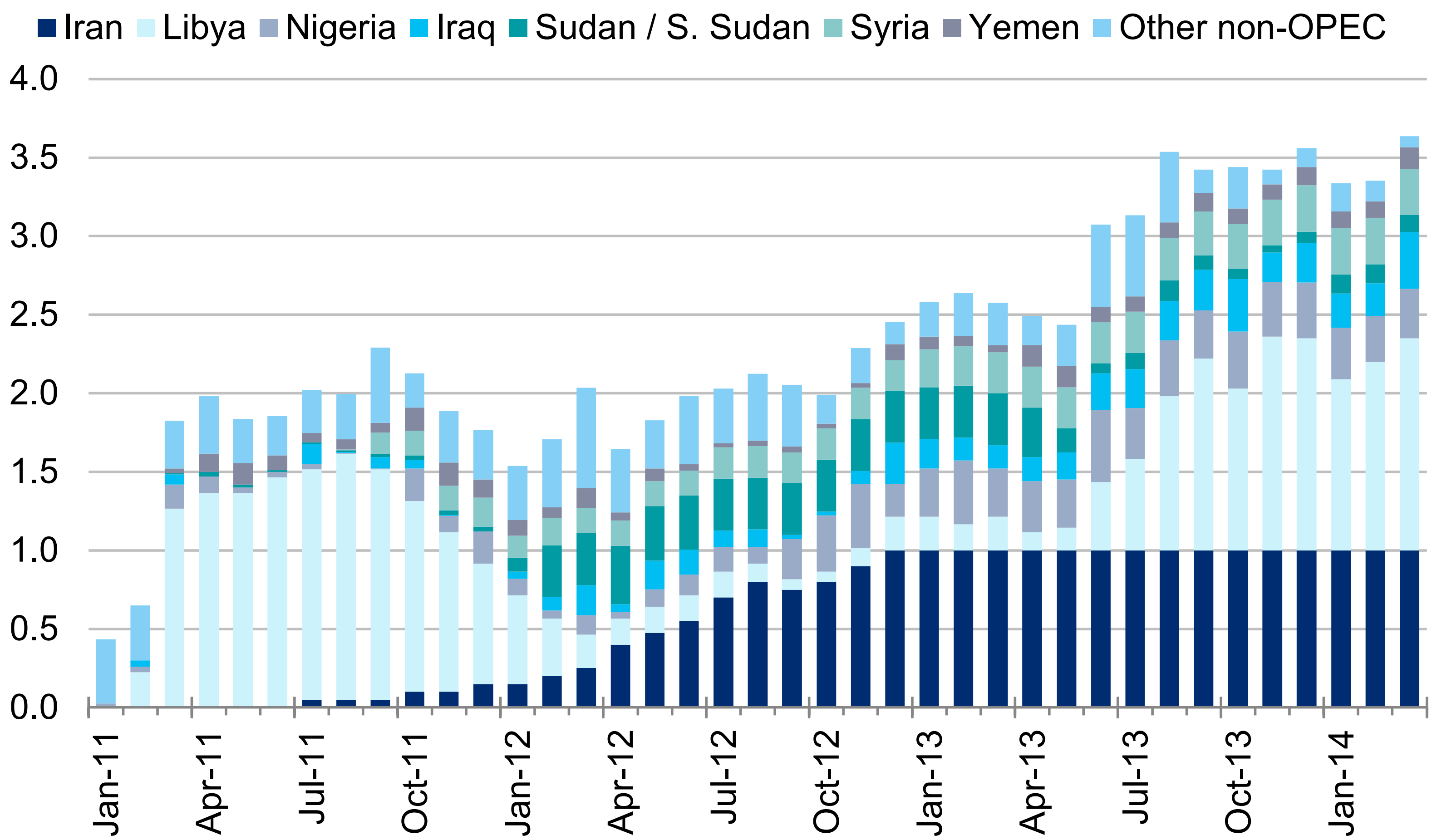


Source: Bloomberg, Citi Research

Challenges to petrostates

Prior to January 2011 – before the Libyan civil conflict – global supply disruptions were mostly around 500-k b/d worldwide; since then, these have risen to 2-m b/d then to well over 3-m b/d, and more is at risk

Estimated unplanned crude oil production outages (m b/d, 2011-14)



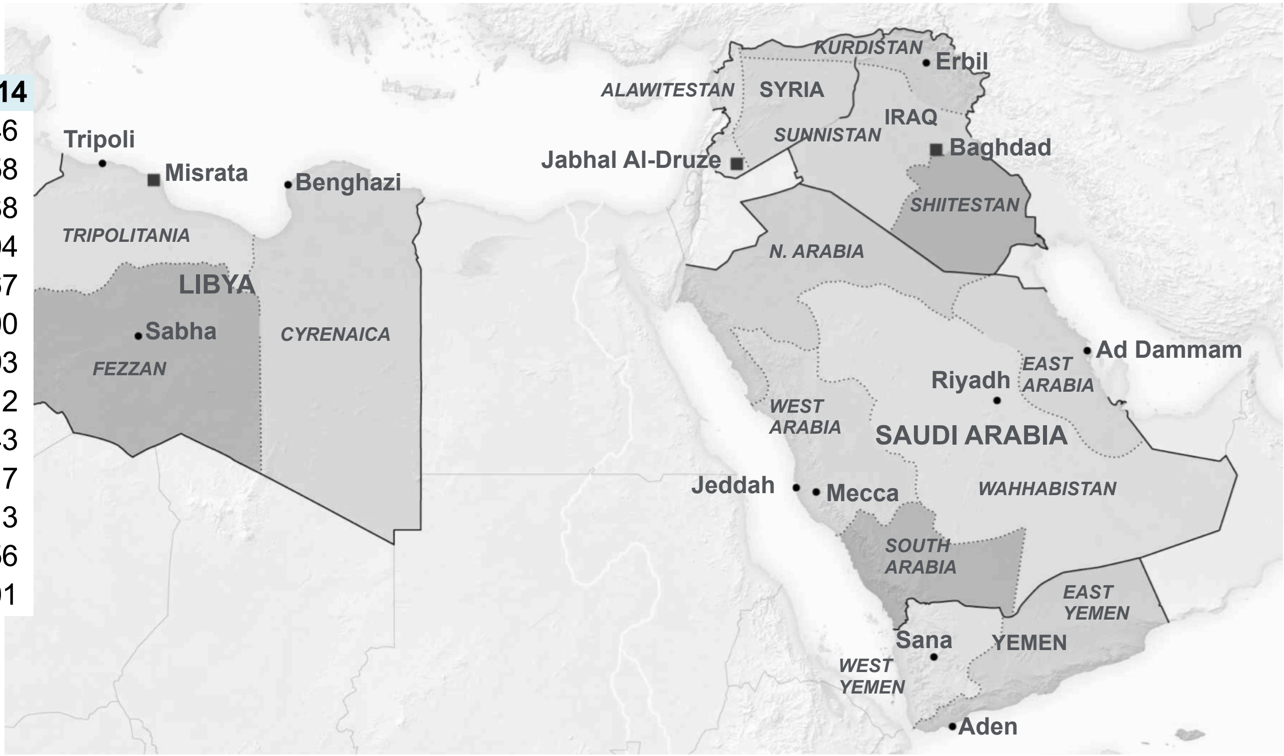
Source: EIA, Citi Research

Redrawing the map, and the grab for resource rents

Post-Spring governance faces challenges of factional divisions among calls for political power sharing, widespread availability of arms, Sunni-Shia divisions, and extremist groups entering the fray in power vacuums.

Fiscal breakeven prices for selected oil exporter countries ($/bbl)

	2011	2012	2013	2014
Qatar	38	42	46	46
Kuwait	44	49	54	58
Saudi Arabia	77	74	84	88
Oman	78	80	94	104
UAE	92	79	68	67
Libya	183	89	99	100
Iraq	93	95	99	93
Russia	100	115	118	112
Iran	84	130	140	143
Bahrain	111	115	119	117
Algeria	111	120	113	113
Venezuela	140	170	165	156
Yemen	195	237	215	201



- Rentier states engaged in the “grab” for resource rents, but how to distribute? Calls for power/revenue-sharing
- With prices staying flat, or falling, this comes into conflict with petrostates’ high fiscal breakeven oil price needs
- Unstable boundaries – Libya, Iraq, elsewhere? Russia/Ukraine
- Can unlock production too – Kurdish region?

Source: NYTimes, IIF, Citi Research

2. “Vox Populi” risks in developed markets too

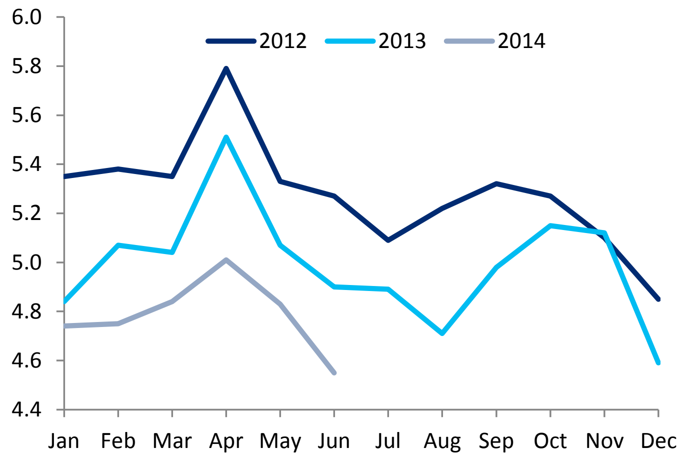
Vox Populi risks have increased in middle-income and industrialized countries too

- Lower trust in elites and public institutions, but still tend to express through the ballot box
- “Public license to operate” – oil sands, fracking, deepwater regulation; cross-border pipelines (Keystone XL); US hydrocarbons exports; local politics
- Jobs versus the environment? Affordability of energy? The foreign policy angle after Russia-Ukraine crisis
- Carbon bubble / budget?

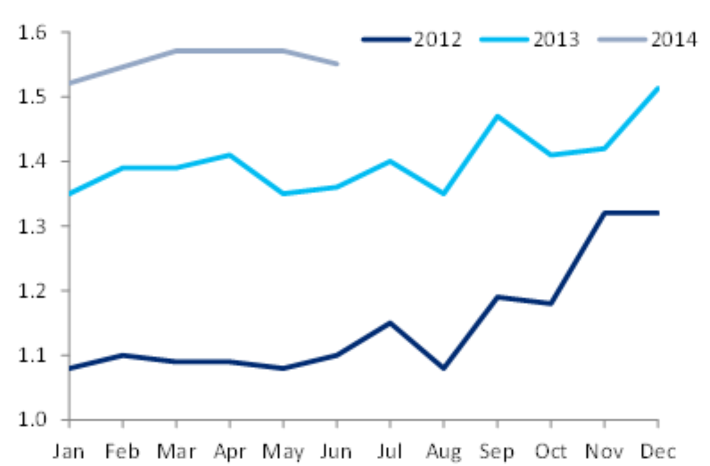
3. Russia and China – supplier of energy, supplier of capital

Russia is directing its flows east, even before the Russia-Ukraine crisis created a greater concern for diversifying away from Europe; China ties up pipeline supplies from Central Asia, Russia

Russian westbound crude exports falling sharply (m b/d)



…only partially matched by eastbound sales so far (m b/d)

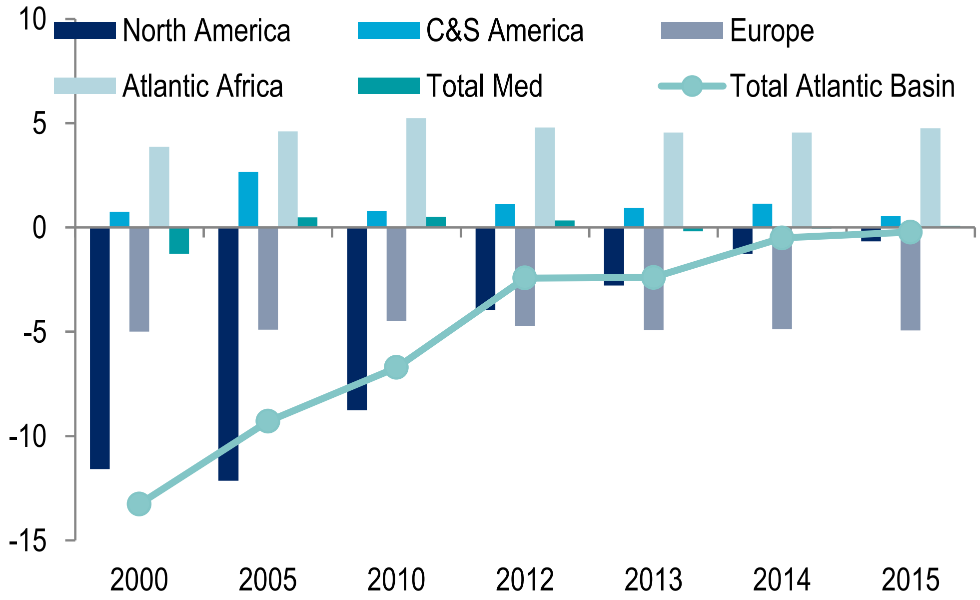


- Russia's move from a lumpy European supplier of oil and gas to a global supplier is having significant repercussions on the balance between pipeline and seaborne transportation
- China preference for pipeline sourcing, is impacting not just Central Asian supply lines, but is reinforcing Russia's move toward tied pipeline transportation
- But China is also becoming a major source of capital in the global upstream, with a different political risk appetite

Source: Bloomberg, Citi Research

Brent as broken benchmark, although Atlantic Basin deficit fading

A major issue with global oil pricing is that Brent is swayed by local balances; these have been supportive, but are shifting, in an interplay with geopolitics

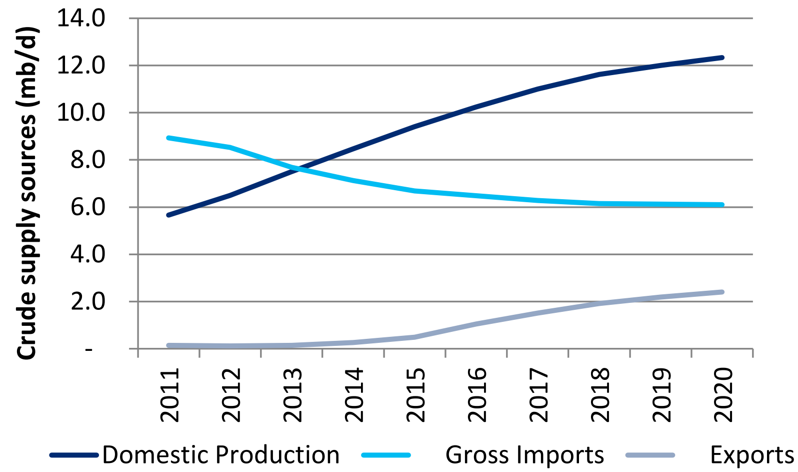


- Crude production growth in the Atlantic Basin (North & South America, Europe, FSU and Africa) is expected to outpace refinery run rate growth which will leave more crude in the Atlantic Basin trying to find a new home. This can add weight to crude prices in the region.
- Crude production growth driven by North America and Latin America can more than offset declines in North Sea production and Russian flows heading away from Europe.

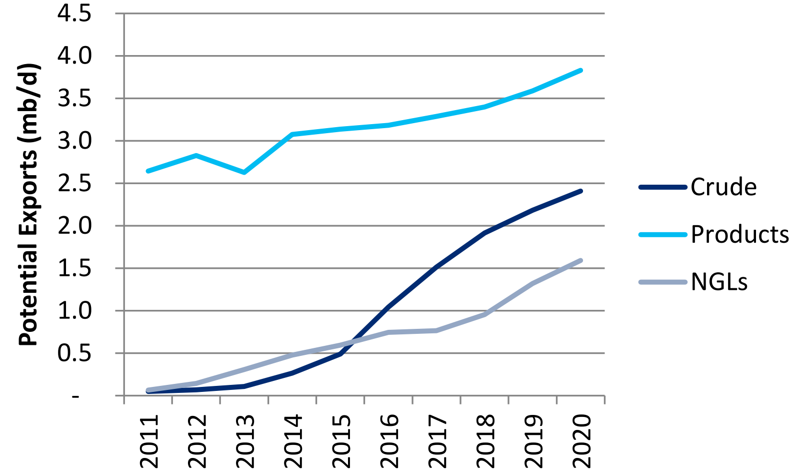
Source: EIG, Citi Research

4. US heading towards hydrocarbons self-sufficiency – can others follow?

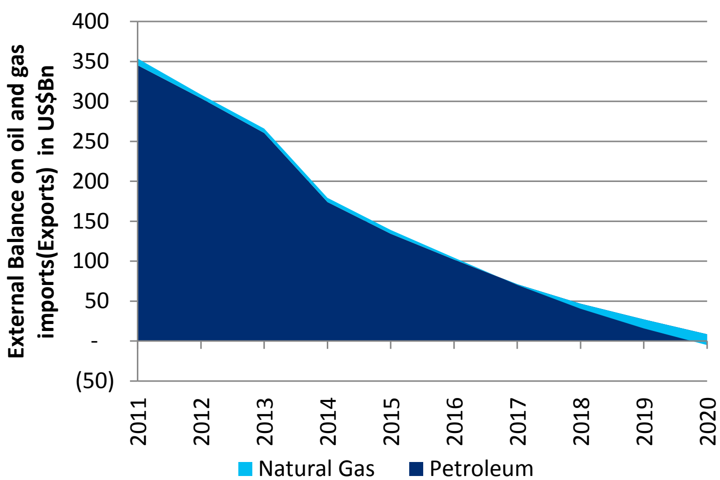
Rising US production to reduce imports and spur exports



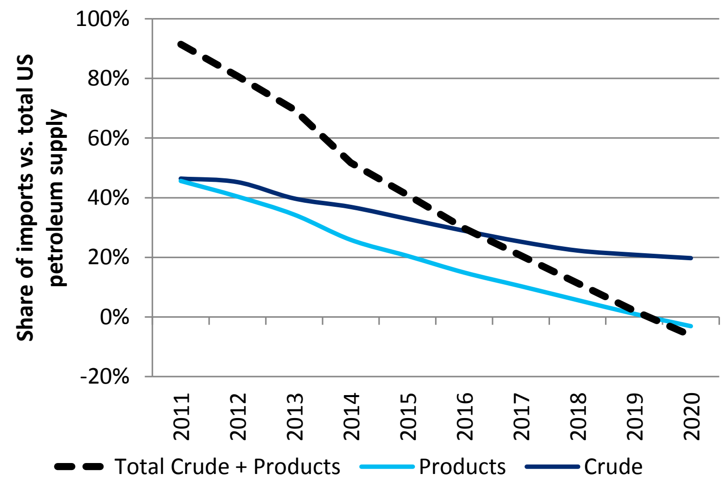
The exports of excess light crude could surge starting in 2015, along with strong product and NGL exports



Oil/gas trade balance could go from a deficit of $354Bn in 2011 due to imports to +$5Bn in 2020 due to exports



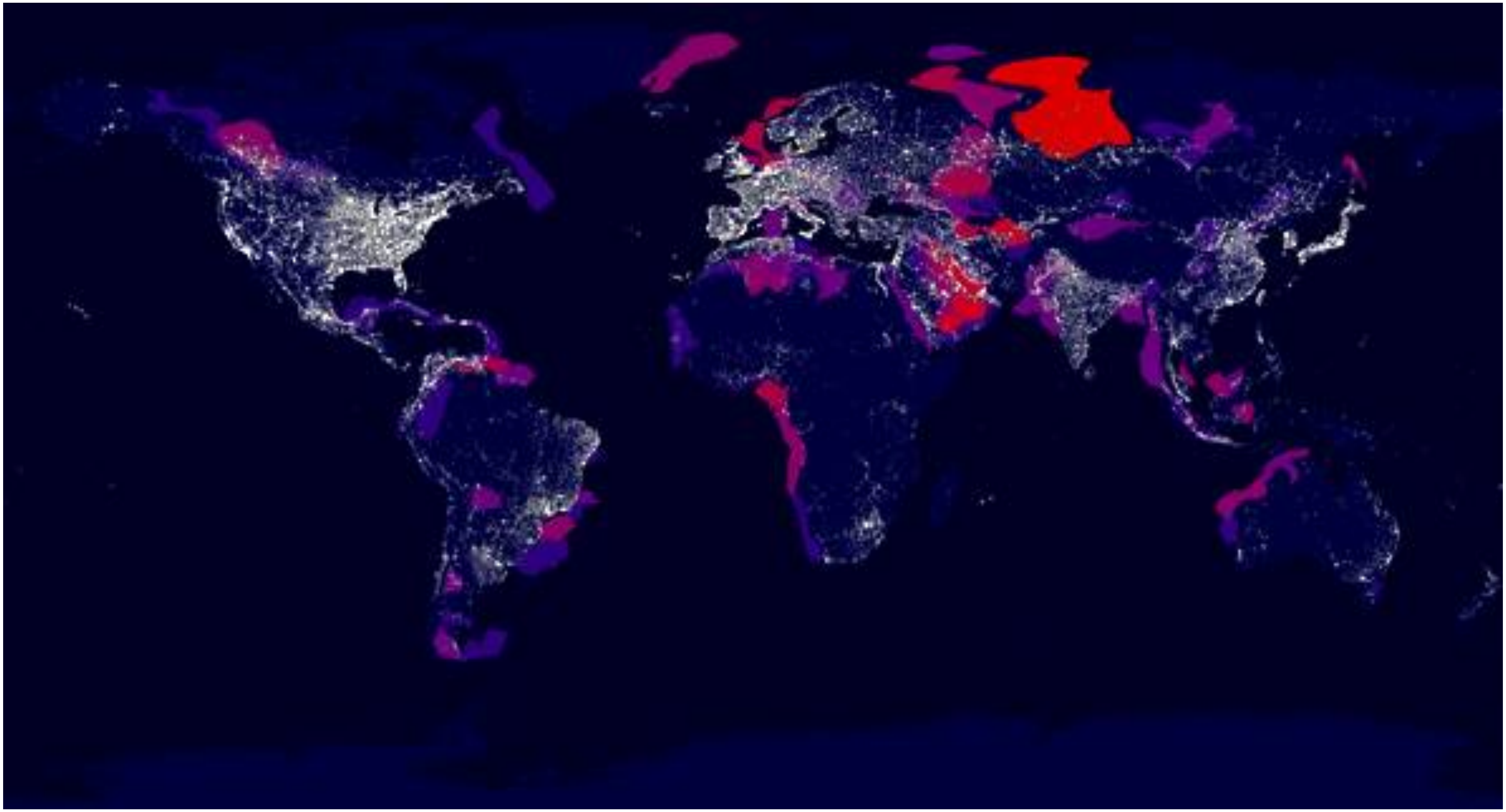
Dependence on foreign oil? The US could be a net exporter of petroleum as soon as 2019 (volume share of total US petroleum supply)



