Citi Research

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Mind the Gulf

What does the North American energy revolution mean for Latin America?

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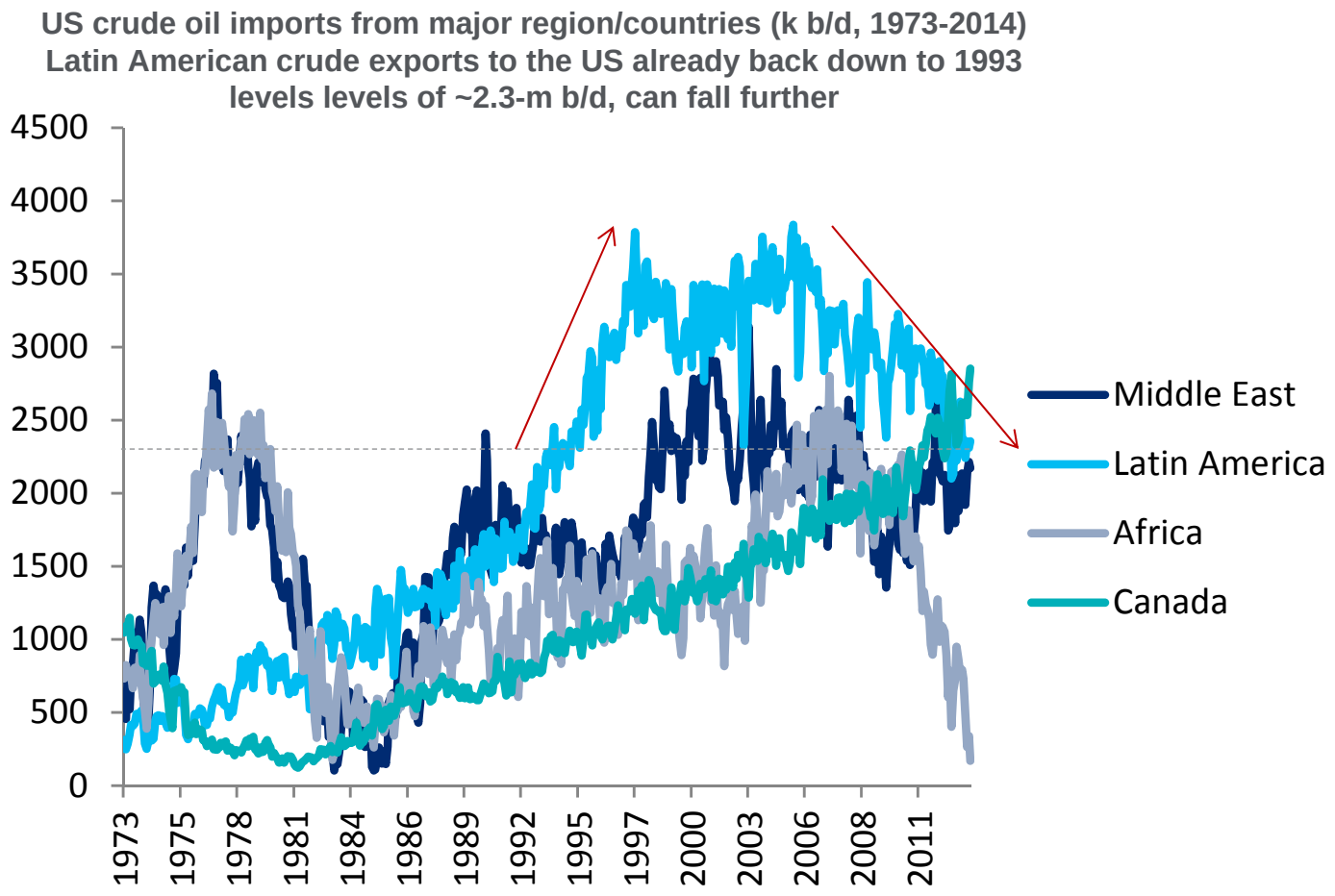
The US is not being a very good neighbor…

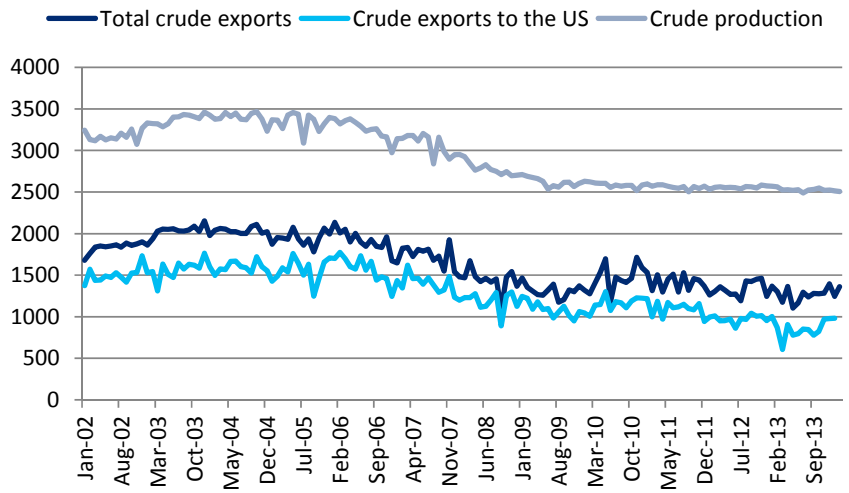
Newfound supply growth from shale oil and Canadian oil sands pushed out African imports, and put price pressure on LatAm and Middle East imports; limited takeaway pipelines for Canada depressed prices there too.