Source: EIA, Citi Research

Pre-2005, resources looked concentrated in the Middle East/FSU

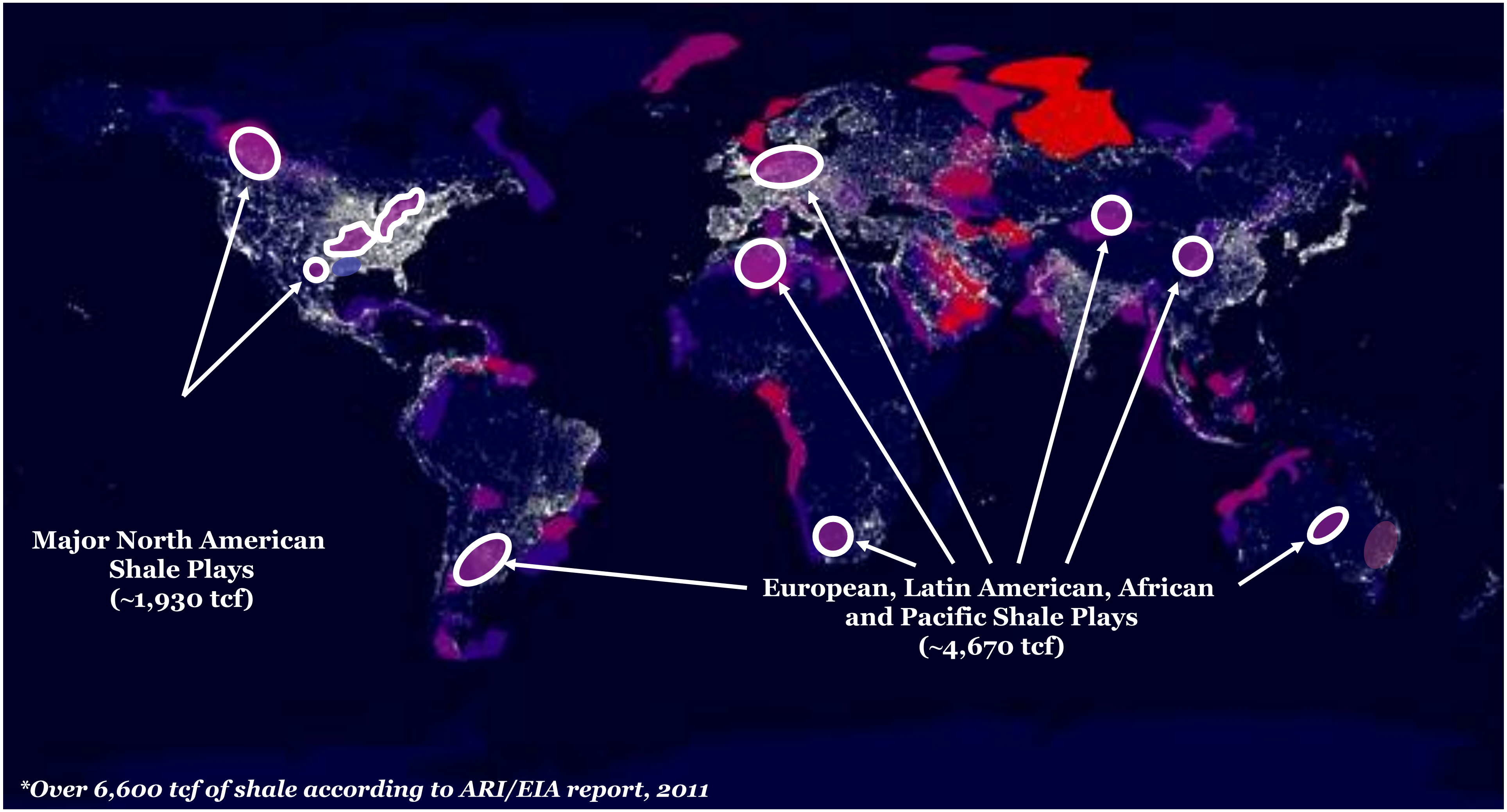
…and far from consumption centers



Source: Baker Institute

The advent of global shale resources could thus be transformative…

…for pricing, trade patterns, geopolitics, industry structure…



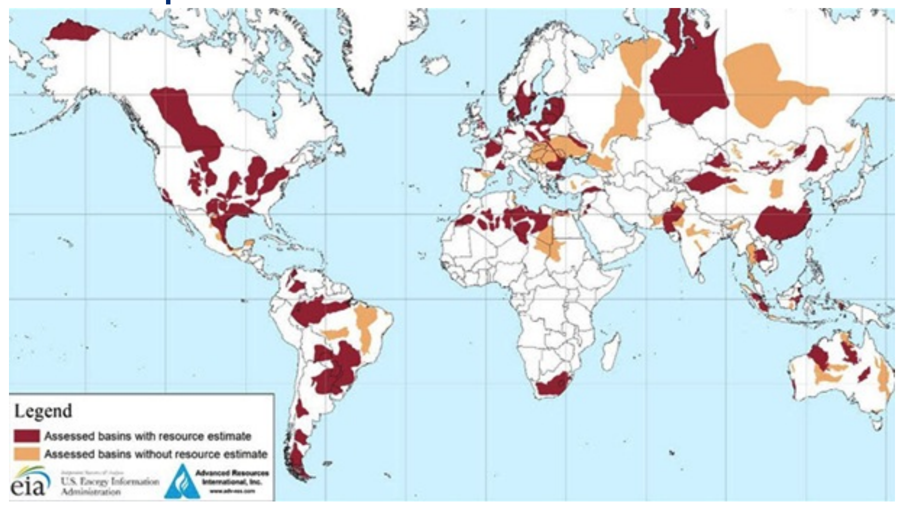
Source: Baker Institute

Spreading of unconventionals would be geopolitically profound

Shale revolution's spread could have unexpected geopolitical impacts – a turn away from resource nationalism?

- Availability of shale could lead countries to rush to develop – this may be happening
- The shale revolution should be sustainable. US shale resources are only ~15% of TRC reserves globally. N. Africa, Ukraine, Saudi Arabia are taking steps. Other major shale resource holders include Mexico, Argentina, Russia, China
- More widespread development could cause a widespread fall in reliance on foreign sources supplies, changing global crude trade flows and the geopolitics of oil.
- Shale production could make net oil importers more self-sufficient. Structurally this means more stable global oil prices with downward pressure.
- US, Canadian supply surge already offset a massive rise in global supply disruptions in the world since Feb. 2011, keeping Brent prices range-bound at the $110 level.

Global map of shale resources



Top 10 technically recoverable shale oil and gas reserves

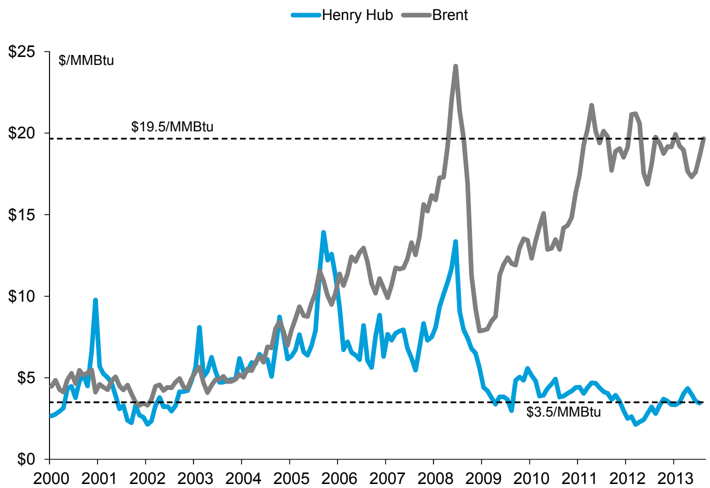
Shale Gas (Tcf)		Shale Oil (Bln Barrels)	
US	1161	Russia	75
China	1115	US	48
Argentina	802	China	32
Algeria	707	Argentina	27
Canada	573	Libya	26
Mexico	545	Australia	18
Australia	437	Venezuela	13
South Africa	390	Mexico	13
Russia	285	Pakistan	9
Brazil	245	Canada	9
Others	1536	Others	65

Source: EIA, Citi Research

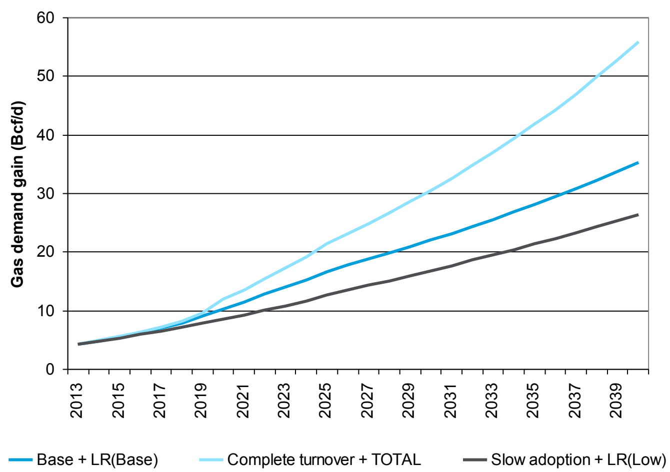
Slowing oil demand growth and oil-to-gas substitution, over time

…driven by switching economics as well as environmental and energy security concerns, and EM economic headwinds and high prices and fuel subsidy reforms

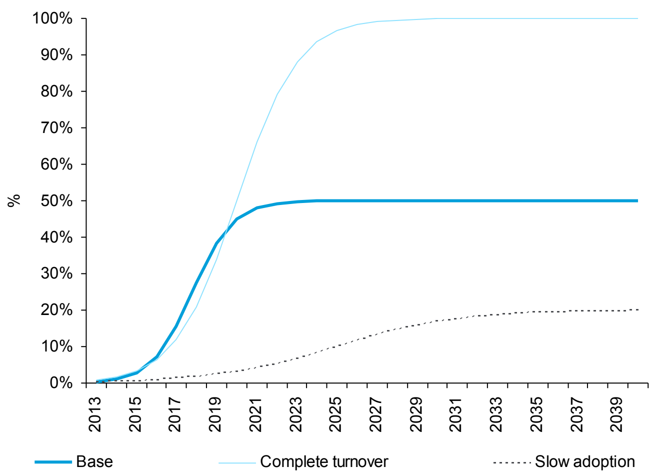
Crude and US natural gas prices have diverged



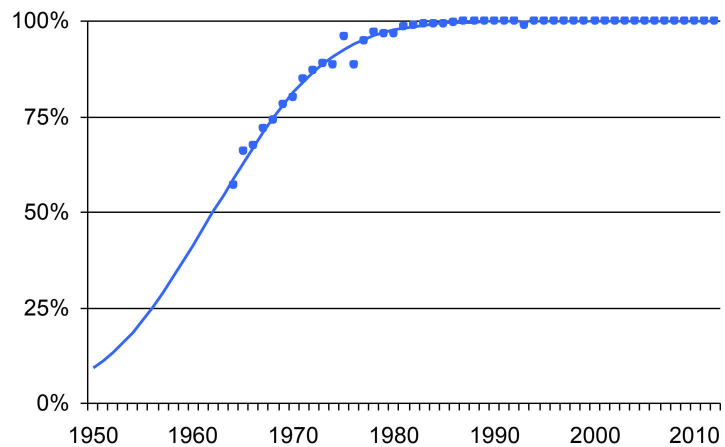
Projected gas demand in transportation



Estimated NGVs as % new HDV sales in the US



Diesel's share of new Class 8 trucks sales in US, 1950-2010



Source: MacKay, Wards Auto, Westport, Ayres-Ayres-Warr, Citi Research

5. Shale revolution putting pressure on government take?

Oil prices holding over $100 yet oil industry returns sub-par, and IOCs reining in capex as a result, while the US shale revolution is attracting a growing share of this capex

- Era of shale abundance? Perception? Resource owners around the world may feel more pressure to compete for investment
- Surge in US production stands in stark contrast with flat to declining production in much of the rest of the world; Mexico now opening up, could others follow?
- MENA region starting to feel the pressure as the increased competition for IOC capex is occurring at the same time as above-ground risks are rising. Iraq and Iran and improving on previous terms, Abu Dhabi, Oman EOR in the past
- Incentives for shale development, in particular, including Argentina, Algeria
- Some hold-outs, still: Norway, Kazakhstan, Brazil

Mexican energy reforms promise opportunities across sectors

- Constitutional reform passed December 2013, secondary legislation presented April 2014, which could pass in weeks; reform introduces competition, transforms Pemex’s monopoly, strengthens state authority powers
- Round Zero determines which assets Pemex can (1) retain, (2) seek partners for, (3) relinquish, and could be ruled on by end-2014
  - Pemex likely retains key assets in shallow water, onshore conventional
  - JV for technology, operations, capital: Chicontepec horizontal drilling, extra-heavy oil in shallow water, deepwater Perdido Basin
  - What about shale gas in Burgos Basin and elsewhere? And other resources: numerous small marginal fields, EOR
- Licensing rounds, not direct negotiations, based on single economic variable
- Simple, transparent fiscal regime – royalty, applicable to profit-sharing, producing-sharing, license contracts – specific terms on a round-by-round basis for flexibility
- Local content requirements at 25% by 2025 does not seem too onerous
- Permits for midstream, downstream: natural gas from the US, and within Mexico; importing light sweet crude from the US to optimize domestic refining system

Appendix

Mexico's energy reforms come at a time of great global shifts…

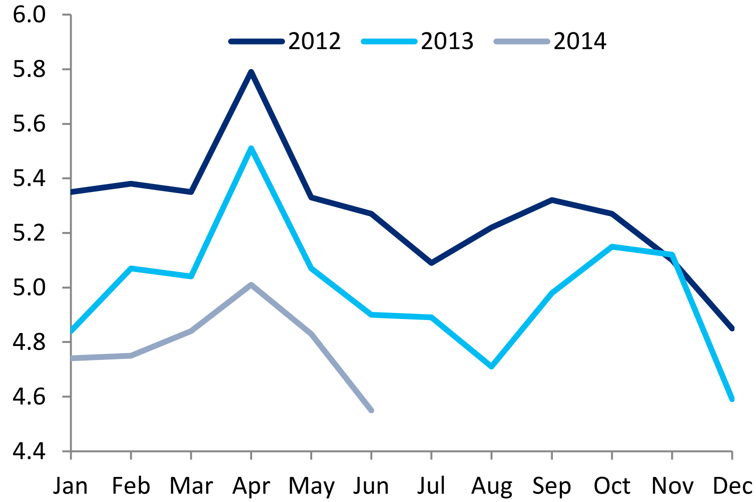
…presenting both challenges and opportunities.

- Mexico has a chance to revitalize its energy sector
- Challenges from US and Canadian oil supply growth, arriving in the Gulf of Mexico, mean looking towards other markets, particularly Asia
- Upstream opportunities: shale/tight gas and oil, deepwater, extra-heavy oil, marginal fields
- Downstream opportunities: access to US shale gas, light tight oil, and NGLs
- Midstream opportunities
- Services sector opportunities

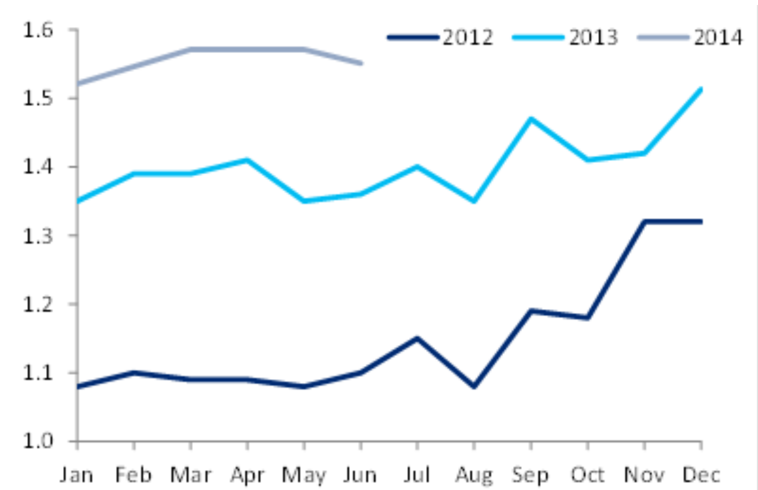
Russia's change from lumpy European to Asian crude supplier accelerating

Starting this year the move from waterborne and pipeline supply of Russian crude to Europe to pipeline and waterborne supply to Asia should grow rapidly

Russian West-bound exports are falling sharply



Only partially matched by East-bound sales…so far



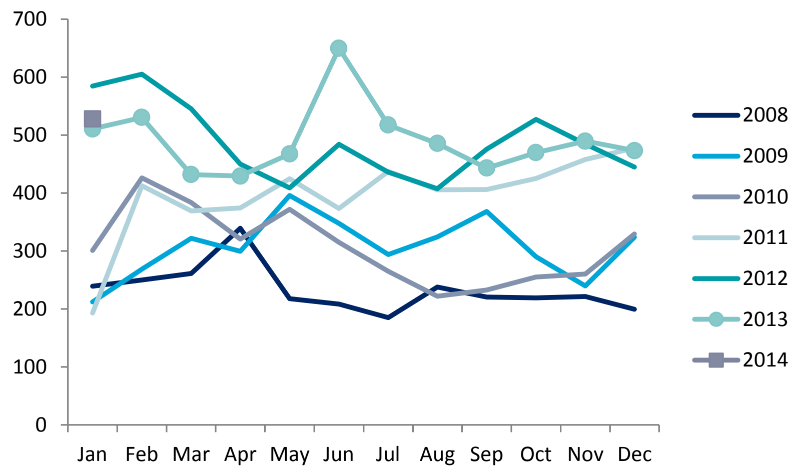
- **Russian crude exports are eroding** as stagnant production confronts secularly growing domestic demand along with an increase in product exports.
- Meanwhile an array of bilateral pre-export financing deals look likely to double sales of crude to China from 480-k b/d in 2013 to over 920-k b/d, doubling sales via the ESPO pipeline to 600-k b/d, plus 140-k b/d via the Kazakh-China pipeline, plus 180-k b/d to the JV CNPC refinery in Tianjin.
- Most of this change in direction also removes waterborne supplies, replacing it with pipeline deliveries, and the shift has already started.

Source: FGE, Citi Research

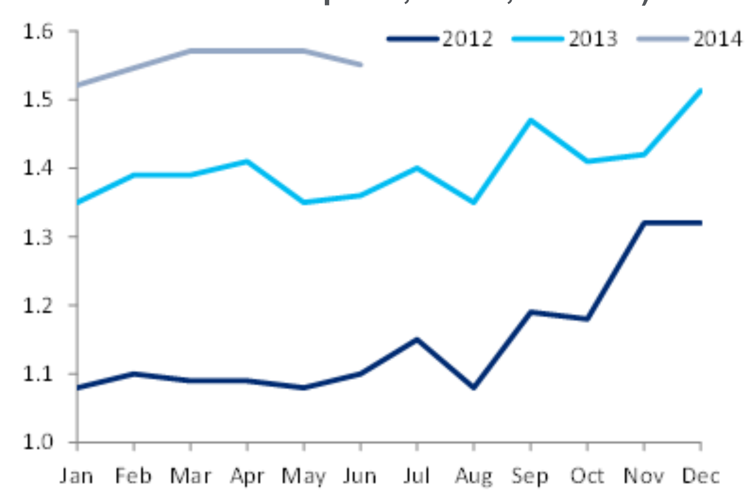
Slowing Chinese demand growth plus pipeline deals lower waterborne imports

Bilateral Russian deals and expected ramp-up in Iraqi exports are pushing out other Middle East suppliers from China's market

After rapid growth, China's waterborne crude imports are plateauing (k b/d, 2008-14)



…while imports from Russia grow (Russian eastward crude exports, m b/d, 2012-14)



- **Chinese demand could rise by ~300-350-k b/d in 2014, while Russian sales should growth by 180-k b/d and Iraqi sales could increase by 525-k b/d,** depending on how much Iraqi exports can grow this year.
- So far, traditional suppliers to Asia from Latin America, the Middle East and West Africa have not slowed their sales efforts in Asia, but an erosion of sweet-sour spreads, already being fostered by changes in the US Gulf Coast look likely to spread to the Far East this year.
- If Iran is allowed to export more crude in the second half of the year, it could further exacerbate competition for market share this year.

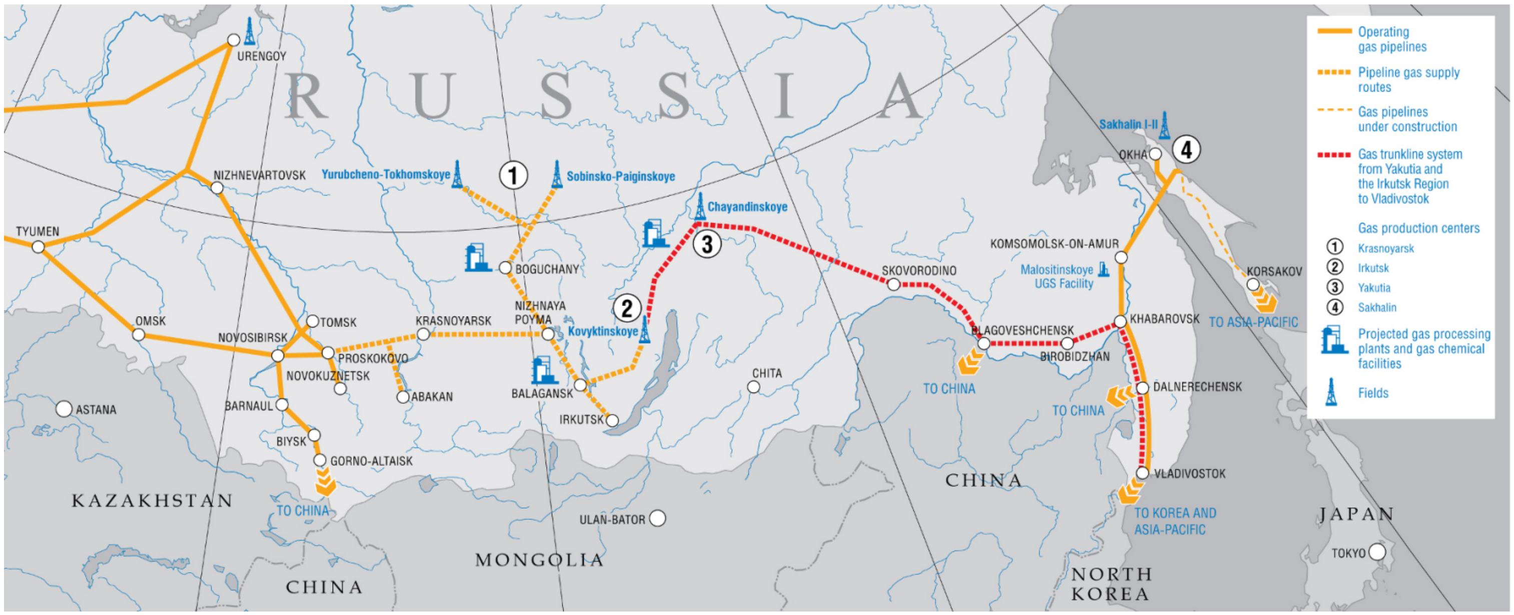
Source: China NBS, China Customs, FGE, Citi Research

The Russia-China 30-year natural gas supply deal

- **The deal represent the biggest progress in Russia-China energy trades:**
  - **Volume**: 38-bcm/yr (~3.7 Bcf/d), but could be expanded to 60-bcm/year (~5.8 Bcf/d)
  - **Route**: From East Siberia and be shipped to Northern and Eastern China.
  - **Additional Clauses:** China will also make a $20-billion prepayment to Gazprom for the field and pipeline construction and provide tax benefit for the imported gas.

- **The imports price has been the major barrier for the negotiation in the past year**. Details on pricing were not released but a $400bn total contract value hints at c$380/mcm, lower than Russia's export price to Europe but comparable to pipeline imports from central Asia.

"Power of Siberia" gas pipeline



Source: Gazprom, Citi Research

Rationales behind Russia's Decision

Geopolitics, economic development, strategic positioning and economics are all key drivers in getting the gas deal with China completed

- **The current deal with China could be the best outcome possible.**
  - It involves the development of two giant gas fields Chayanda and Kovykta in Eastern Siberia. It also enables the construction of the "Power of Siberia" gas pipeline and the Vladivostok LNG ("VLNG") with much better economics.
- **Russia depends significantly on gas exports to Europe for government revenues** but revenues could continue to fall as exports decline further over time, compounded by lower prices.
- **The continued decline of European gas demand and the rise of LNG supply could cut Russian exports to Europe by nearly the same amount that Russia would be getting from exporting to China.**

European Gas Supply-Demand Balance and Electricity Generation Breakdown

Gas Balance (Bcf/d)	2011	2012	2013	2014	2015	2016	2017
Demand	**547**	**539**	**520**	**503**	**496**	**491**	**503**
Industrial / Own Use	162	163	156	153	153	153	155
Power Generation	177	159	133	124	117	112	121
Res./Comm./Public	208	218	231	226	226	226	226
Supply							
Domestic Production	**266**	**270**	**259**	**251**	**232**	**228**	**222**
U.K.	48	44	39	33	28	24	21
Norway	101	115	110	112	112	112	113
Netherlands	77	73	75	70	60	57	57
Domestic	40	38	35	36	32	35	31
Pipelines ex-Russia	**46**	**51**	**51**	**52**	**55**	**55**	**55**
Algeria	30	32	35	35	36	36	35
Libya	2	6	3	3	3	3	3
Iran	6	5	5	7	7	8	8
Azerbaijan	4	5	5	6	7	7	8
Turkmenistan	4	2	2	1	1	1	1
Call on Russia Gas and LNG	**236**	**219**	**210**	**200**	**210**	**208**	**226**
If LNG imports ramp up							
LNG imports	90	69	48	48	66	72	83
Imports from Russia	**146**	**143**	**161**	**152**	**144**	**136**	**142**
Electricity: Utilized capacity (GW)	**2011**	**2012**	**2013**	**2014**	**2015**	**2016**	**2017**
Total Generation	383	383	383	381	384	388	391
Coal	102	108	107	106	107	107	104
NG+import	79	67	57	53	51	49	52
Fuel Oil	3	2	2	2	2	2	2
Nuclear	99	96	97	99	98	98	95
Hydro	56	61	63	63	65	67	69
Solar	5	7	8	9	9	10	11
Wind	19	22	24	25	28	30	32
Other Renewables	20	19	24	23	23	24	24
Load growth (%)	-1.0%	0.0%	0.0%	-0.5%	0.9%	1.0%	0.8%

Source: EIA, IEA, Citi Research

Far-reaching strategic implications

1. **The reduction in Russia's reliance on Europe for revenue could be achieved**
2. **Russian Far East's gas supply becomes much more competitive.**
3. **China also gains leverage in gas supply deals**, as new gas supply would help to meet demand and diversify supply.
4. With Russia able to ramp up its Eastern Gas Program and China partially reducing its LNG demand growth, **global LNG supply could be in further excess,** which should be absorbed but at a lower price, affecting LNG developers.
5. **Coal demand for power generation could fall further** as gas substitutes coal, thereby affecting coal producers.

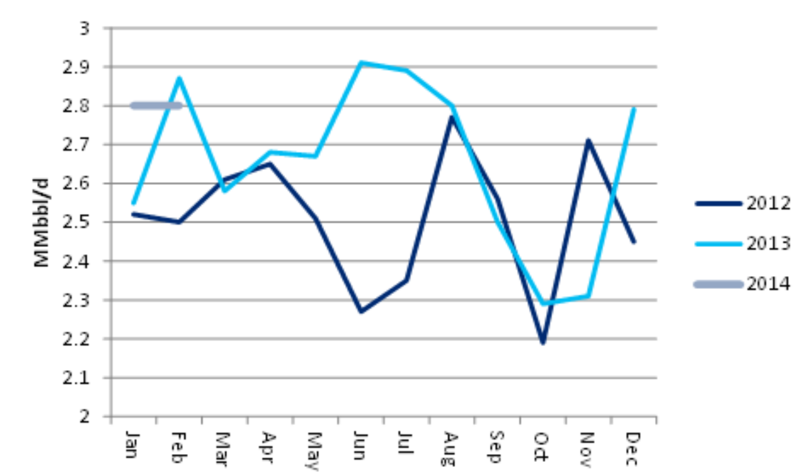
China's gas pipeline network

Source: IEA, Citi Research

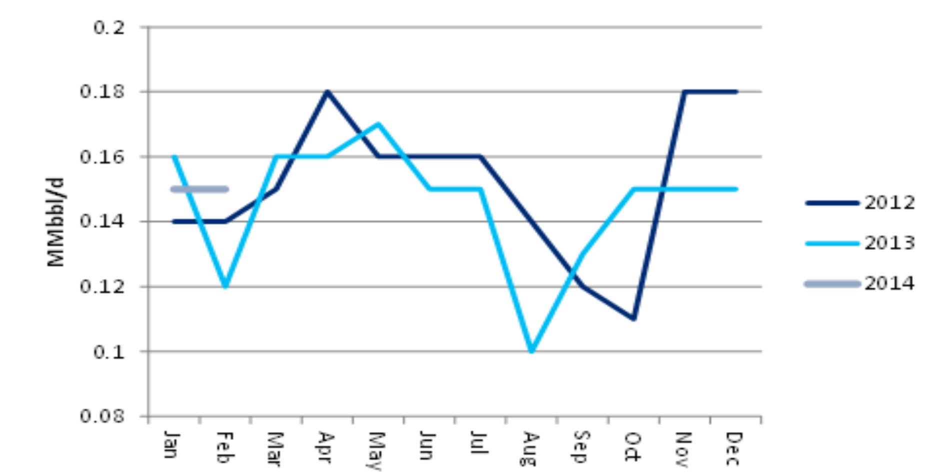
Meanwhile product exports have grown and should continue to grow

Russian policies have prompted refinery expansions, higher quality products, with fuel oil falling from 33% of exports to closer to 10%, and gasoil potentially doubling toward 1-m b/d

Product exports likely to remain mostly West bound

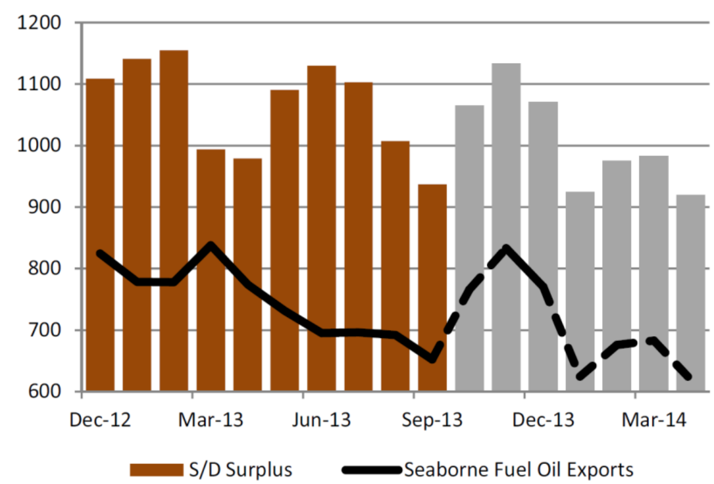


But East bound sales could rise with new refineries



- The trend has been toward more product exports, given growing refinery capacity, and have already risen from 2.85-m b/d in 2011 to 3.17-m b/d last year, and could grow to 3.3-m b/d this year
- Meanwhile there should be a growing and dramatic drop in dirty product sales as new refineries yield less fuel oil, and a significantly higher percentage of clean products; the bottom right graph shows the situation if the fuel oil export duty were to be changed in 2014, instead this has been deferred into 2015.

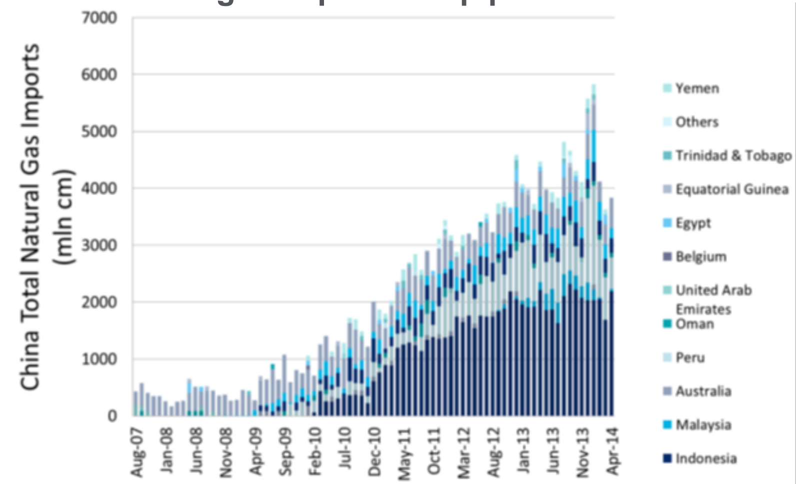
Russian fuel oil surplus and seaborne exports*



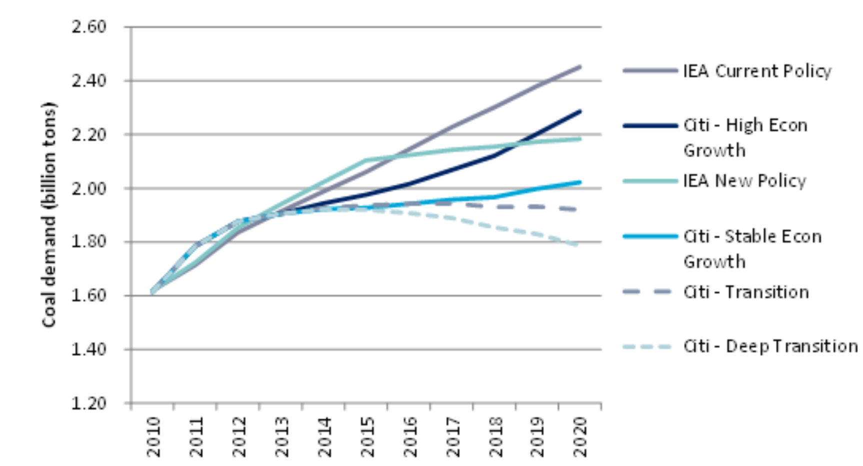
Source: FGE, Citi Research

China boosts its fuel diversity, possibly reducing coal burn, emissions

China natural gas imports via pipelines and LNG



China coal demand under different scenarios (2011-2020)



China's natural gas supply-demand balance (Bcf/d)

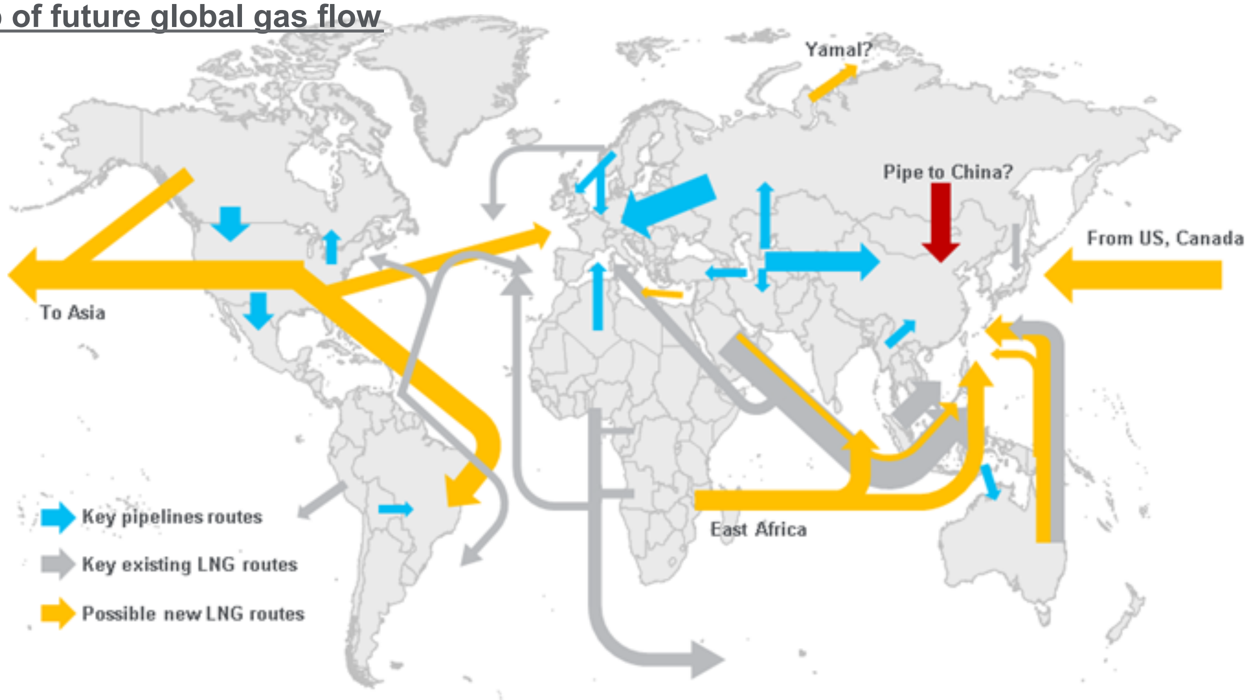
LNG Imports	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025
Australia	0.4	0.4	0.4	0.4	0.5	0.9	1.8	2.3	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5
Canada	-	-	-	-	-	-	-	-	-	-	-	0.5	0.6	0.6	0.6	0.6
Equatorial Guinea	-	-	-	-	-	-	0.2	0.0	-	-	-	-	-	-	-	-
Indonesia	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Malaysia	0.3	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4	0.4
Papua New Guinea	-	-	-	-	0.0	0.2	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3	0.3
Qatar	0.3	0.4	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7	0.7
Russia	-	-	-	-	-	-	-	-	-	-	0.1	0.4		0.4	0.4	
US	-	-	-	-	-	-	0.3	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
Yemen	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.1	0.1	0.1	0.1	0.1	0.1	0.1	-
LNG Imports	1.3	1.7	2.0	2.0	2.1	2.7	4.1	4.8	4.9	4.9	5.0	5.7	5.7	5.9	5.9	5.6
Pipeline Imports																
Turkmenistan Pipe	0.3	1.4	2.1	2.3	2.9	3.9	5.8	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7	7.7
Myanmar Pipe	-	-	-	0.2	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Russia Pipe	-	-	-	-	-	-	-	-	0.7	1.5	2.2	3.0	3.7	3.7	3.7	3.7
Gas Pipeline Imports	0.3	1.4	2.1	2.5	3.3	4.4	6.3	8.2	8.9	9.7	10.4	11.2	11.9	11.9	11.9	11.9
Domestic Production	9.1	9.9	10.3	10.3	10.4	10.4	10.5	10.7	11.0	11.3	11.6	12.0	12.4	12.9	13.5	14.1
Total Supply	10.7	13.0	14.3	14.8	15.8	17.5	20.9	23.7	24.1	25.9	27.0	28.9	30.1	30.8	31.3	31.6
Growth Rate		21%	10%	3%	7%	11%	19%	13%	1%	7%	4%	7%	4%	2%	2%	1%
Total Demand	10.3	12.6	13.9	15.6	17.1	18.7	20.2	21.9	23.5	25.2	26.8	28.6	30.4	32.2	33.9	35.7
Growth Rate		22%	10%	12%	10%	9%	8%	8%	8%	7%	6%	7%	6%	6%	5%	5%
Gas Supply Shortfall	(0.4)	(0.4)	(0.4)	0.8	1.3	1.1	(0.7)	(1.8)	(0.5)	(0.7)	(0.2)	(0.3)	0.4	1.5	2.6	4.1

Source: IEA, BP, Woodmac, Citi Research

The evolution of the global gas market entering a new stage

- Both the gas deal unlocking vast resources in Russia's Far East and sharply higher US LNG exports are both critical events in the global gas market
- Buyers in Asia and Europe already see potential US exports as a secure source of supply
- But the previously scattered nature of Russia's Eastern Gas Program is given new life.
- With the possibility of ~95-Bcm/yr (~9.3-Bcf/d) of gas exports from Russia by mid-2020, Russian gas exports to Asia could rival that of the US, which itself could bring on more than 8 to 10-Bcf/d of LNG to market

Map of future global gas flow

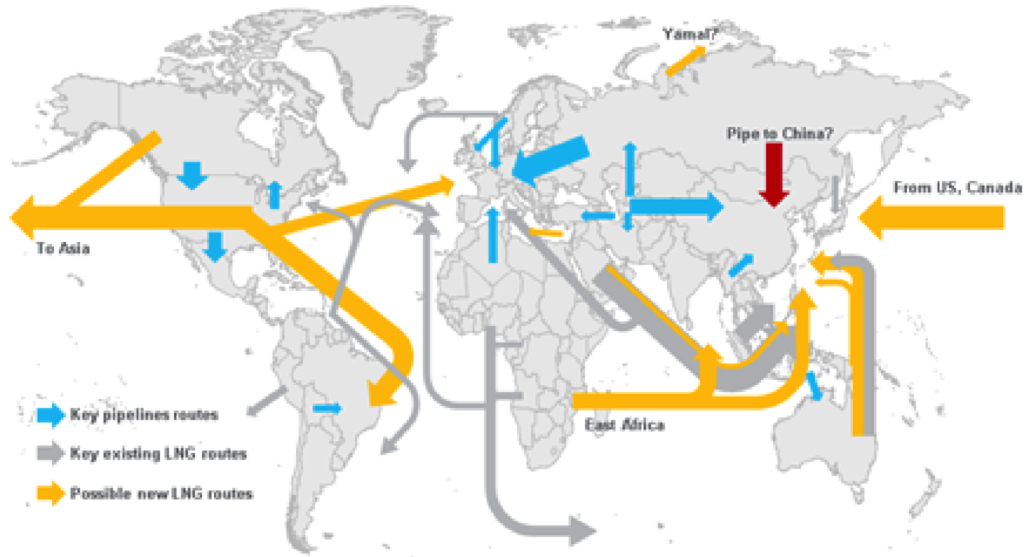


Source: Citi Research

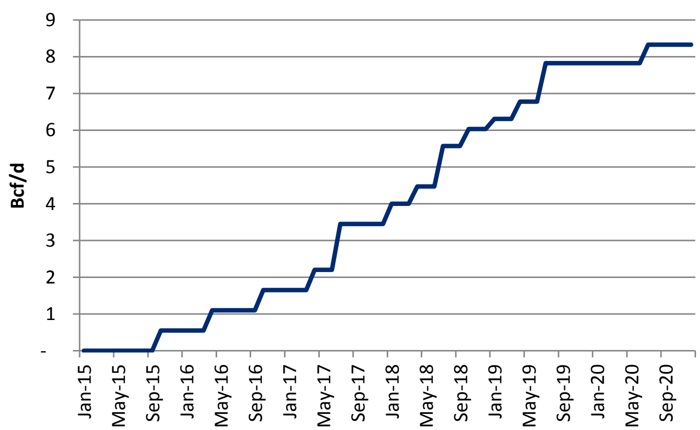
North America poised to become one of the largest global gas suppliers

US gas exports should reinforce growth of LNG spot market, allow importers supply not sourced in Mid-East or Russia; and pipeline gas exports to Mexico could surge to satisfy the strong demand for gas

Map of future global gas flow



Possible amount of US LNG exports (2015-2020)



US LNG exports could surpass Qatar and Australia by 2020

Terminal	Company	Location	mtpa	Bcf/d
Approved (non-FTA)				
Sabine Pass	Cheniere	Cameron, LA	16.5	2.2
Freeport	Freeport/Macquarie	Freeport, TX	10.5	1.4
Lake Charles	Energy Transfer Partners	Lake Charles, LA	15.0	2.0
Cove Point	Dominion	Lusby, MD	5.8	0.8
Freeport expansion	Freeport/Macquarie	Freeport, TX	3.0	0.4
Cameron	Sempra	Hackberry, LA	12.8	1.7
Pending				
Jordan Cove	Jordan Cove	Coos Bay, OR	6.8	0.9
Oregon	LNG Dev Co.		9.4	1.3
Corpus Christi	Cheniere	Corpus Christi, TX	15.8	2.1
Lavaca Bay	Exelerate	Port Lavaca, TX	10.4	1.4
Gulf Coast	Gulf Coast LNG	Brownsville, TX	21.1	2.8
Southern LNG	Southern LNG	Savannah, GA	3.8	0.5
Gulf LNG	Gulf Coast LNG Export	Pascagoula, MS	11.3	1.5
CE FLNG	CE FLNG	Plaquemine, LA	8.0	1.1
Golden Pass	Golden Pass Products	Port Arthur, TX	19.5	2.6
South Texas LNG	Pangea LNG	Offshore, TX	8.2	1.1
Main Pass	Freeport-McMoRan	Offshore, LA	24.2	3.2
Sabine Pass	Sabine Pass Liquefaction	Cameron, LA	2.1	0.3
Sabine Pass	Sabine Pass Liquefaction	Cameron, LA	1.8	0.2

Source: Citi Research

Note: Schematic only; size of arrows not reflective of actual flow; arrow directions indicative only

What a gas spot market will bring

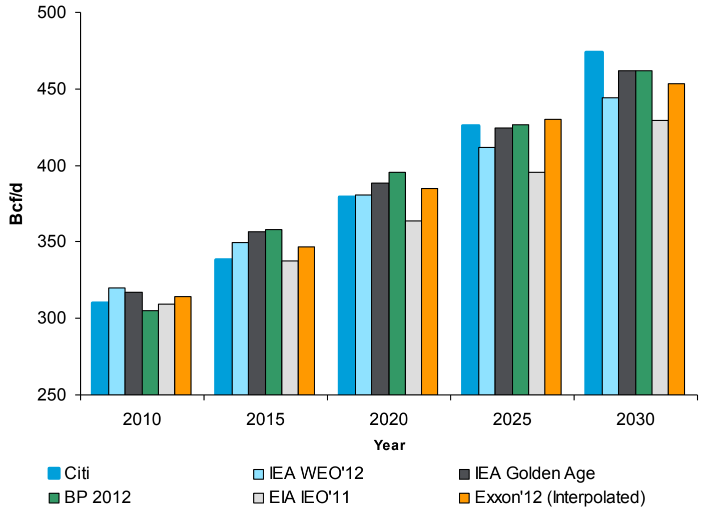
There's nothing like a spot market to unleash market mechanisms, including a forward price market, hub trading, and some significantly flow consequences

1. Lack of destination restrictions, no re-sale prohibitions, means that seasonally low use periods will lead buyers to sell into highest prices short-term market
2. A spot market should ultimately create a global price that would be used to arbitrage transportation differentials around global consumers
3. A global price should create more competitive conditions for sellers, who have enjoyed "OPEC-like" advantages to date
4. LNG from OECD sources should all else equal be seen as more secure and more competitive than other LNG sourced supply
5. Spot trading should create conditions for a trading hub and futures contract, but
    - Will the hub likely be in a consumer country (Singapore? China?)
    - Or will it naturally emerge in a producer country (US? Qatar?)