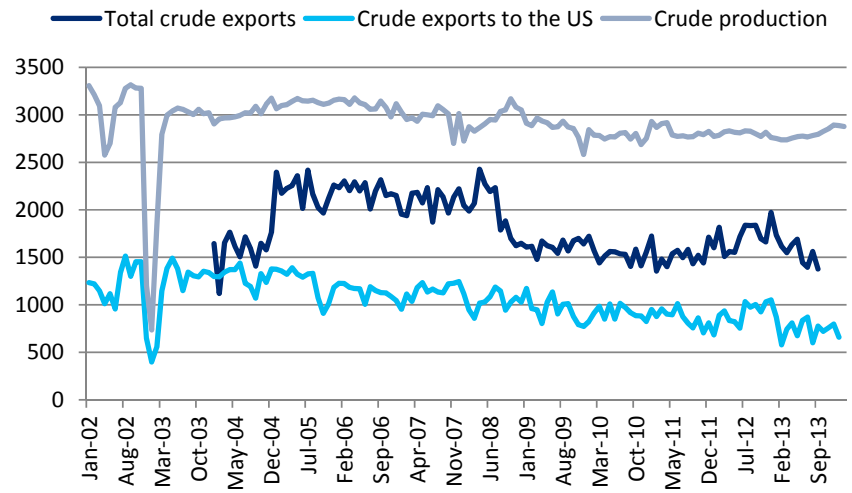
Source: EIA, Citi Research

Lost sales to the US as market share declines…

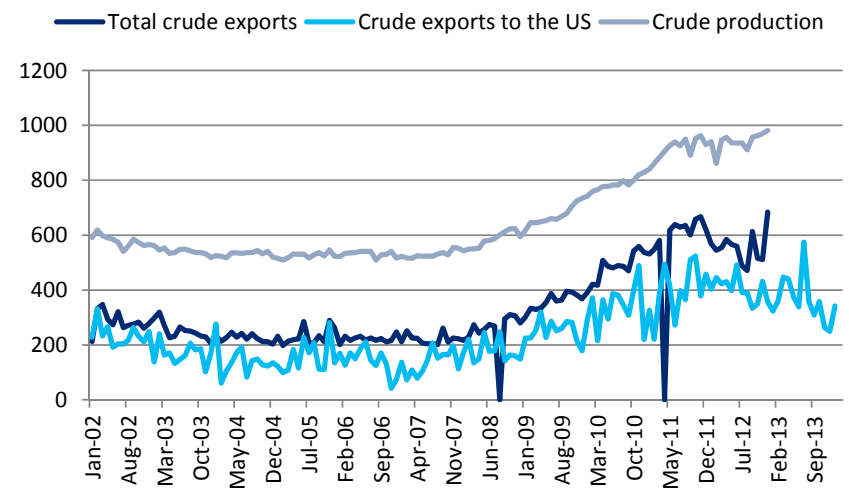
Mexico's total crude exports, exports to the US, and crude production (k b/d, 2002-14)



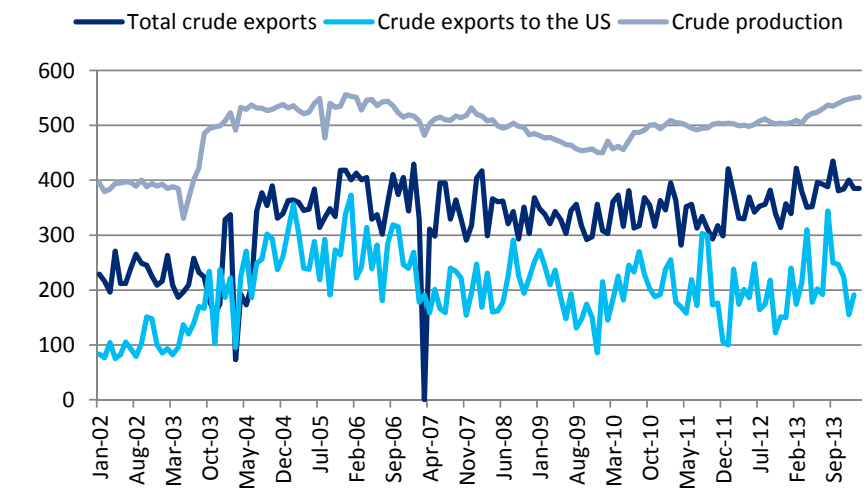
Venezuela's total crude exports, exports to the US, and crude production (k b/d, 2002-14)



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



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



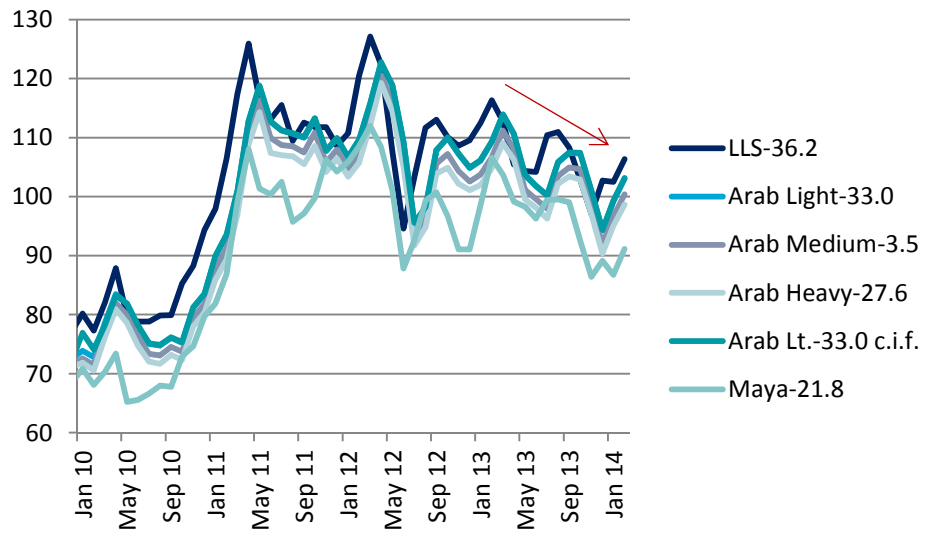
Source: EIA, JODI, Citi Research

*Note that JODI production and export data for these countries are self-reported, lagging; Venezuelan data, in particular, may be overstated.

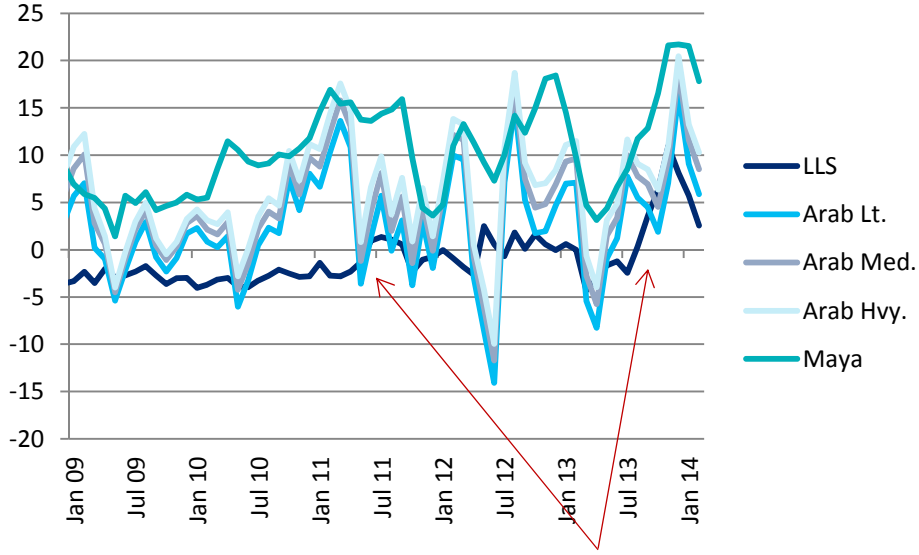
…and as prices come under pressure

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

Selected USGC grades, flat prices for LLS, Saudi OSPs, Maya ($/bbl, 2009-14)



Discount of selected USGC prices to Brent – LLS, Saudi OSPs, Maya ($/bbl, 2009-14)



LLS tests then surges to a substantial discount to Brent, pressuring other USGC grades

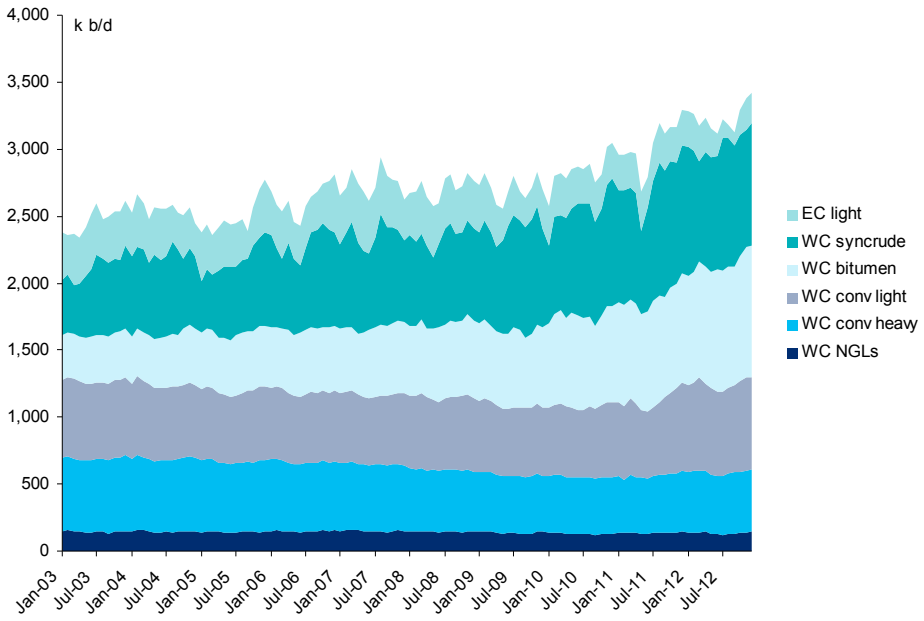
- Choices for sour crude suppliers to US are constrained by lack of alternative markets
- Slowdown in Chinese refinery expansions limit their market choices further
- The hike up of Saudi Official Selling Prices (OSPs) to the US for May suggest the beginnings of some diversion of Saudi crudes to other regions