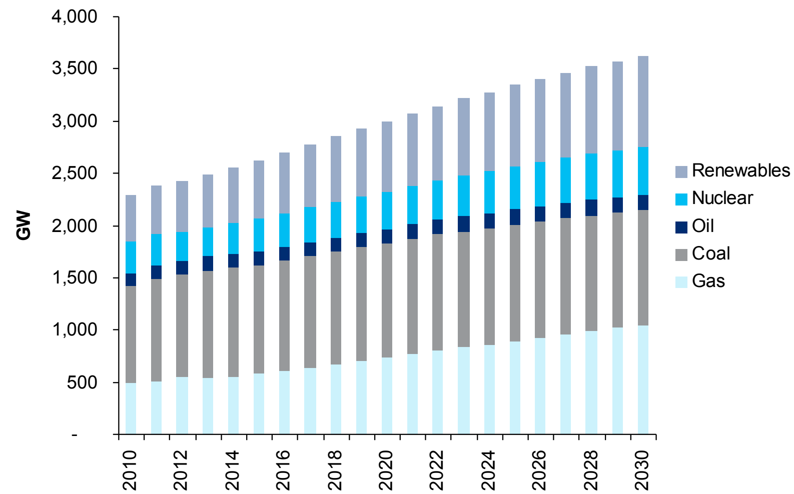
Putting it all together: a remaking of global energy landscape

Gas: Rising global supply to meet demand needs

Estimates from different forecasters

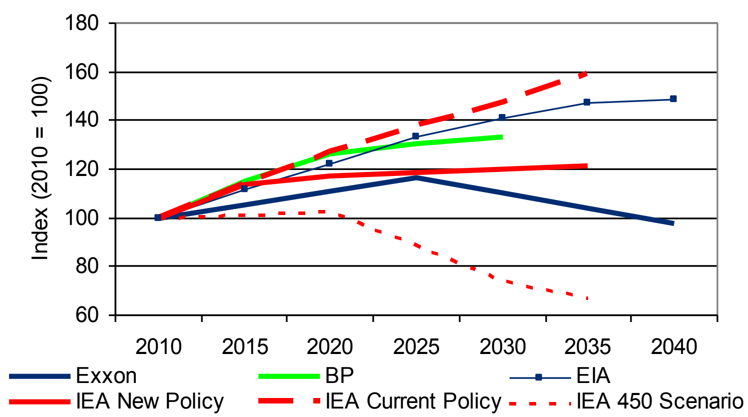


Power: Renewables and gas to power rising demand



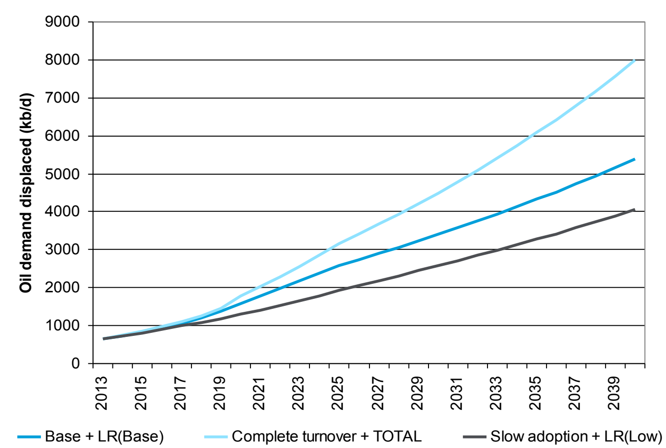
Coal: Demand should peak, led by China's slowdown

Scenario could follow IEA's New Policy and Exxon's cases



Oil: Displacement to slow global demand growth

Gas-for-oil substitution in transportation, but substitution in power generation could cut an additional 5-mb/d of demand



Source: BP, EIA, Exxon, IEA, Citi Research

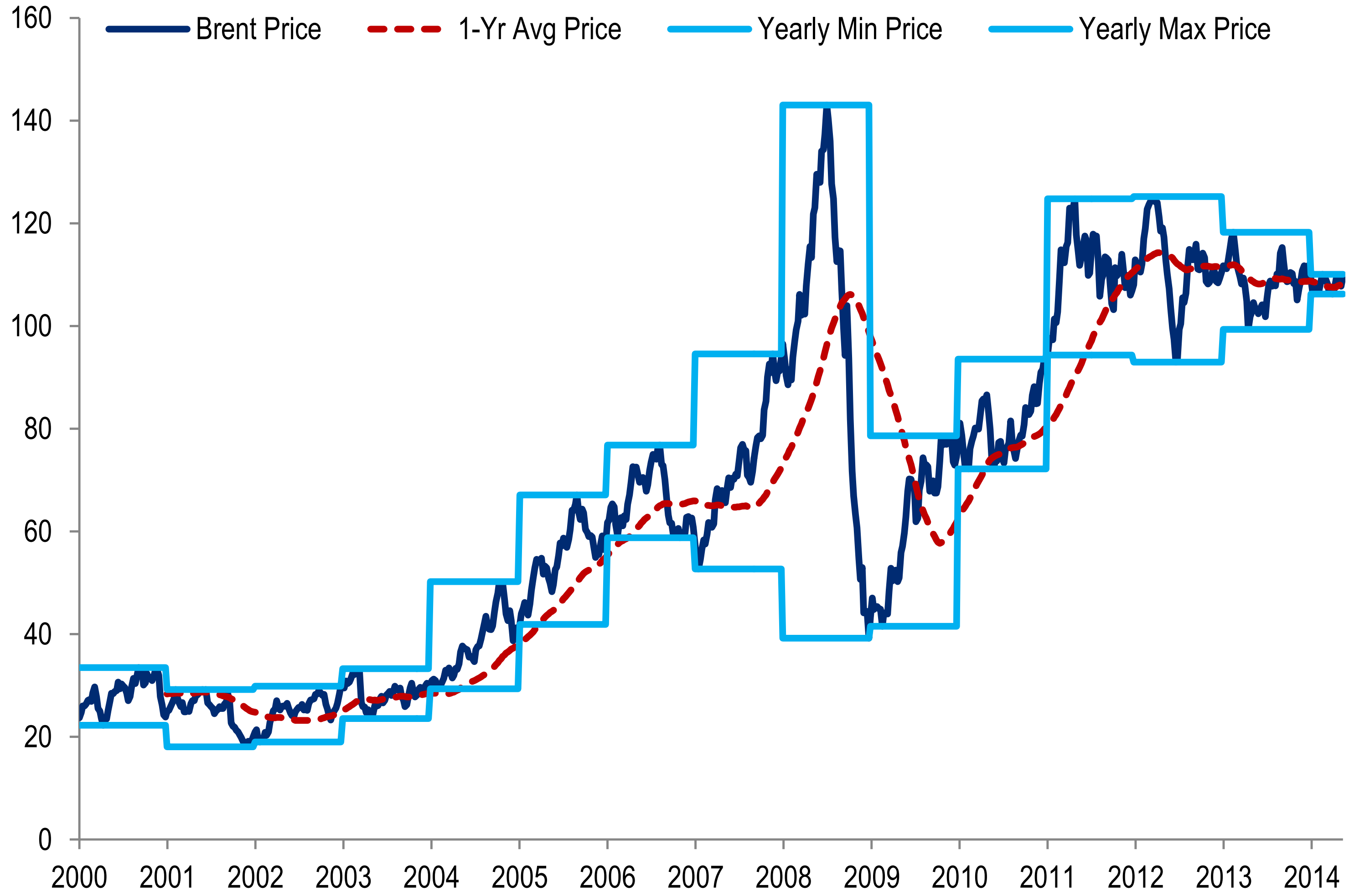
Ongoing/potential disruptive trends to remake the energy market

- **The last decade saw the emergence of disruptive technology and significant change on the supply side**
- **How and when new technology emerges is always a surprise but improvements of current technology could be just as impactful**
  - Over the past five decades, the hardware industry built on the semiconductor concept developed in the 1960s. Improvements in current technology, such as gas plants, can leverage existing infrastructure and be more impactful
  - Technology can have a large impact on the market if infrastructure is not a hurdle. Shale gas was able to leverage off the existing network, with incremental improvements elsewhere. Storage technology still has to undergo years of massive commercialization before they will have a market-wide impact.
  - But being nimble in response to emerging trends is always a key success factor.

Crude oil prices have been range-bound for several years

Prices have been range-bound with new supply balancing lost supply… but it has been the “wrong” quality of crude in the “wrong” place, unable to get to the most suitable markets.

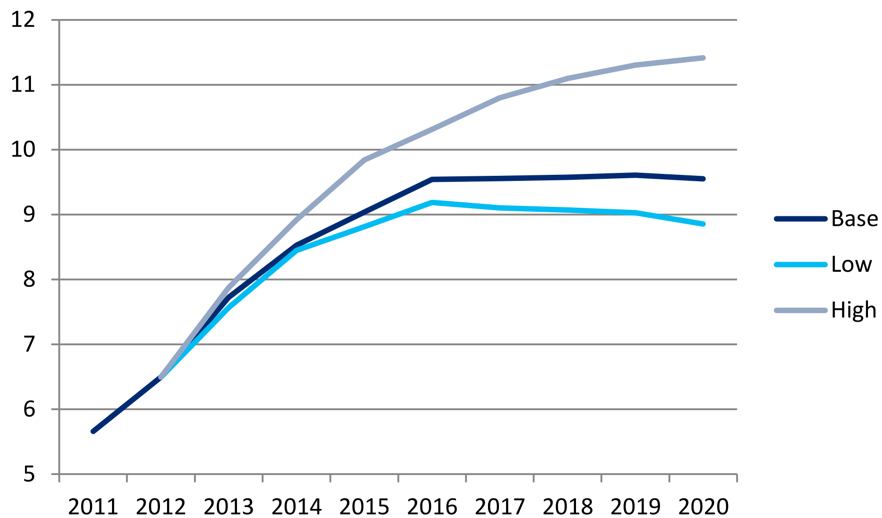
Brent crude oil prices ($/bbl, 2001-2014)



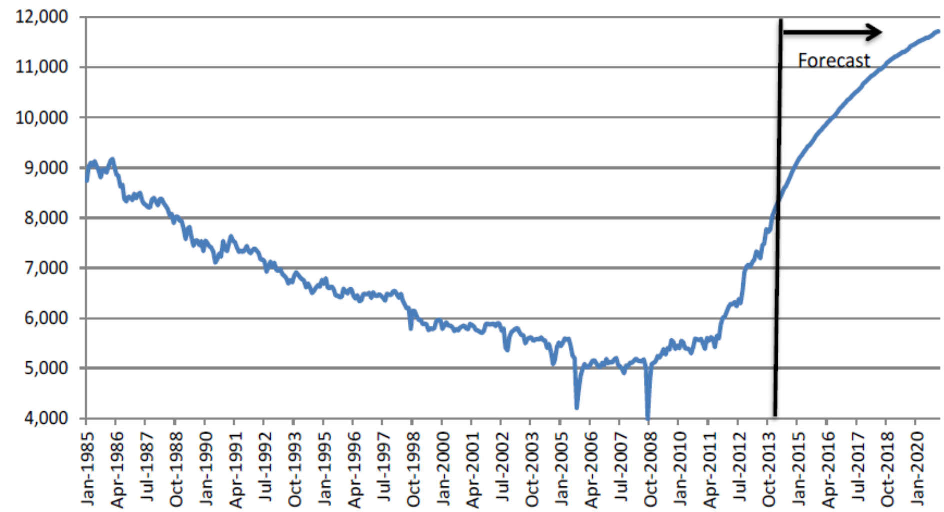
Source: Bloomberg, Citi Research

US supply growth: three different paths for the rest of the decade

EIA AEO 2014 US crude production outlooks



Raymond James US crude production outlook (Feb 2014)



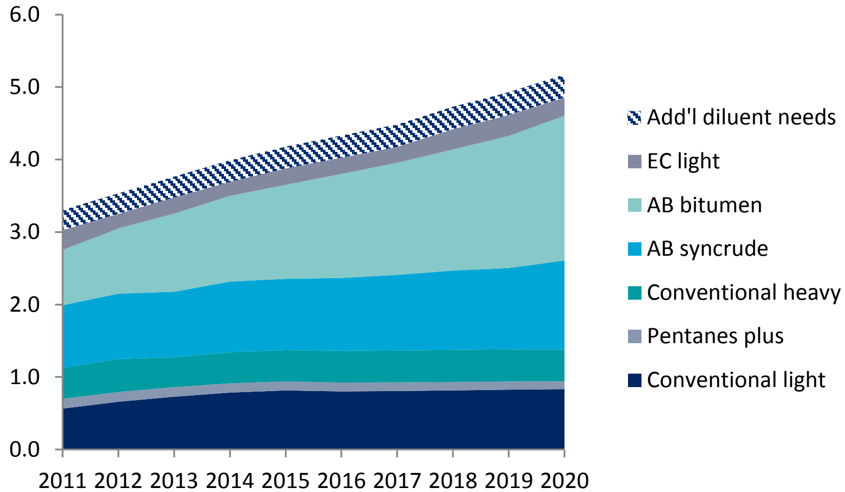
- Different paths for US crude production for 2014-2020:
  - EIA's base case for US crude production: +1-m b/d to 9.6-m b/d (and NGL production grows only +0.14-m b/d to 2.65-m b/d by 2020, but March 2014 already at 2.8-m b/d)
  - EIA's high case +2.5-m b/d to 11.4-m b/d between 2014-2020 in its high case. IHS CERA sees US crude production rising to 10-m b/d by 2020.
  - Raymond James sees US crude production getting to ~12-m b/d in 2020, but previous outlooks had been as high as 13-14-m b/d by 2020.
- Citi's outlook is on the higher side, and sees US crude production getting to 12-m b/d in 2020.

Source: EIA, company reports, Citi Research

* Incremental crude production in excess of refinery/splitter additions

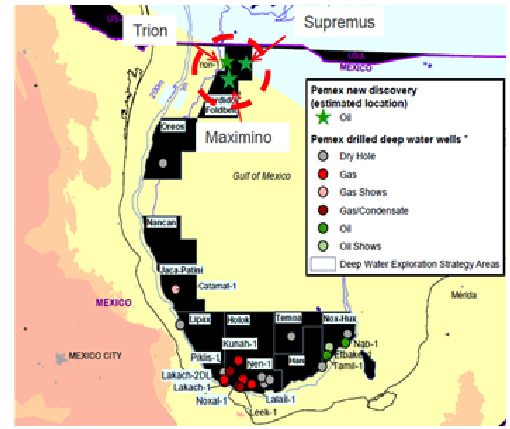
Other non-OPEC supply growth

Canadian crude production could reach ~5-m b/d this decade (m b/d, 2011-2020)

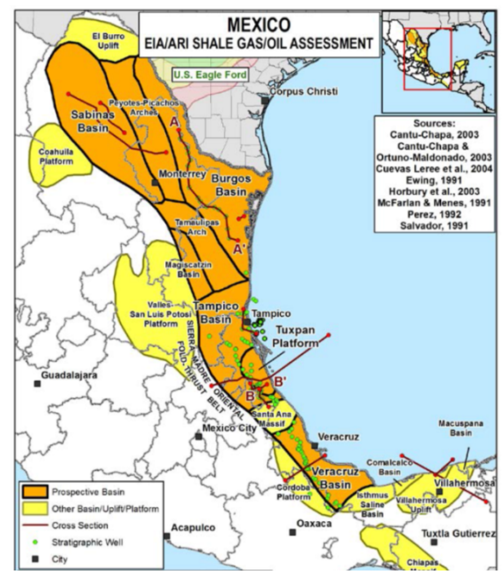


- Canada and Mexico can contribute to robust North American supply…
- …while the FSU, Brazil, China, and West Africa should also be adding supply this decade too.

Mexico's energy reforms can foster development of offshore deep water supply in the Gulf of Mexico…



…as well as onshore shale resources

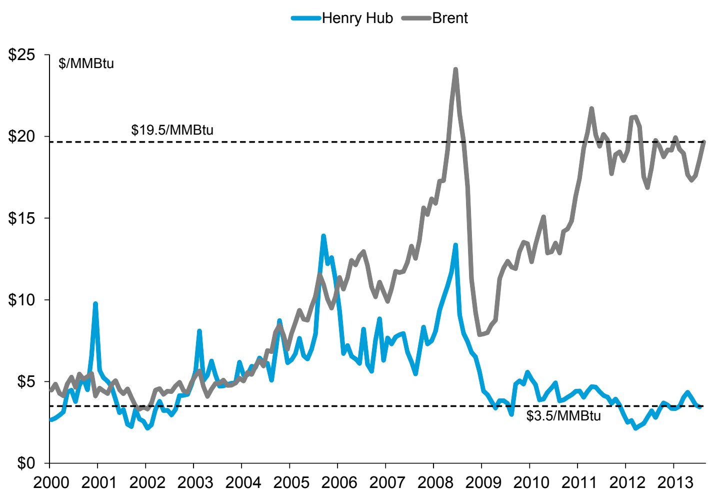


Source: NEB, EIA, Wood Mackenzie, Citi Research

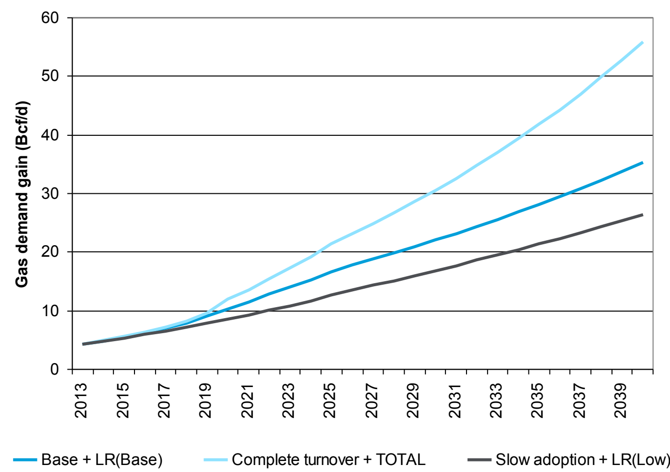
Slowing oil demand growth and oil-to-gas substitution, over time

Eroding the 40-m b/d global motor fuel market – natural gas can substitute for oil in transportation, particularly road vehicles, as shown below, but also for rail and marine transport too

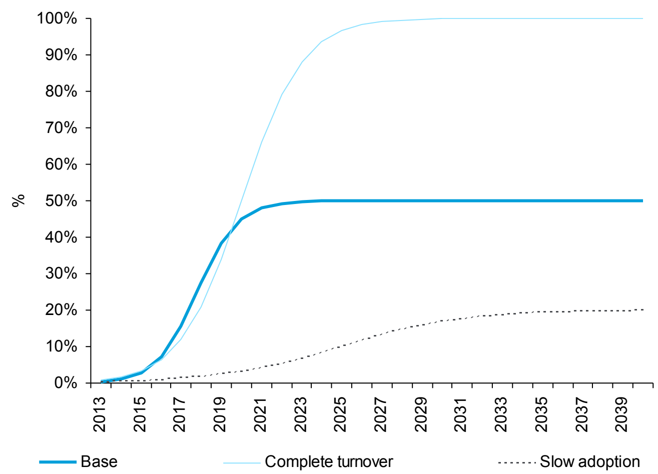
Crude and US natural gas prices have diverged



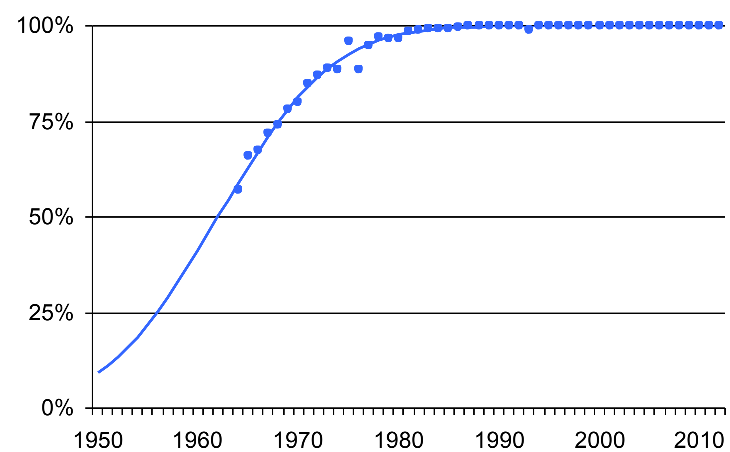
Projected gas demand in transportation



Estimated NGVs as % new HDV sales in the US



Diesel's share of new Class 8 trucks sales in US, 1950-2010



Source: MacKay, Wards Auto, Westport, Ayres-Ayres-Warr, Citi Research

The upshot: Brent range-bound, but could fall precipitously

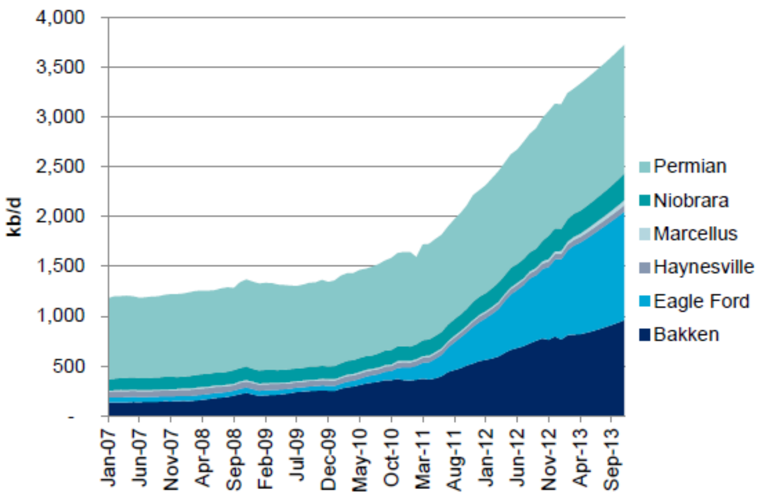
Brent stays range-bound for now, but could see a precipitous fall at some point, with indications that long-term prices could be $90 Brent as a ceiling rather than a floor.