Source: EIG, Bloomberg, Citi Research

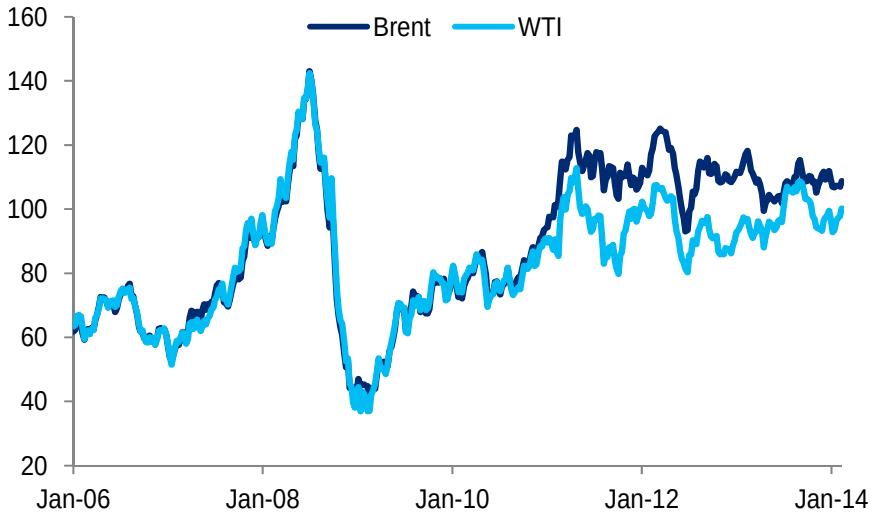
Heavy oil sands supply steadily growing in Canada…

…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



Brent-WTI price differential - pre-2010, WTI typically traded at a slight premium to Brent, but even in 2007 and 2008, began testing discounts of $4 at times, before breaking out in 2011 and 2012

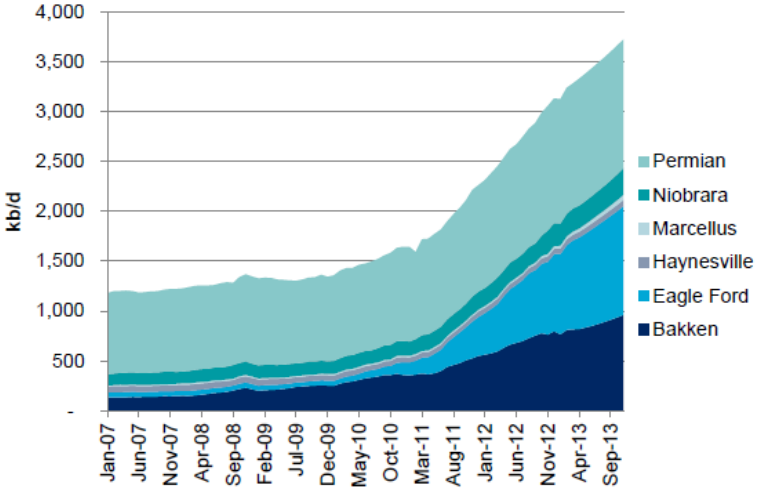


Source: NEB, EIA, Bloomberg, Citi Research

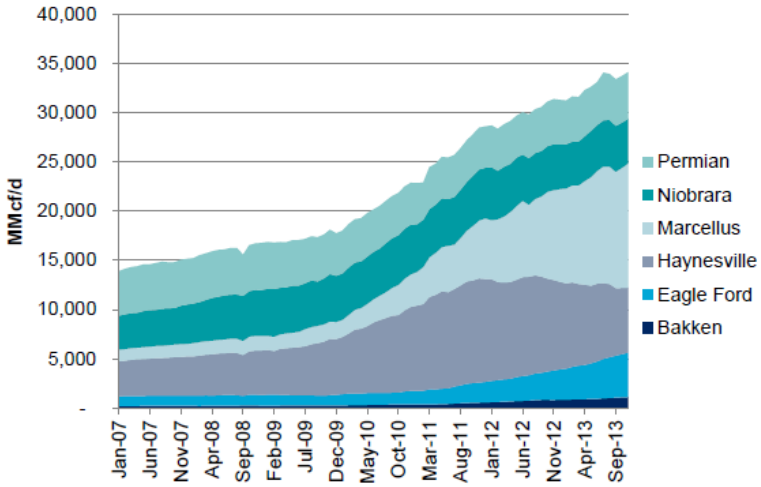
…combined with light tight oil from the US shale revolution…

…and the shale revolution began with natural gas.

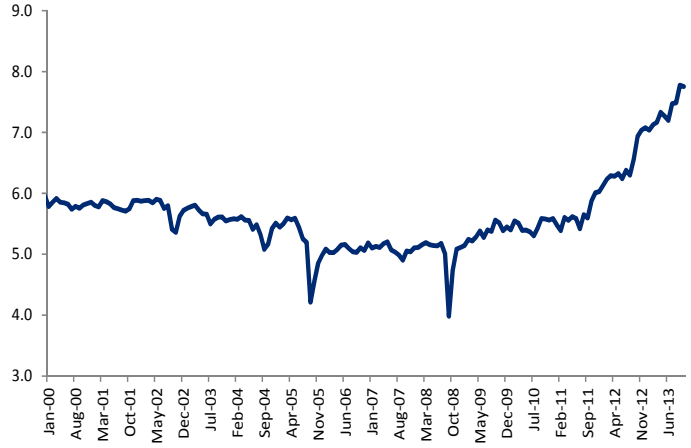
Shale oil/liquids production began surging in late 2010…



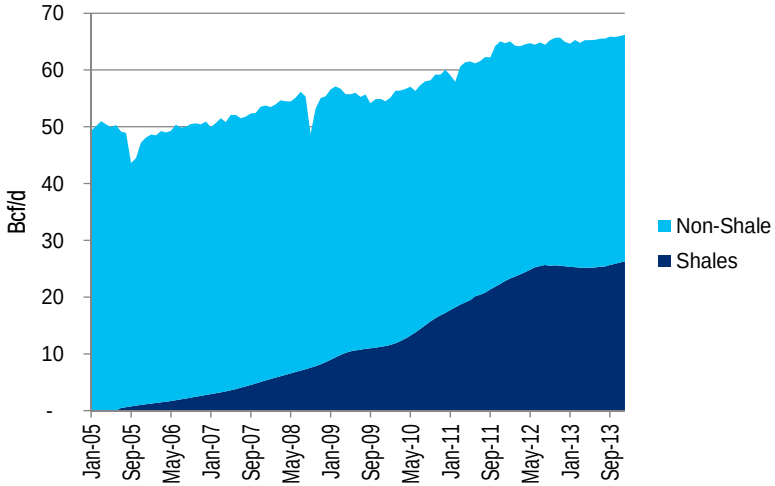
…while shale gas production started rising post-2008



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

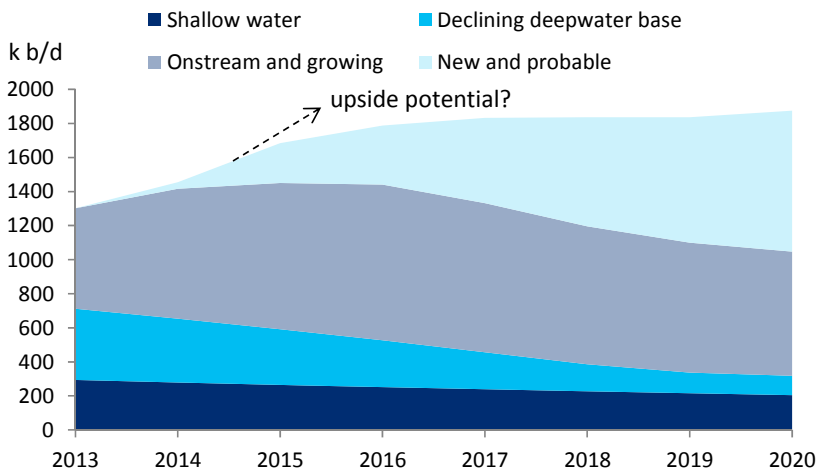


Source: Bloomberg, EIA, Citi Research

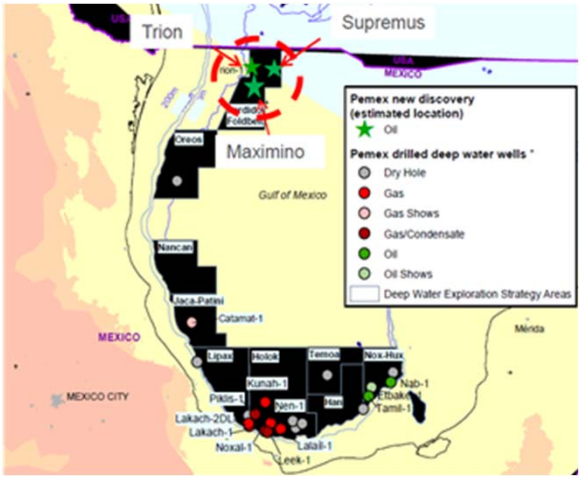
US deep water Gulf of Mexico production is set to grow

US Gulf of Mexico begins to add meaningful volumes on top of shale; could Mexico also surprise?