- **An upside breakout is unlikely and the downside is a lot more probable:** More disruptions are possible, but so is more production, including more output from Saudi Arabia. Global crude balances imply that only a massive Middle East disruption breaks the range on the upside, and its economic consequences would like limit sustained upward price moves
- **Refining margins look likely to soften, except in the US, and new refineries tend to see high throughput,** but so far product oversupply hasn't led to a significant closure of refineries in Asia or Europe
- **A downside price breakout is unlikely in 2014,** unless there is a rapid growth in production from Libya and Iraq, no new disruption from Nigeria or Venezuela, with new supply focused substantially on North America, but also Atlantic/Pacific Basins
- **Refinery capacity build-out in the Middle East and East Asia are turning global flows on their head,** potentially reducing Middle East available crude supplies, replacing them with product flows
- **OPEC production growth could push market softness out until 2015,** with a higher probability of new substantial sustainable flows from Iraq and Libya and possibly Iran

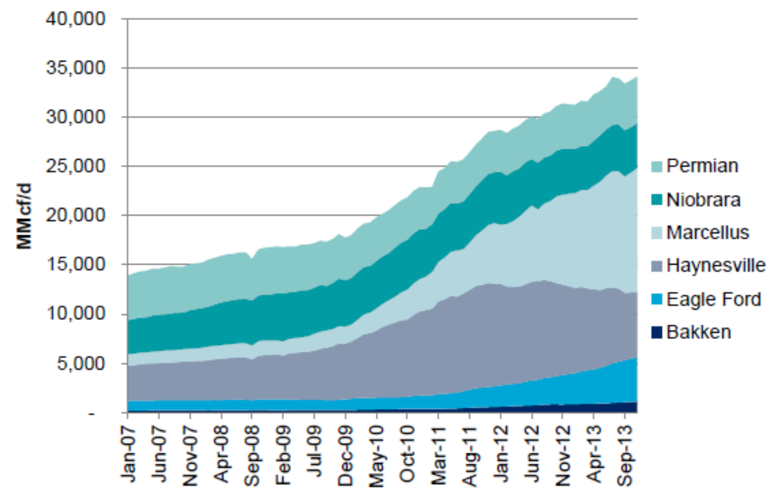
Light tight oil from the US shale revolution

…and the shale revolution began with natural gas.

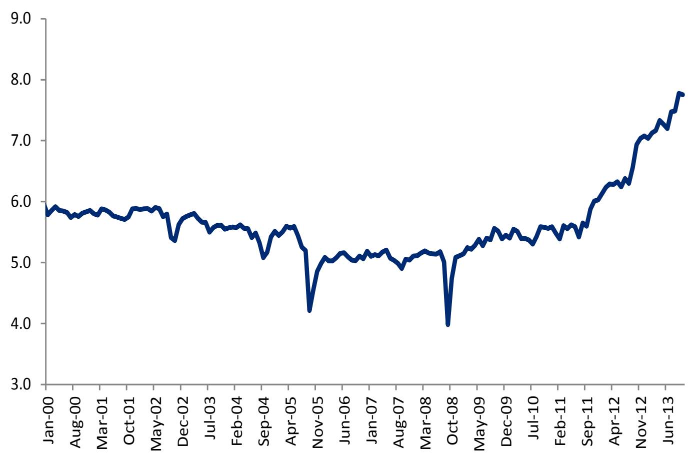
Shale oil/liquids production began surging in late 2010…



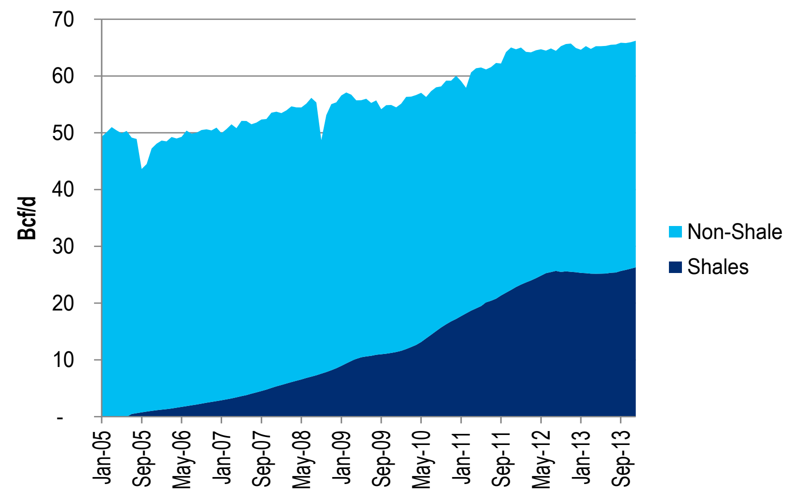
…while shale gas production started rising post-2008



US oil production grew from 5-m b/d in 2007 to >8-m b/d



Shale production has driven total US gas output growth

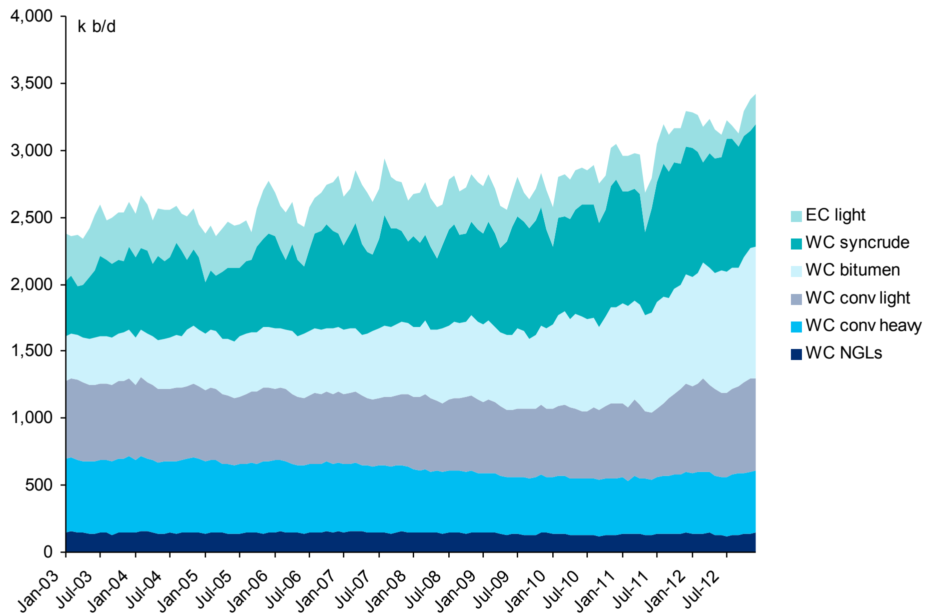


Source: Bloomberg, EIA, Citi Research

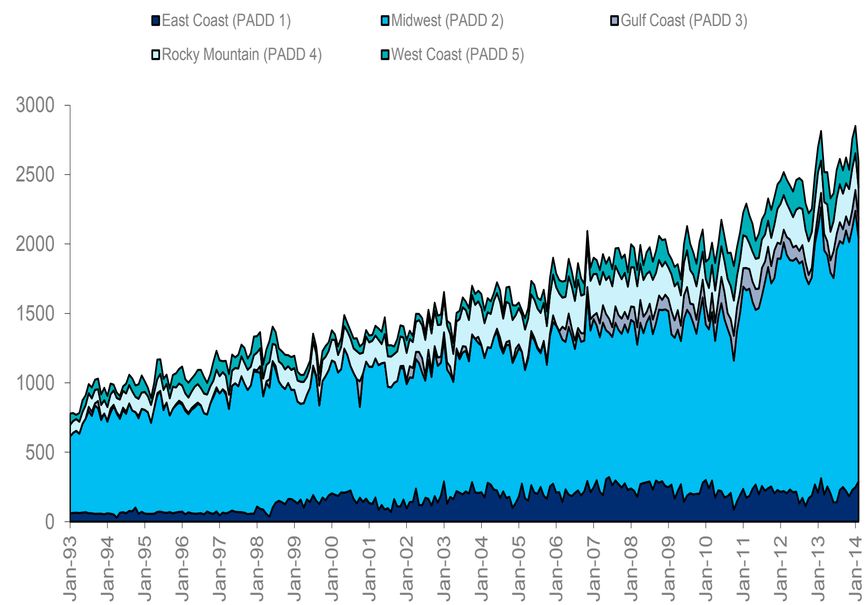
Heavy oil sands supply steadily growing in Canada…

…leading to the first WTI-Brent oil price disconnect in 2007-08

Canadian oil production by type (2003-2013) showing growth in syncrude, bitumen and "conventional light", which includes shale oil



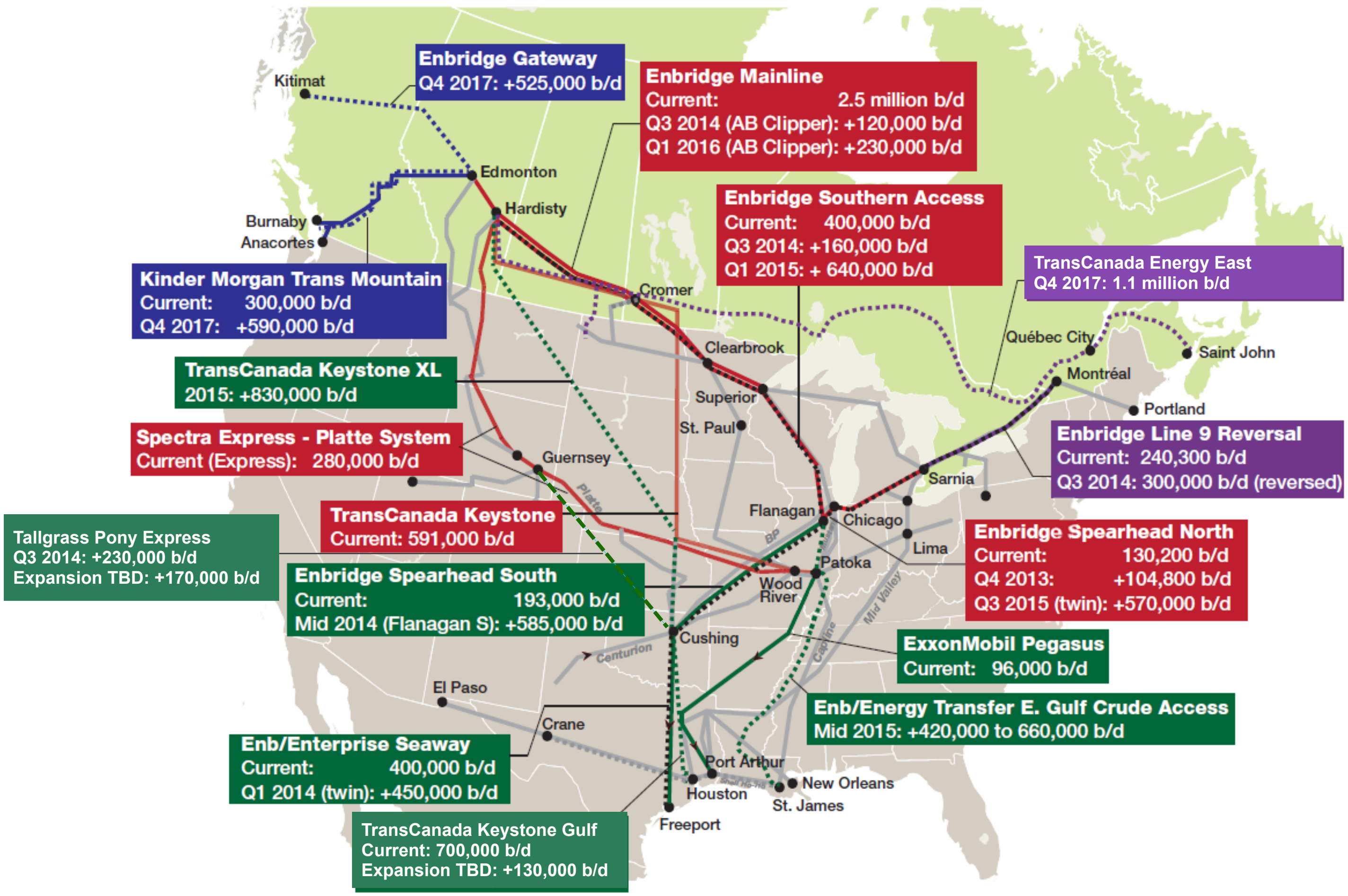
US crude imports from Canada, by PADD (k b/d) – Canadian crude production growth has been absorbed by PADD II so far; 2H'14 pipelines should allow more crude to end up in PADD III at the expense of PADD II, while western Canadian production growth continues



Source: NEB, EIA, Bloomberg, Citi Research

Another year of new pipelines brings new waves of oil to the Gulf

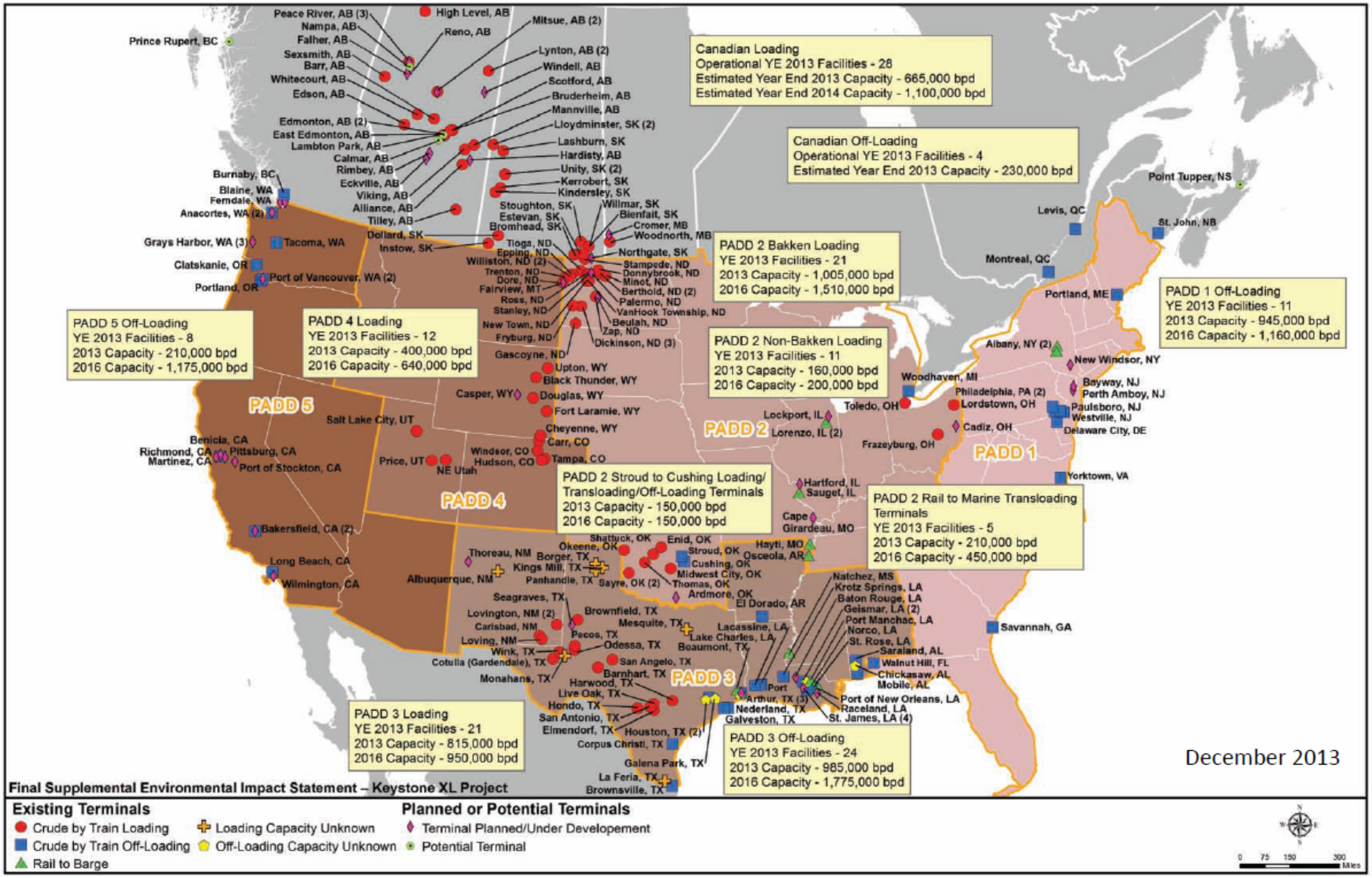
Surging domestic crude oil production has led to reversals and expansions and new-builds of pipelines, as well as increased rail and barge movements, more storage capacity, with huge impacts in 2014-2015



Source: CAPP, Genscape, company reports, Citi Research

…and rail, too, to the Gulf, East, and West Coasts

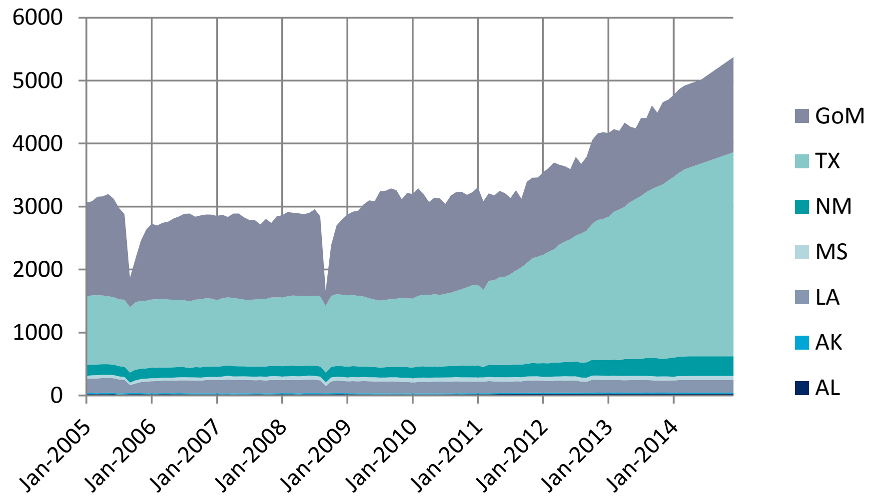
All grades of US Gulf Coast crudes can come under pressure due to growing crude-on-crude competition. Western Canadian, inland US crudes can reach waterborne markets, but limited export options – for now.



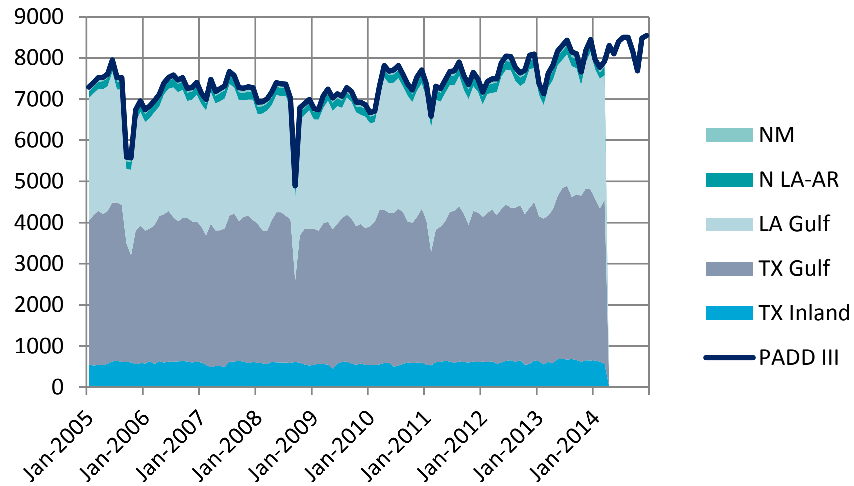
Source: DOS, Citi Research

The crude glut arrives on the Gulf Coast

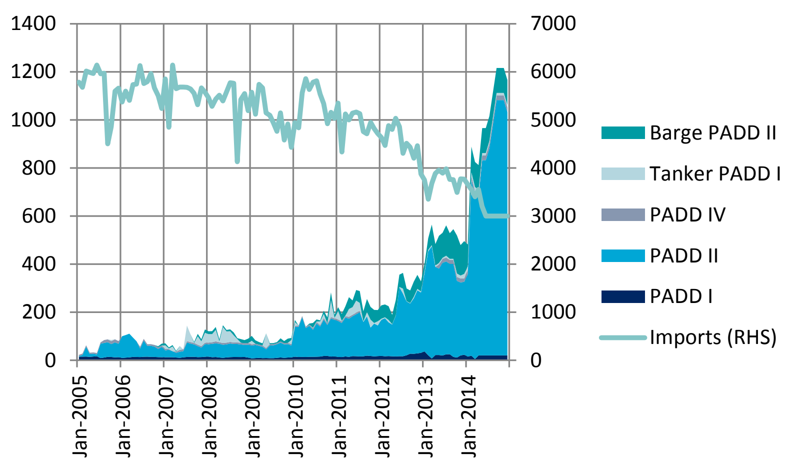
PADD III production driven by Eagle Ford, Permian Basin, US Gulf of Mexico (k b/d, 2005-14)



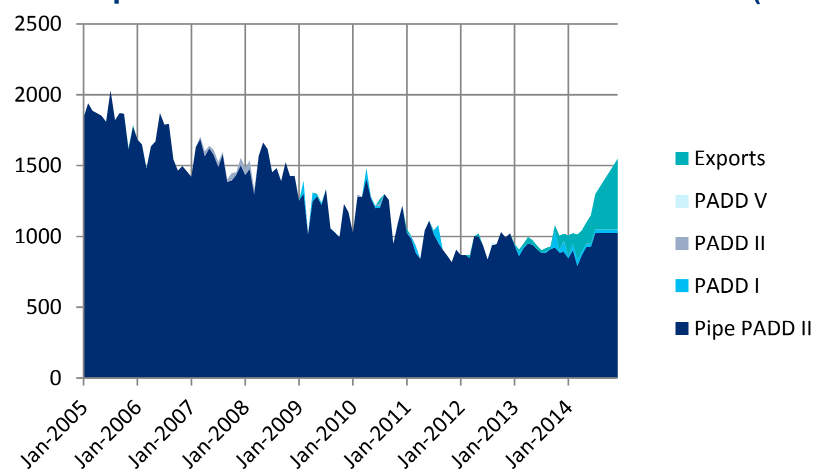
Refinery runs soaring, recent TX Gulf capacity added, some additions to come (k b/d, 2005-14)