The US GoM could add significant volumes from next year



Mexico could develop fields in the Perdido Basin



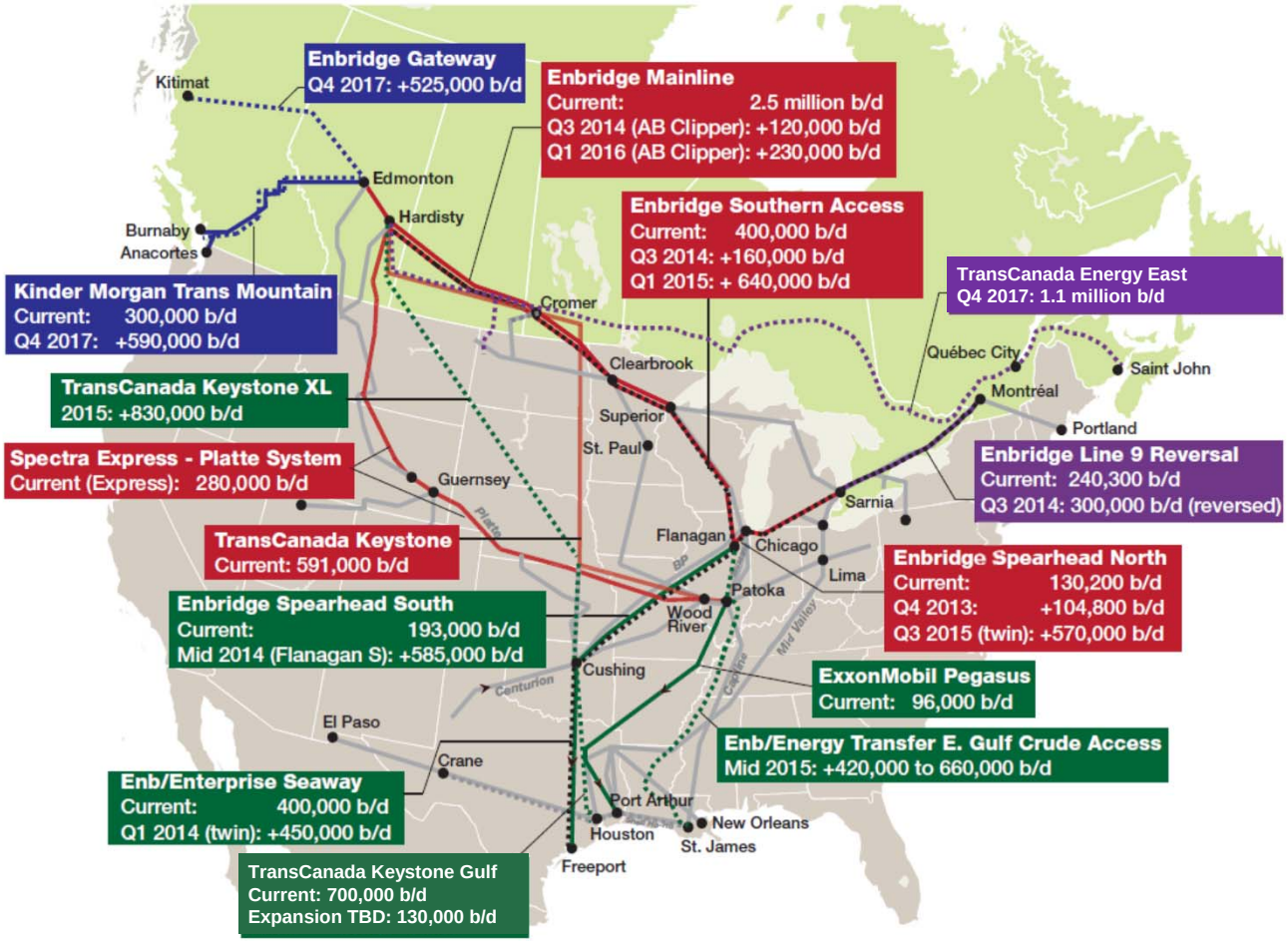
- **The US Gulf of Mexico can begin adding production growth in earnest in 2014, adding to already fast growth in shale production.** At some 1.3-m b/d of production in 2013, this could rise to over 1.8-m b/d by 2016, or some ~150-k b/d each year for the next few years. 2014 could see growth from Atlantis, Auger, Caesar/Tonga, Cascade, Chinook, Na Kika, Tahiti, Thunder Horse, Who Dat, with potential new volumes from Big Foot, Dalmatian, Lucius, Tubular Bells.

- **Mexico energy reforms could unlock near-term and long-term supply.** In the near term, the Trion, Supremus and Maximino fields in the Perdido Basin, on the Mexican side of the Gulf of Mexico, could be producing quicker than expected if Mexican energy reforms proceed smoothly and these fields can be tied back to nearby US subsea lines through Pemex partnerships with IOCs that would be unlocked by the Mexican constitutional changes under proposal. In the longer term, onshore plays, including shale in the Burgos Basin, which is an extension of the same formation as the Eagle Ford in Texas, could also drive supply growth.