PADD III imports: new pipeline inflows from Cushing push out waterborne imports; ~200-k b/d rail inflows additional (k b/d)



PADD III exports: outflows to PADD II have fallen, and waterborne exports are rising; Capline and Mid Valley could provide outlets under extreme conditions (k b/d)

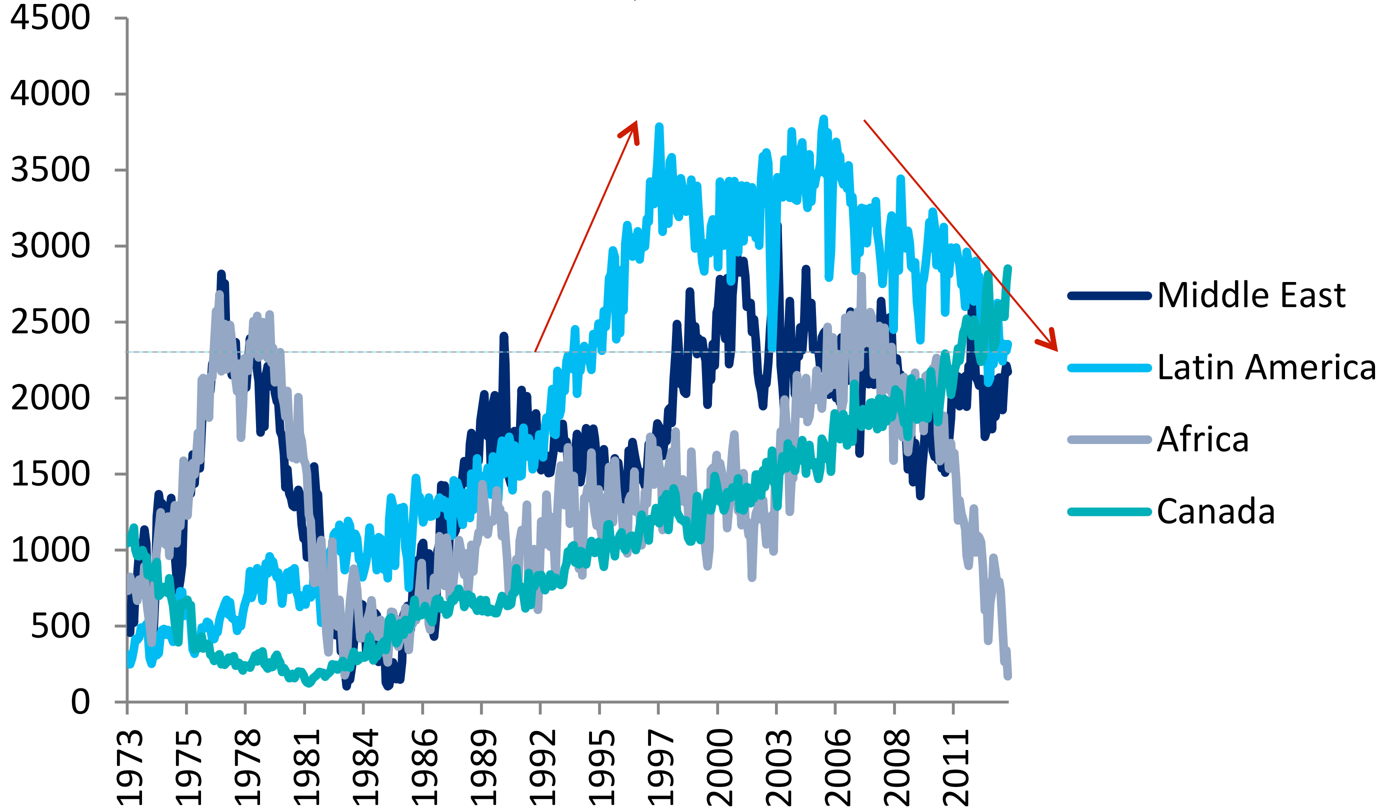


Source: EIA, Citi Research

…pushing out crude imports from Africa, Latin America

Newfound supply growth from shale oil and Canadian oil sands pushed out African imports, and put price pressure on LatAm and Middle East imports; limited takeaway pipelines for Canada depressed prices there too.

US crude oil imports from major region/countries (k b/d, 1973-2014)
Latin American crude exports to the US already back down to 1993 levels levels of ~2.3-m b/d, can fall further

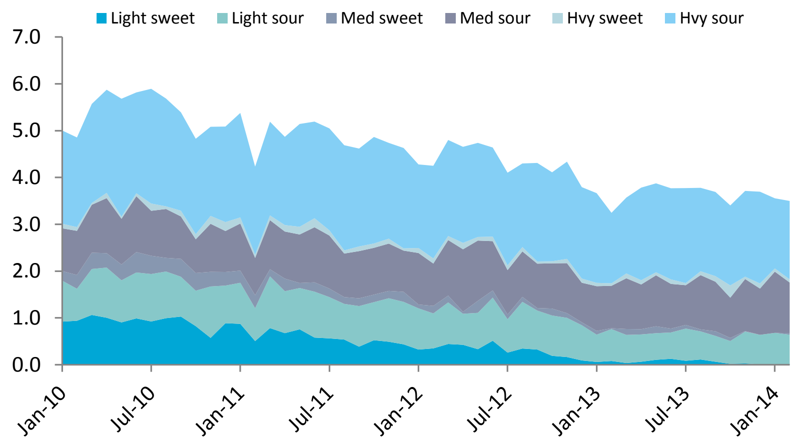


Source: EIA, Citi Research

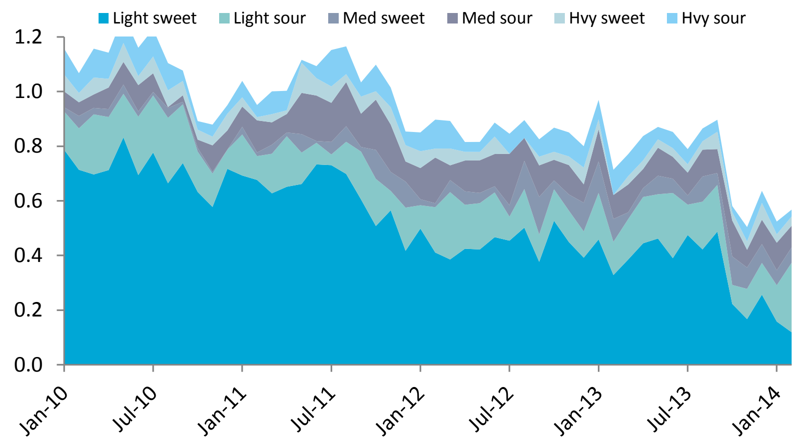
North American light sweet crude imports backed out first

…while other crude qualities remain sticky.

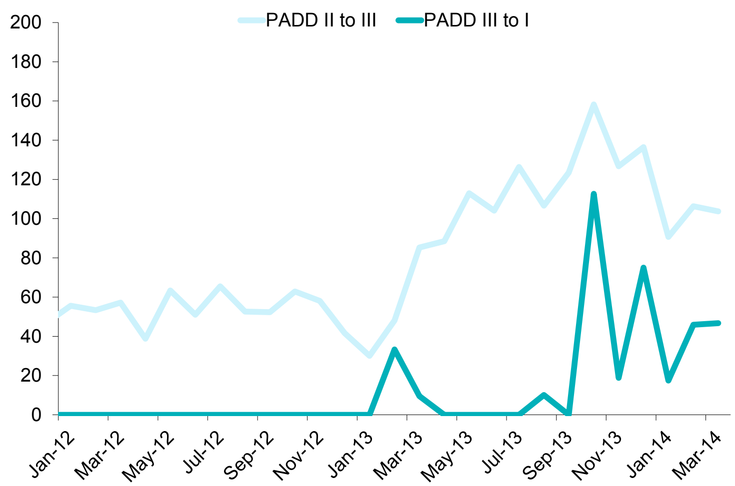
US PADD III / Gulf Coast crude imports by quality (m b/d)



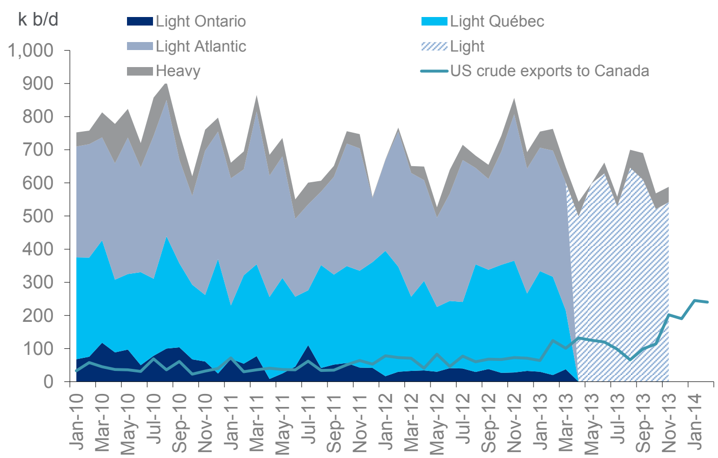
US PADD I / East Coast crude imports by quality (m b/d)



Tanker/barge movements include Jones Act movements from the Gulf Coast to to East Coast



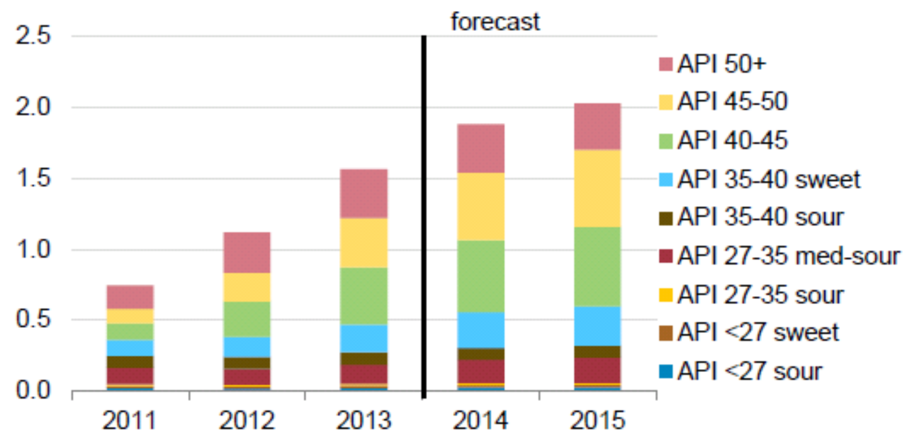
Eastern Canada crude imports by quality, vs US crude exports to Canada (k b/d)



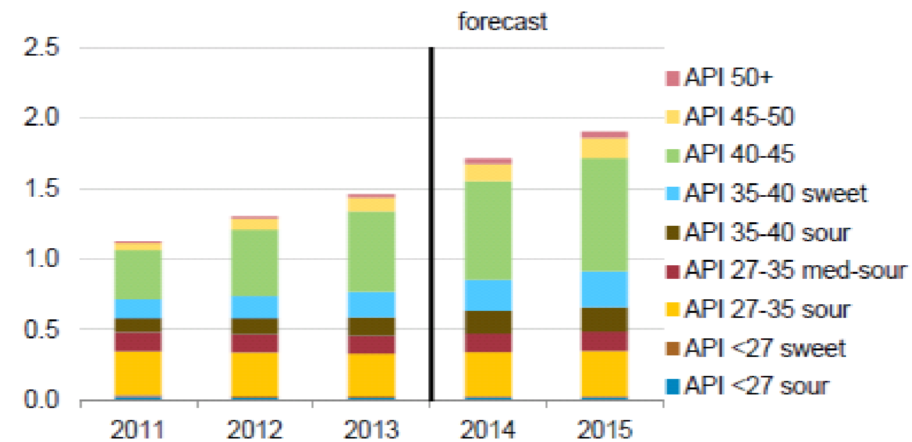
Source: NEB, EIA, Citi Research

Under pressure: Gulf Coast light sweet crude, condensates

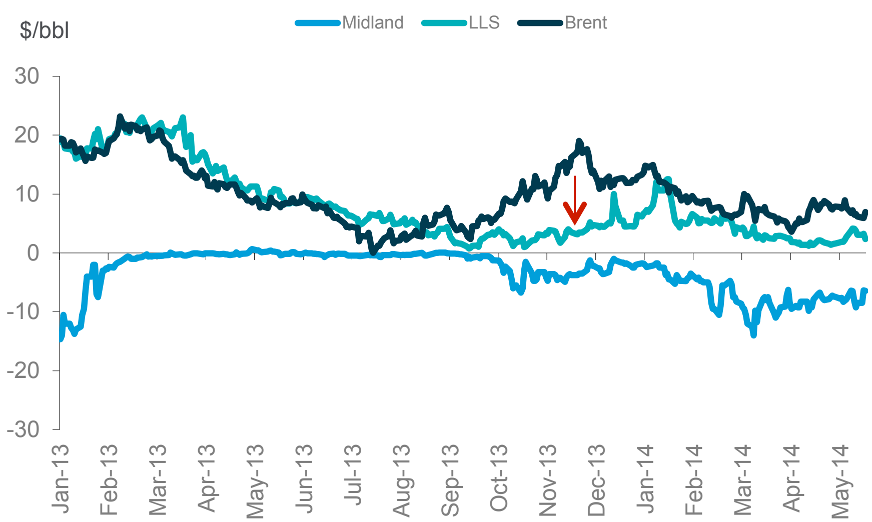
Gulf Coast crude oil production (Eagle Ford output plus 50-k b/d of Haynesville and 450-k b/d conventional production) by quality



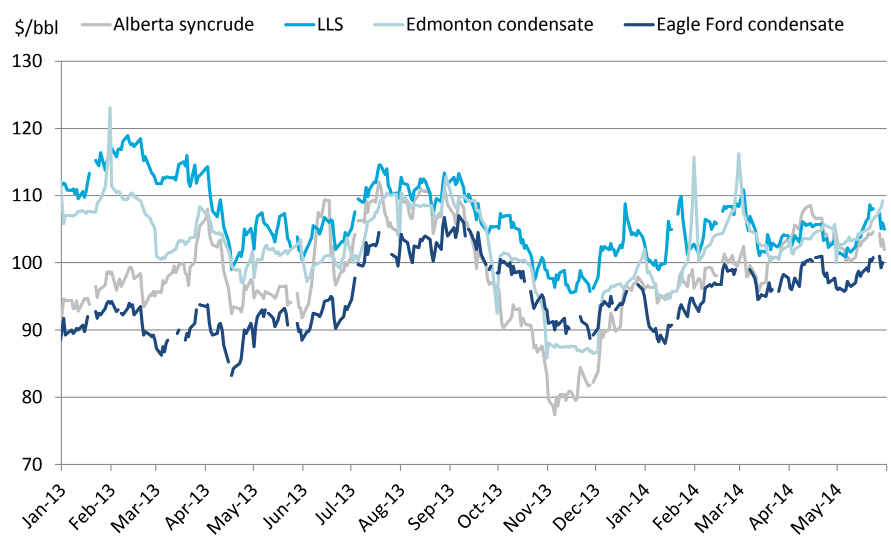
Permian Basin and regional crude oil production by quality (includes 100-k b/d of non-Permian Basin production)



Brent, LLS, Midland differentials to WTI: LLS disconnects from Brent as USGC becomes glutted



Eagle Ford condensate vs. selected NAM crude prices: EF condensate is at a sizeable discount to LLS

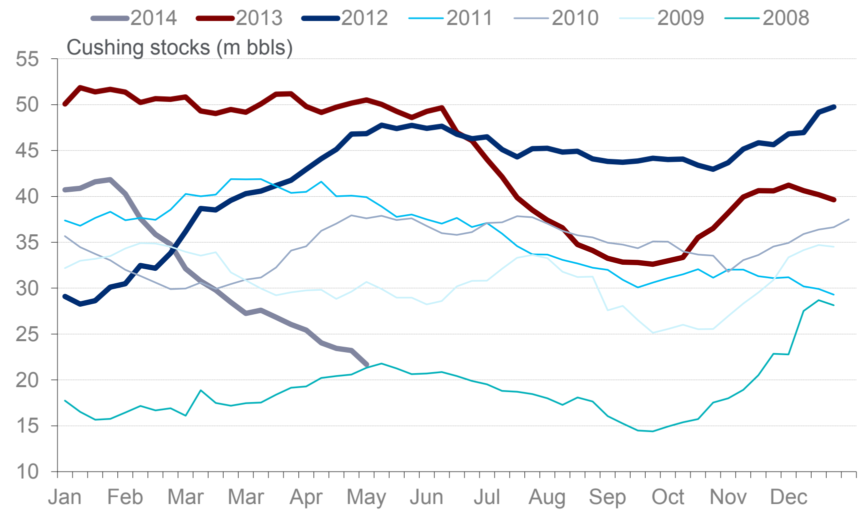


Source: EIA, Bloomberg, Citi Research

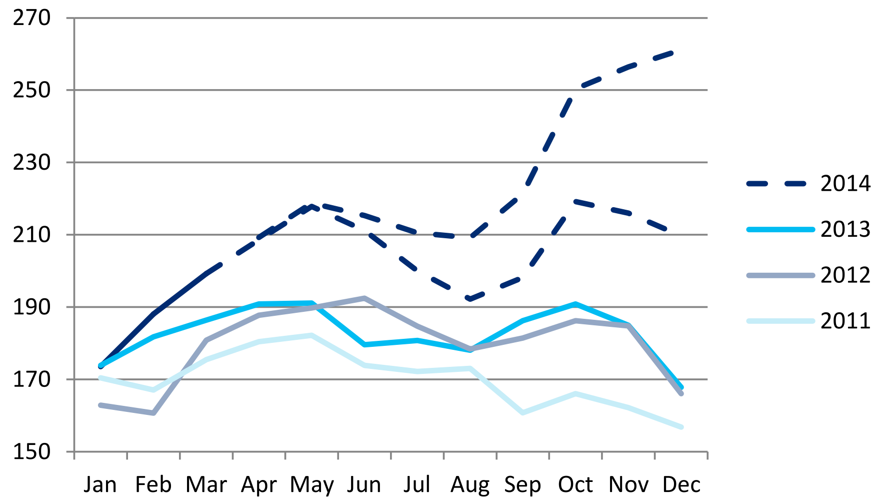
Bloated crude oil inventories shifting to the US Gulf Coast

Cushing stocks are in a race to the bottom, while PADD III stocks are in a race to the top

Cushing crude stocks on the way down…



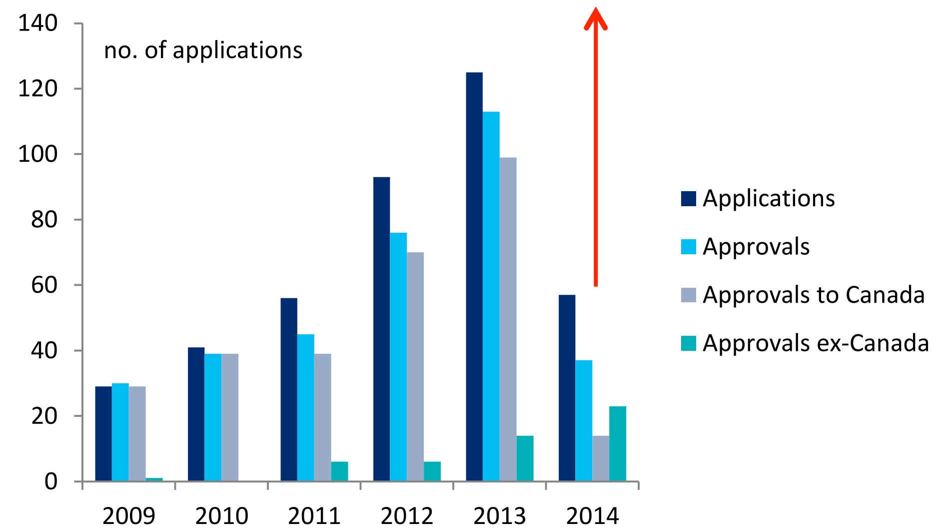
…as PADD III crude stocks march upwards with refinery maintenance



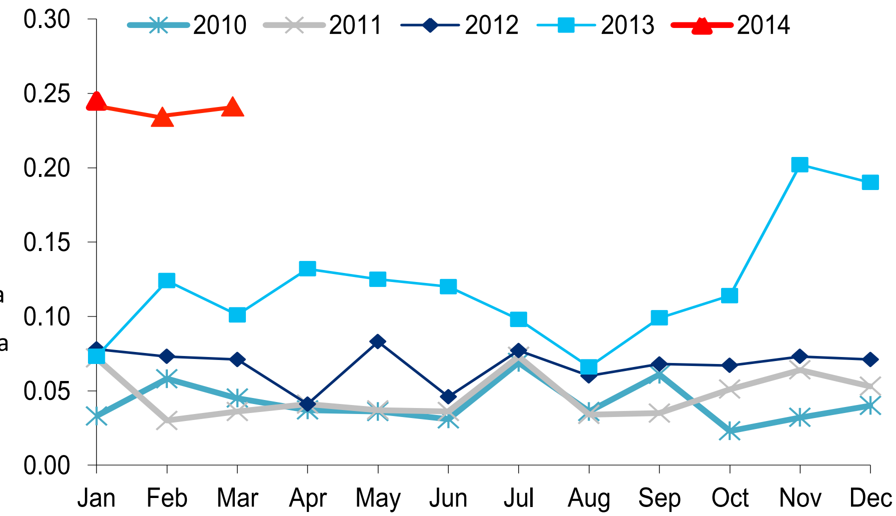
Source: EIA, Citi Research

US: to become a one million barrel per day crude exporter?