Source: Wood Mackenzie, Citi Research

US and Canadian crude arriving on the Gulf Coast by pipe…

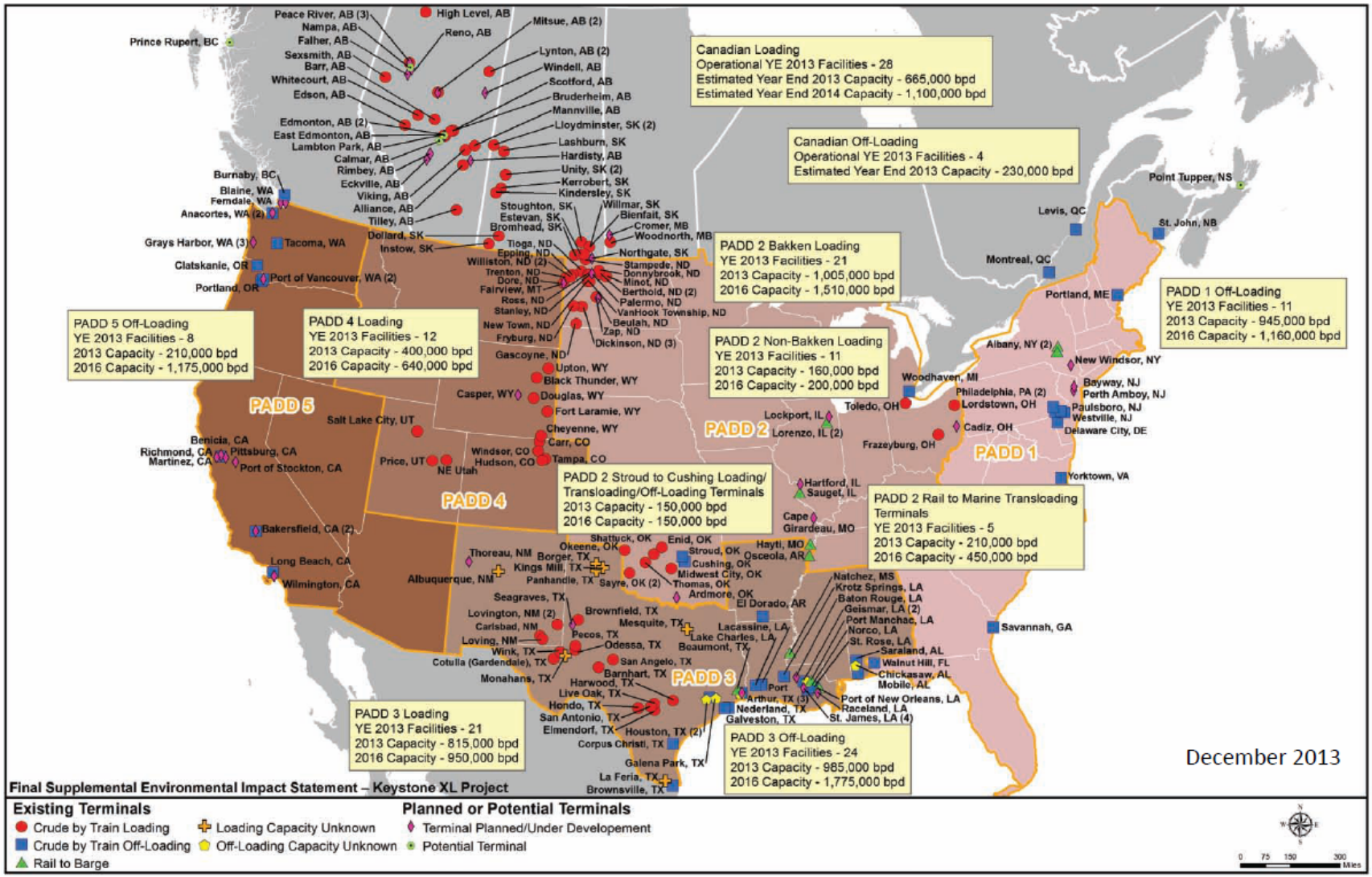
Surging domestic crude oil production has led to reversals and expansions and new-builds of pipelines, as well as increased rail and barge movements, more storage capacity; Canadian crude is coming to the Gulf Coast.



Source: CAPP, Citi Research

…and by rail

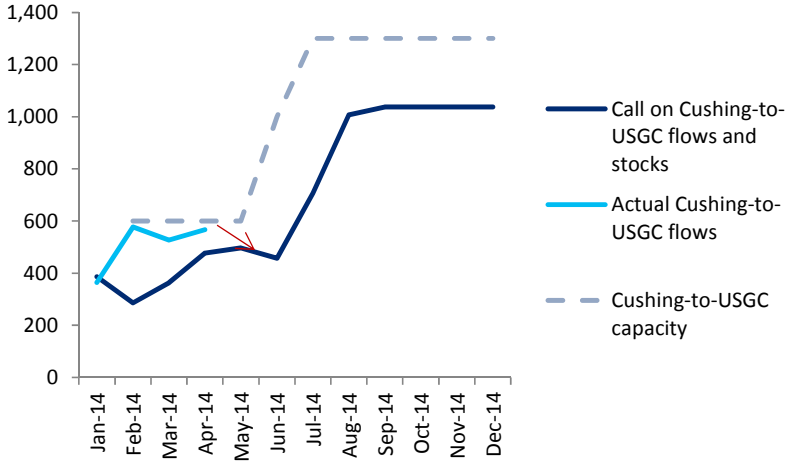
Rail transport from Canada to US Gulf puts further pressure on foreign suppliers, who face the choice of competing for market share at lower prices, finding limited outlets elsewhere, or cutting production.