US crude export applications and approvals (2014 is year-to-end-Feb)



US crude exports, mostly to Canada (k b/d, 2010-14)

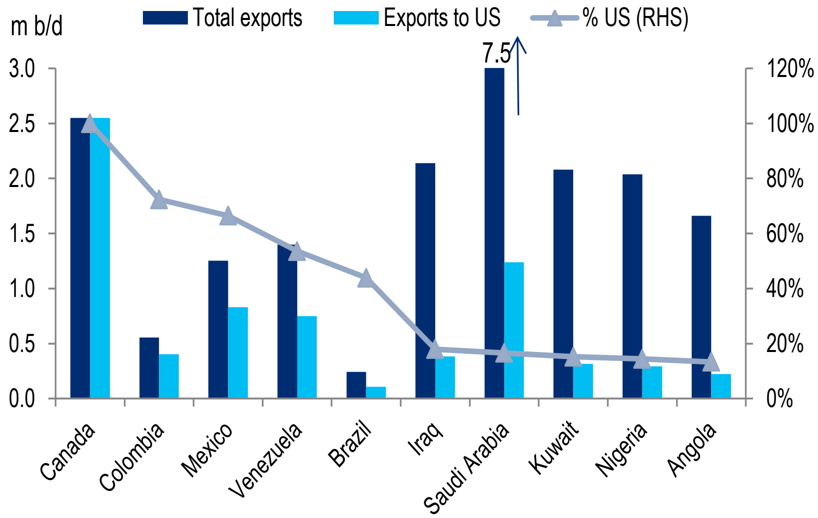


- By end-2014, the US could be exporting another 200-k b/d to Canada (up to 400-k b/d)…
- …another 100-k b/d from Alaska…
- **…perhaps 100- to 150-k b/d to Mexico to feed inland and west coast refineries to improve product yields and …**
- …some 200-k b/d of re-exports of Canadian crude…
- …and perhaps even 200-k b/d of condensates if reclassified as petroleum products.

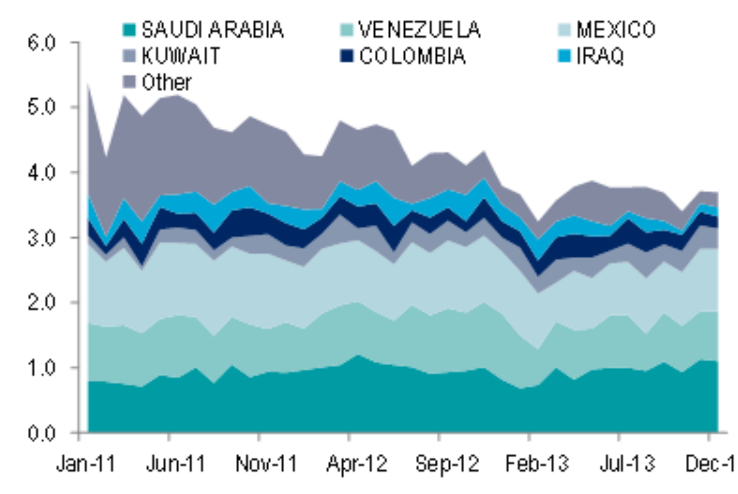
Source: EIA, BIS, Citi Research

Losing crude oil market share on the US Gulf Coast?

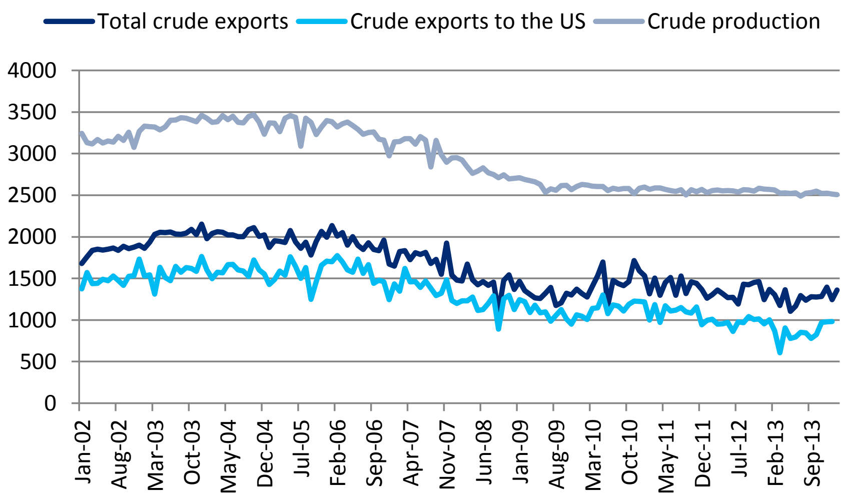
Nigeria and Angola have dropped out of the US crude market…



…while Canada joins three countries in battle for the US Gulf Coast (USGC crude imports by origin, m b/d)



Mexico's total crude exports, exports to the US, and crude production (k b/d, 2002-14)

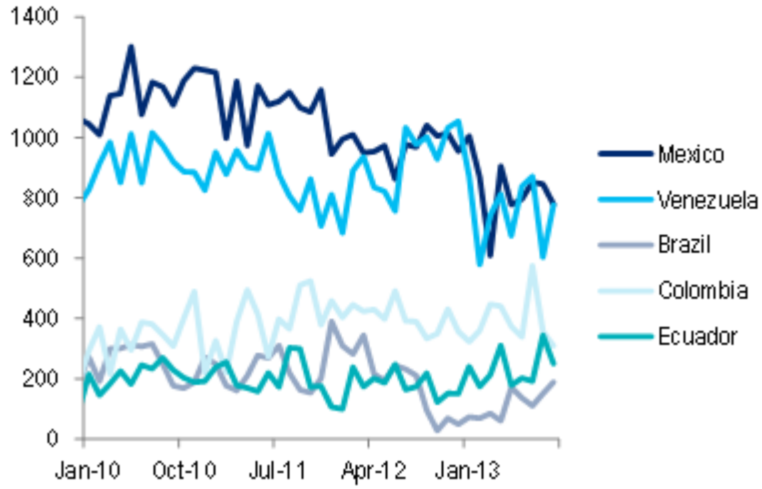


- Venezuela already dropped 50% of its US market share, by diverting to South and East Asia
- Mexico has shrunk exports to the US by 15% and increased shipments to Asia and Europe by >100-k b/d; this year expect a surge in Pacific deliveries of up to 100-k b/d via Salinas Cruz and 50-k b/d to Europe
- Saudi Arabia hiking OSPs to the US signals the beginnings of diversion elsewhere

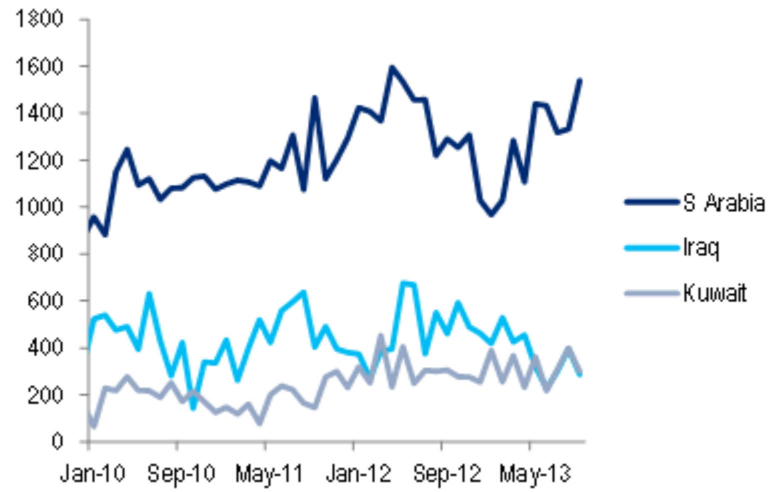
Source: EIA, JODI, Citi Research

Crude exports from the Americas increasingly looking to Asia

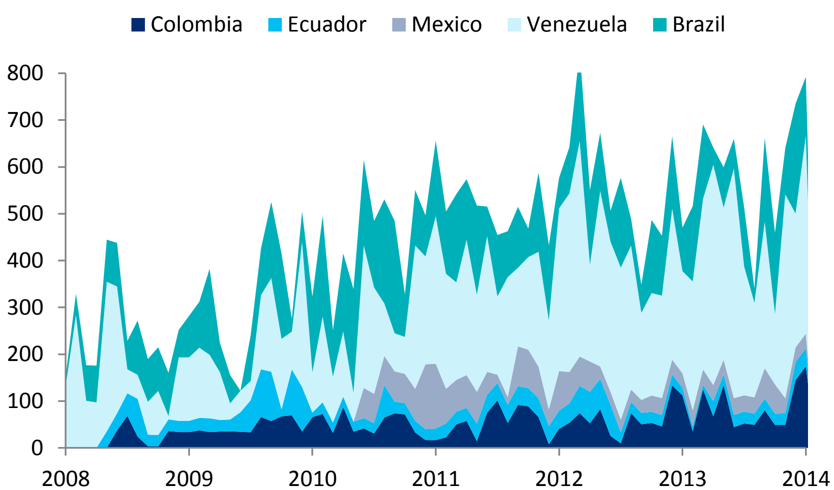
US crude imports from Latin America (k b/d)



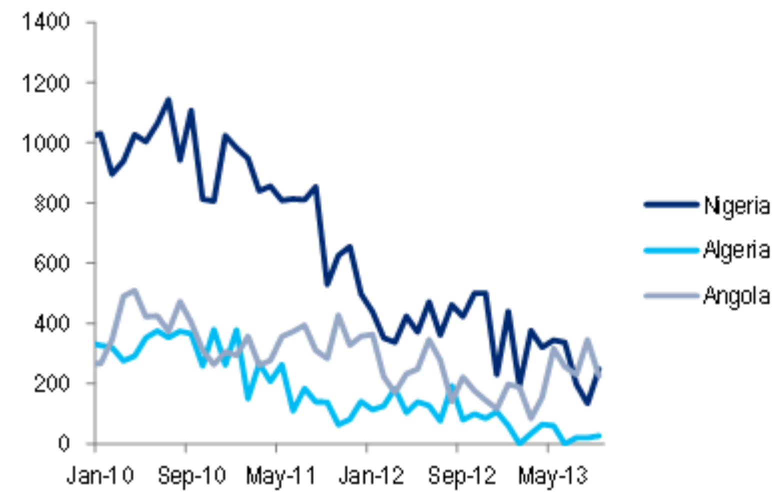
US crude imports from the GCC (k b/d)



China crude imports from selected countries (k b/d)



US crude imports from N. and W. Africa (k b/d)

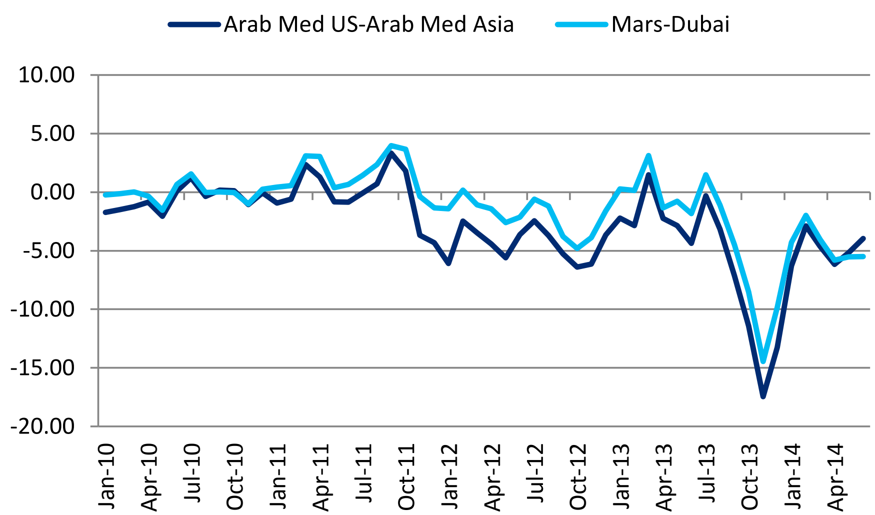


Source: EIA, China Customs, Citi Research

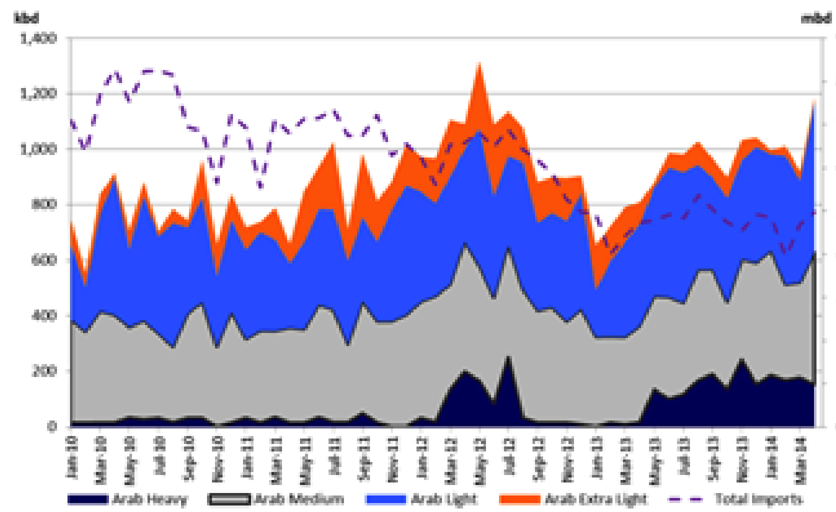
…as sour crude prices come under pressure

The main sour crude producers prices are linked to LLS on the US Gulf Coast; with LLS moving into a structural discount to Brent, Saudi Arabia, Venezuela, Mexico, others are under a price squeeze

Medium sour crudes priced in the US Gulf Coast and Asia – Mars-Dubai, and Arab Medium prices given Mars, Dubai and Saudi OSPs for the two regions ($/bbl, 2010-14) – Arab Medium has priced favorably to be taken by the US since late 2011, but a hike in US OSPs is likely beginning to indicate diversions towards Asia over time



US Gulf Coast crude oil imports from Saudi Arabia by grade (LHS), versus total (RHS) – Arab Light has dwindled, while other grades have stayed robust, even as total imports have fallen



- **…but the potential for US crude exchanges could mean light sweet crude supply into Mexico's refineries, boosting high-value light product yields, while allowing US Gulf Coast light sweet crude prices to reconnect with Brent, and putting less pressure on medium and heavy crudes…**

Source: Bloomberg, Poten, Citi Research

Energy reforms promise opportunities across sectors

- Constitutional reform passed December 2013, secondary legislation presented April 2014, which could pass in weeks; reform introduces competition, transforms Pemex's monopoly, strengthens state authority powers

- Round Zero determines which assets Pemex can (1) retain, (2) seek partners for, (3) relinquish, and could be ruled on by end-2014
  - Pemex likely retains key assets in shallow water, onshore conventional
  - JV for technology, operations, capital: Chicontepec horizontal drilling, extra-heavy oil in shallow water, deepwater Perdido Basin
  - What about shale gas in Burgos Basin and elsewhere? And other resources: numerous small marginal fields, EOR

- Licensing rounds, not direct negotiations, based on single economic variable

- Simple, transparent fiscal regime – royalty, applicable to profit-sharing, producing-sharing, license contracts – specific terms on a round-by-round basis for flexibility

- Local content requirements at 25% by 2025 does not seem too onerous

- Permits for midstream, downstream: natural gas from the US, and within Mexico; importing light sweet crude from the US to optimize domestic refining system

Mexican hydrocarbon resources are diverse

Basin	Cum. Prod.	Reserves 1P	Reserves 2P	Reserves 3P	Prospective resources Conv.	Prospective resources Unconv.
Sotheast	46.5	11.7	17.1	23.5	14.5	
Tampico Misantla	6.5	1.0	6.6	17.6	2.3	34.8
Burgos	2.4	0.4	0.5	0.8	3.2	10.8
Veracruz	0.77	0.2	0.21	0.3	1.4	0.6
Sabinas-Burro Picachos	0.1	0.0	0.0	0.0	0.4	14.0
Deepwater	0.0	0.1	0.42	0.98	27.8	
Yucatán					1.7	
Chiapas					1.3	
Total	56.2	13.4	24.8	43.2	52.6	60.2

Billion barrels of oil equivalent

Royalties

Hydrocarbon Type	Price (USD)	Royalty (%)
Oil/Condensate	<60	5
Oil/Condensate	≥60	(P/8)-2.5
Associated Gas	-	P/100
Non-associated gas	≤5	0
Non-associated gas	5<P<5.5	(P-5)*(60.5/P)
Non-associated gas	≤5.5	P/100

Source: Pemex preliminary estimates at 12/31/13, CNH

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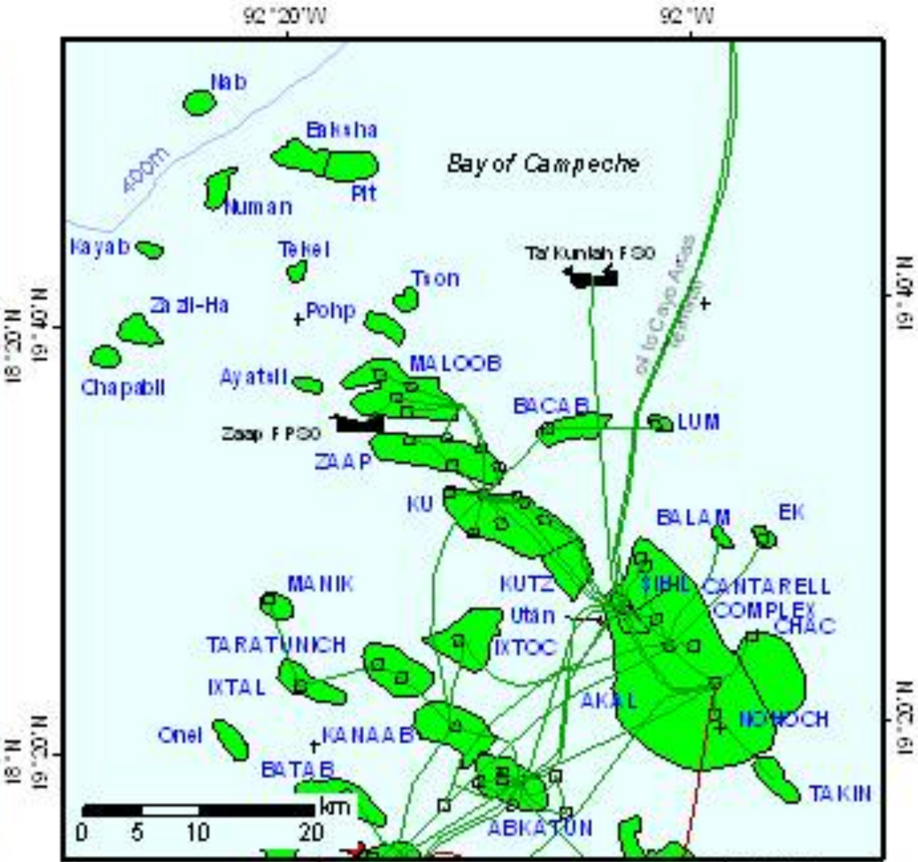
Mexican hydrocarbon resources are diverse

Onshore conventional…

…and shallow water, Bay of Campeche area – KMZ, Cantarell



Source: Wood Mackenzie

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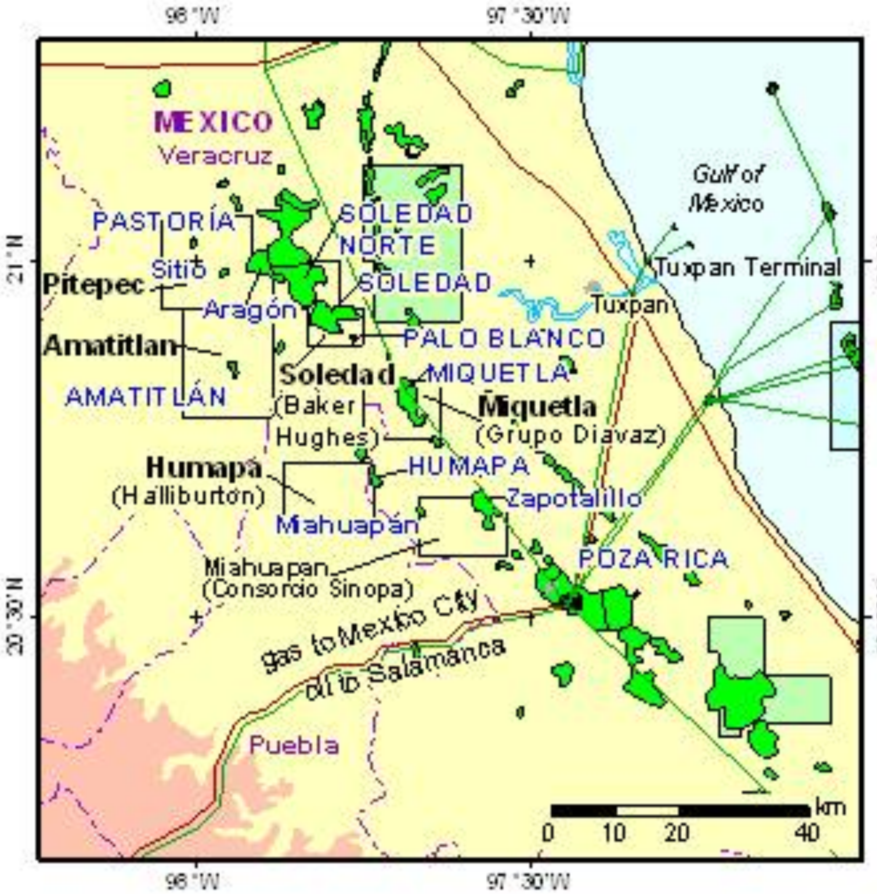
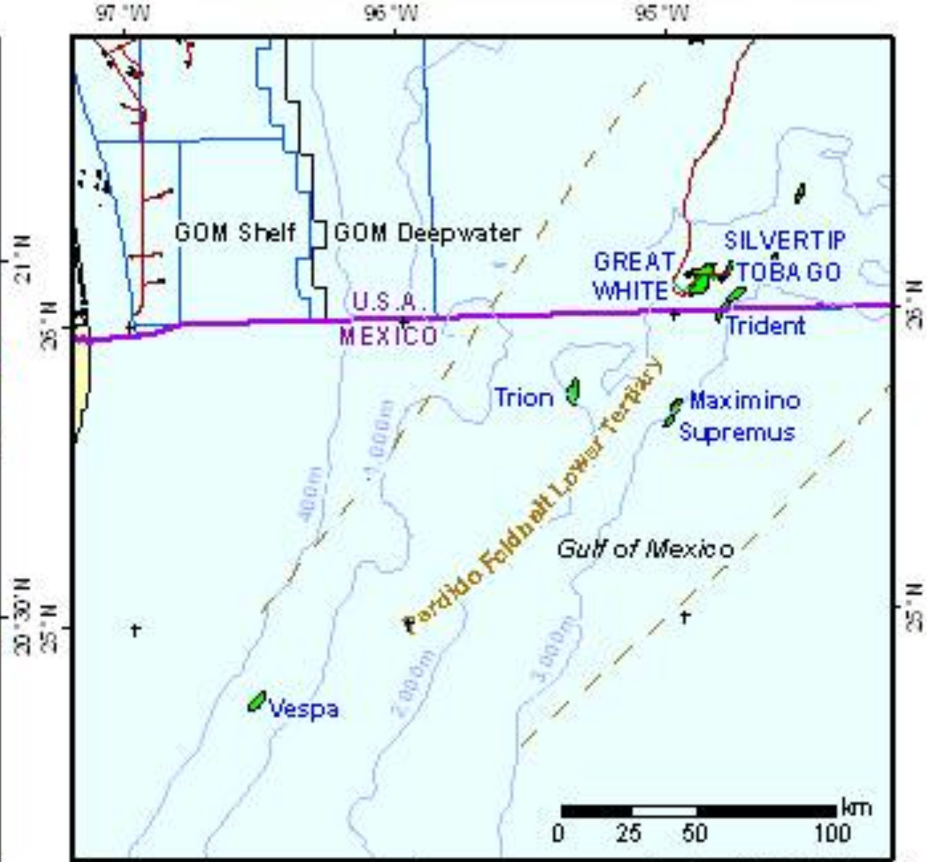
Mexican hydrocarbon resources are diverse

Onshore Chicontepec area could benefit from partnering on horizontal drilling



Deepwater Perdido Basin area could benefit from partnerships too



Source: Wood Mackenzie

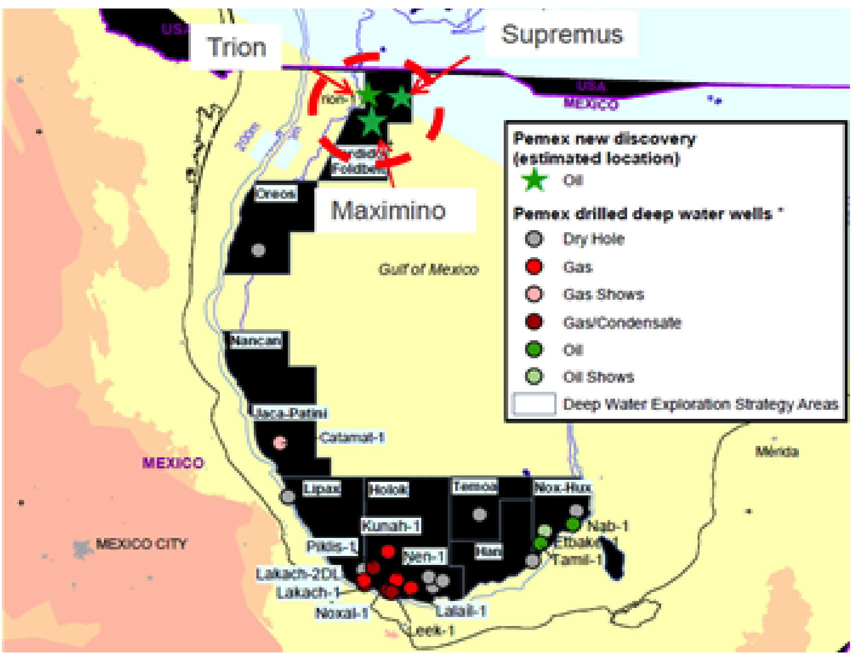
Mexican shale and deepwater resource potential

Tapping into them depends on how the current reforms play out

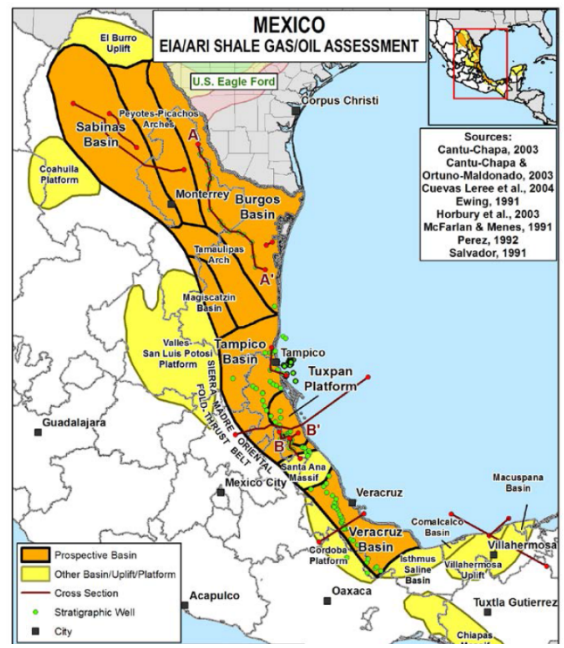
- Despite the large resource base, Mexican production has fallen from 3.6-m b/d to 2.5-m b/d, and reserves of oil and gas have fallen even further, while unconventional onshore and deepwater resources provide an unusual opportunity

- Total technically recoverable shale resources in Mexico are estimated as 545-Tcf of natural gas and 13.1-bn bbls of oil. In addition to the estimated TRR in the Burgos Basin (343-Tcf of gas and 6.3-bn bbls of oil, there is favorable geology in the Tampico, Tuxpan and Veracruz basins further south, potentially holding another 28-Tcf of gas and 6.8-bn bbls of oil.

Map of offshoreresources



Map of shale resources



Source: Wood Mackenzie, EIA, Citi Research

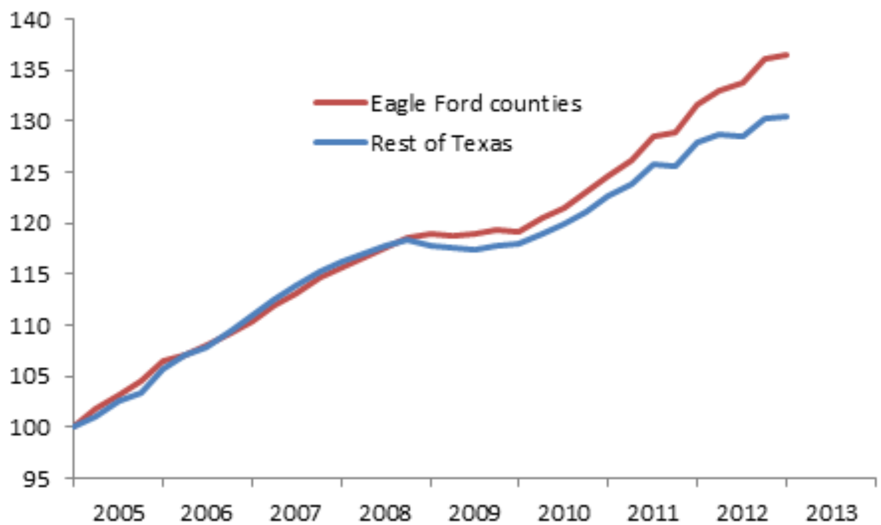
Eagle Ford play illustrates potential economic benefits

There are clear direct gains for employment, government tax receipts, and consumers (especially of natural gas), but indirect benefits are also considerable

- In the Eagle Ford, on the US side of the border, employment growth in some counties has exceeded 20% per annum since 2010; in poorer rural counties, wages remain lower than average but increases have been robust; wages in the 23 counties in the Eagle Ford area have risen 21% faster than those of the rest of Texas
- Taxable sales in the Eagle Ford started to increase sharply in 2010, rising by 10.5% per annum, vs. 4.1% for Texas as a whole.

Average Weekly Wages in Eagle Ford and Rest of Texas

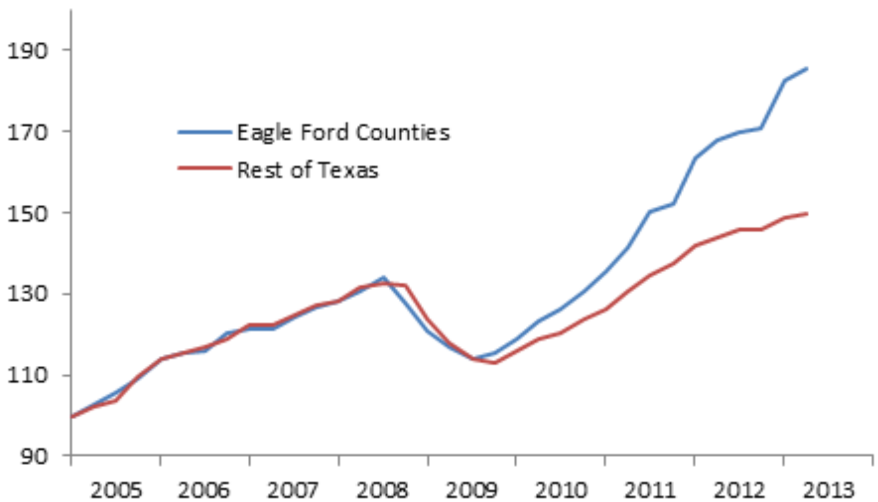
Index, 2005: Q1 = 100*



*4-quarter moving average.
SOURCES: Texas Workforce Commission; Federal Reserve Bank of Dallas.

Taxable Sales in Eagle Ford Counties and Rest of Texas

Index, 2005:Q1 = 100*



*Seasonally adjusted.
SOURCES: Texas Comptroller of Public Accounts; Federal Reserve Bank of Dallas.

US exports of light sweet crude can suit Mexican refineries well

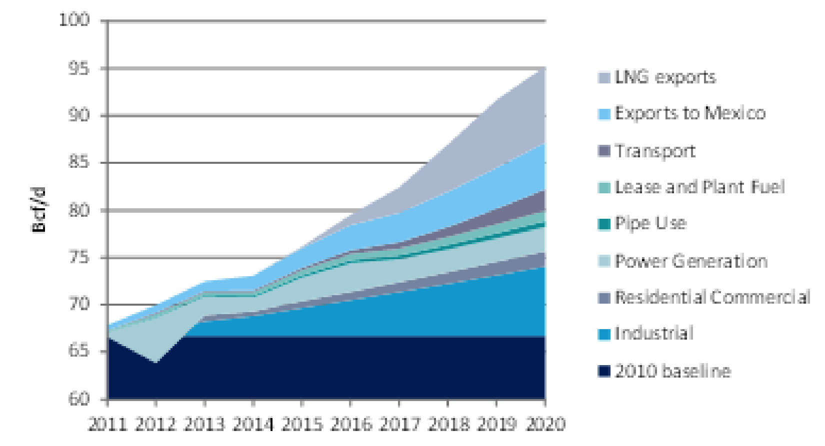
…and could boost yields of high value products like gasoline and diesel; this is whether on the basis of a straight export, or as an exchange for Mexican heavy crude.

Source: EIA, Citi Research

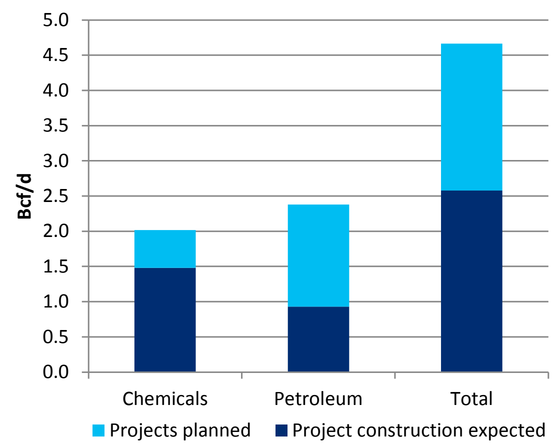
* 50% Pemex, with Shell

US shale gas boom awaiting a robust demand response

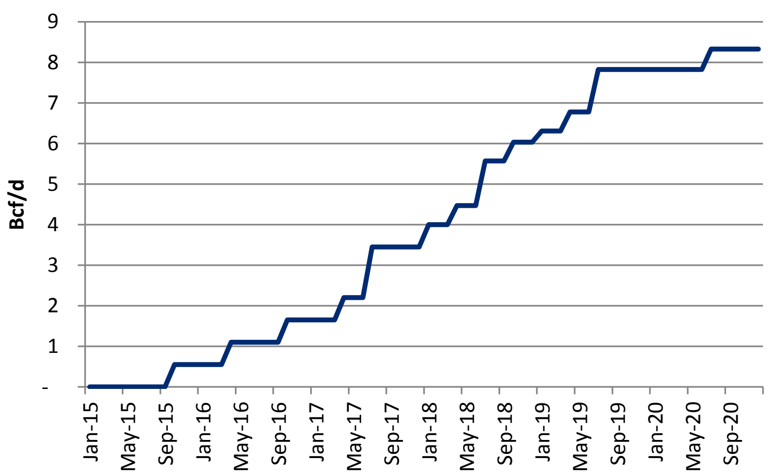
Gas demand to rise due to higher domestic consumption and exports (2011-2020)



Gas demand requirement is already rather sizeable for selected projects



Possible amount of US LNG exports (2015-2020)



LNG exports projects to drive demand growth

Terminal	Company	Location	mtpa	Bcf/d
Approved (non-FTA)				
Sabine Pass	Cheniere	Cameron, LA	16.5	2.2
Freeport	Freeport/Macquarie	Freeport, TX	10.5	1.4
Lake Charles	Energy Transfer Partners	Lake Charles, LA	15.0	2.0
Cove Point	Dominion	Lusby, MD	5.8	0.8
Freeport expansion	Freeport/Macquarie	Freeport, TX	3.0	0.4
Cameron	Sempra	Hackberry, LA	12.8	1.7
Jordan Cove	Jordan Cove	Coos Bay, OR	6.0	0.8
Pending				
Oregon	LNG Dev Co.		9.4	1.3
Corpus Christi	Cheniere	Corpus Christi, TX	15.8	2.1
Lavaca Bay	Exelerate	Port Lavaca, TX	10.4	1.4
Gulf Coast	Gulf Coast LNG	Brownsville, TX	21.1	2.8
Southern LNG	Southern LNG	Savannah, GA	3.8	0.5
Gulf LNG	Gulf Coast LNG Export	Pascagoula, MS	11.3	1.5
CE FLNG	CE FLNG	Plaquemine, LA	8.0	1.1
Golden Pass	Golden Pass Products	Port Arthur, TX	19.5	2.6
South Texas LNG	Pangea LNG	Offshore, TX	8.2	1.1
Main Pass	Freeport-McMoRan	Offshore, LA	24.2	3.2

Source: Company reports, Bentek, Citi Research

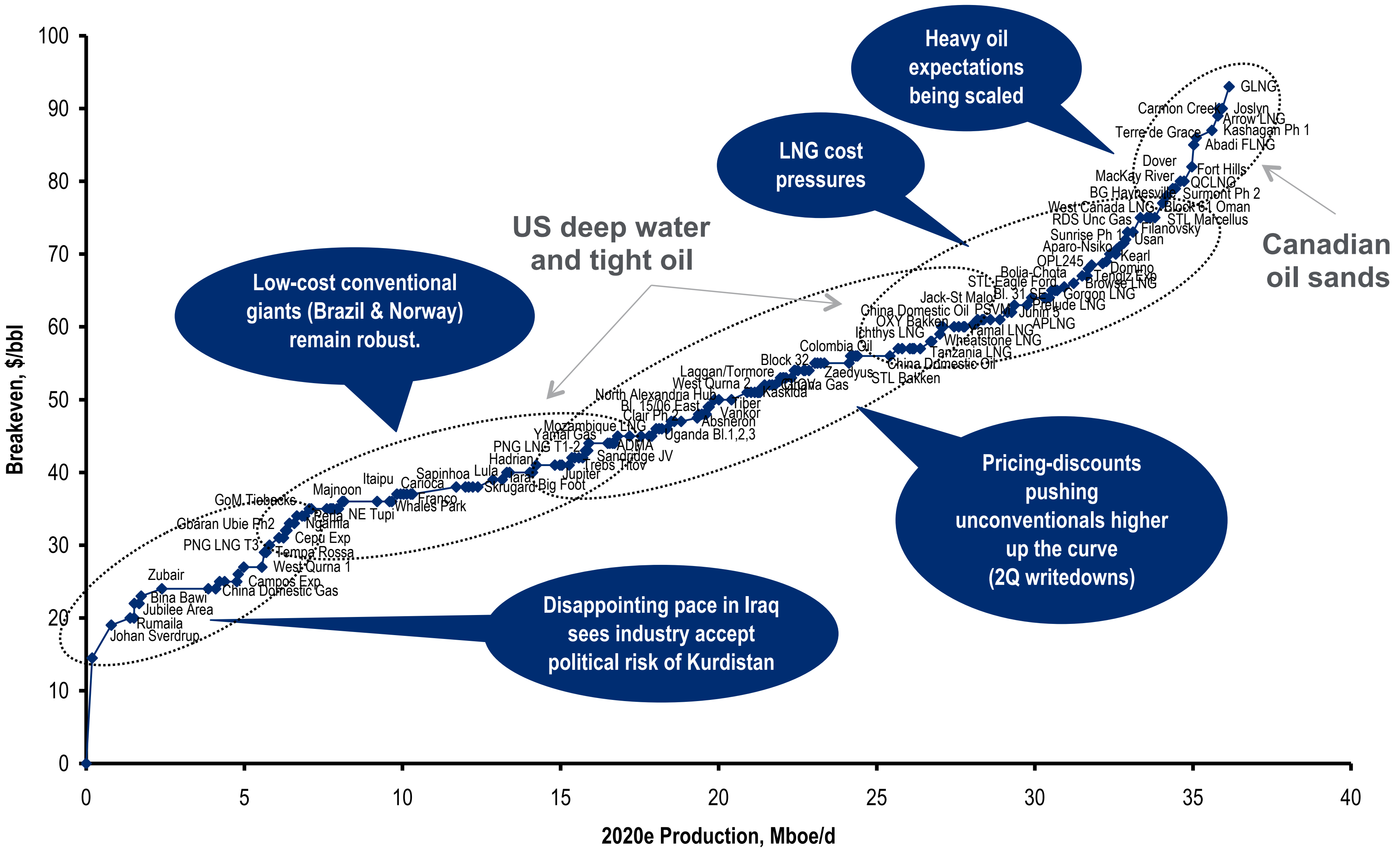
Mexico's energy reforms come at a time of great global shifts…

…presenting both challenges and opportunities.

- Mexico has a chance to revitalize its energy sector
- Challenges from US and Canadian oil supply growth, arriving in the Gulf of Mexico, mean looking towards other markets, particularly Asia
- Upstream opportunities: shale/tight gas and oil, deepwater, extra-heavy oil, marginal fields
- Downstream opportunities: access to US shale gas, light tight oil, and NGLs
- Midstream opportunities
- Services sector opportunities

Where do these prospects sit on the project cost curve?

Onshore projects typically cost $5-100 million, shallow water projects $1-2 billion, and deep water projects $5-8 billion, though equivalent projects in Mexico could eventually see lower levels given labor and regulatory costs.



Source: Citi Research

If restrictive export regime stays in place through 2015…

	4Q'12	1Q'13	2Q'13	3Q'13	4Q'13	1Q'14	2Q'14	3Q'14	4Q'14	2015	2016	2017	2018
WCS Cushing-WCS	17	16	8	10	15	11	10	7	7	10	10	10	7
Maya-WCS Cushing	15	19	13	6	5	0	0	0	0	0	3	2	1
Maya-WCS	32	36	21	16	20	11	10	7	7	10	13	12	8
LLS-WTI	21	20	11	4	1	6	2	1	1	0	3	2	1
Brent-LLS	1	-2	-2	0	5*	4	6	6	10*	15	20	25	30
LLS-Maya	17	11	7	11	8	15	8	8	7	5	5	6	7
WTI-WCS	27	27	17	23	27	21	16	14	13	15	15	16	14
Brent-WCS	49	45	26	27	33	30	24	21	24	30	38	43	45
Brent	110	113	103	112	105	108	109	111	108	105	95	95	95
LLS	110	114	105	110	100	105	103	105	98	90	75	70	65
WTI	88	94	94	106	99	99	101	104	97	90	72	68	64
Maya	93	103	98	99	92	90	95	97	91	85	70	64	58
WCS	61	67	77	83	72	79	85	90	84	75	57	52	50

Source: Bloomberg, Citi Research

* Note that in 4Q'13, though Brent-LLS averaged $5, the peak was as much as $14-15;
In 4Q'14, Brent-LLS could average $8, but at times widen to $10-15 or more.

Base: some exports, outlets, but lag behind production growth

	4Q'12	1Q'13	2Q'13	3Q'13	4Q'13	1Q'14	2Q'14	3Q'14	4Q'14	2015	2016	2017	2018
WCS Cushing-WCS	17	16	8	10	15	11	10	7	7	10	7	7	7
Maya-WCS Cushing	15	19	13	6	5	0	0	0	0	0	3	2	1
Maya-WCS	32	36	21	16	20	11	10	7	7	10	10	9	8
LLS-WTI	21	20	11	4	1	6	2	1	1	0	3	2	1
Brent-LLS	1	-2	-2	0	5*	4	4	3	8*	6	6	6	4
LLS-Maya	17	11	7	11	8	15	8	8	7	7	7	7	8
WTI-WCS	27	27	17	23	27	21	16	14	13	17	14	14	15
Brent-WCS	49	45	26	27	33	30	22	18	22	23	23	22	20
Brent	110	113	103	112	105	108	109	111	108	105	95	90	90
LLS	110	114	105	110	100	105	105	108	100	100	89	84	86
WTI	88	94	94	106	99	99	103	107	99	100	86	82	85
Maya	93	103	98	99	92	90	97	100	93	93	82	77	78
WCS	61	67	77	83	72	79	87	93	86	83	72	68	70

Source: Bloomberg, Citi Research

* Note that in 4Q'13, though Brent-LLS averaged $5, the peak was as much as $14-15; In 4Q'14, Brent-LLS could average $8, but at times widen to $10-15 or more.

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If exports are allowed in 2015…

	4Q'12	1Q'13	2Q'13	3Q'13	4Q'13	1Q'14	2Q'14	3Q'14	4Q'14	2015	2016	2017	2018
WCS Cushing-WCS	17	16	8	10	15	11	10	7	7	10	7	7	7
Maya-WCS Cushing	15	19	13	6	5	0	0	0	0	0	3	2	1
Maya-WCS	32	36	21	16	20	11	10	7	7	10	10	9	8
LLS-WTI	21	20	11	4	1	6	2	1	1	0	3	2	1
Brent-LLS	1	-2	-2	0	5*	4	4	3	8*	2	2	2	2
LLS-Maya	17	11	7	11	8	15	8	8	7	10	10	10	10
WTI-WCS	27	27	17	23	27	21	16	14	13	20	17	17	17
Brent-WCS	49	45	26	27	33	30	22	18	22	22	22	21	20
Brent	110	113	103	112	105	108	109	111	108	105	95	85	85
LLS	110	114	105	110	100	105	105	108	100	103	93	83	83
WTI	88	94	94	106	99	99	103	107	99	103	90	81	82
Maya	93	103	98	99	92	90	97	100	93	93	83	73	73
WCS	61	67	77	83	72	79	87	93	86	83	73	64	65

Source: Bloomberg, Citi Research

* Note that in 4Q'13, though Brent-LLS averaged $5, the peak was as much as $14-15;
In 4Q'14, Brent-LLS could average $8, but at times widen to $10-15 or more.

Appendix A-1

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