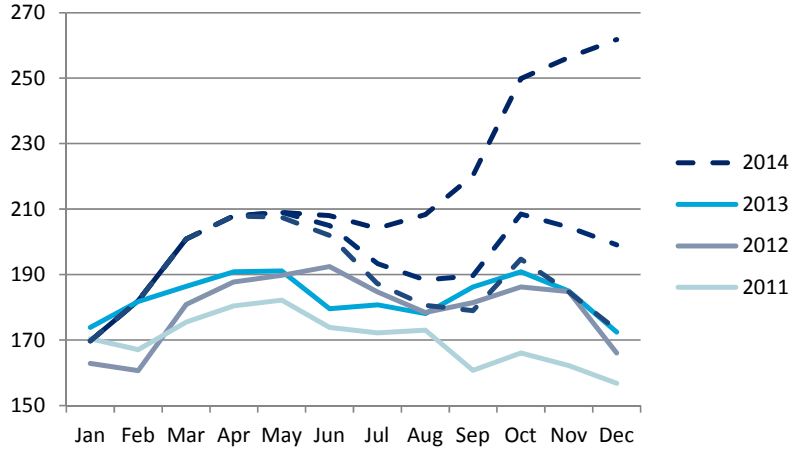
Source: DOS, Citi Research

US crude inventories: exodus from Cushing to the Gulf Coast

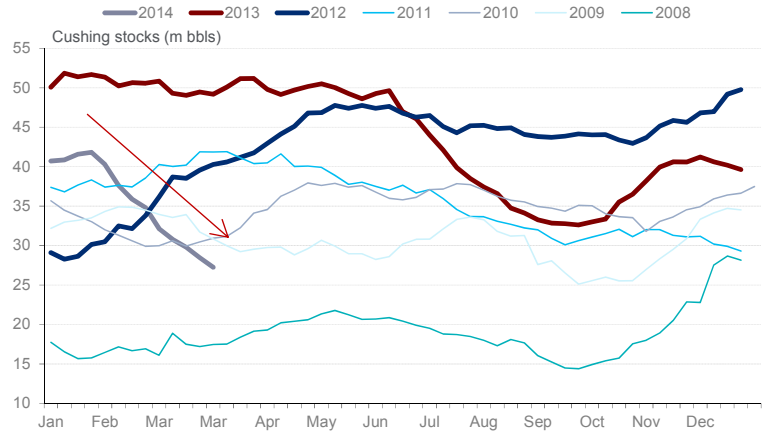
Pipeline flows from Cushing to the USGC are driving Cushing stock draws, but need to be restrained to keep stocks level (bringing the teal line towards the dark blue line) to well within capacity; in 2H'14, lower PADD III demand for Cushing crude may also limit flows



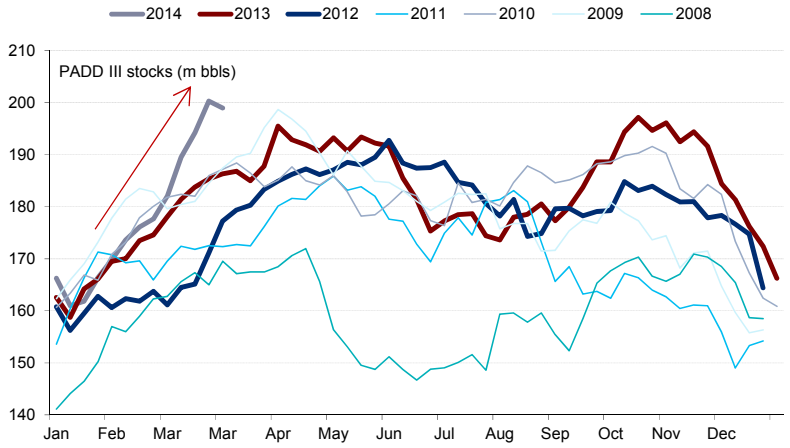
PADD III crude stocks for 2014 under different scenarios versus previous years, given rising production, seasonality of refinery runs, rising flows from Cushing; stocks can stabilize in 2Q'14 at ~210-m bbls but fall maintenance pressures a rebalancing of flows



Cushing crude stocks have been on the way down…



…as PADD III crude stocks march upwards with refinery maintenance



Source: EIA, Genscape, Citi Research

Too much of a good thing – refinery expansions overwhelmed by crude glut

Light sweet crude oil is being produced from US shale plays, but the US refinery system is complex and would prefer heavier, sourer crudes

- Burgeoning refinery capacity expansion
- Also some 10-50-k b/d topping plants
- But incremental refining is overwhelmed by production growth in the Eagle Ford (+400-k b/d y/y in 2013) and Permian (+140-k b/d y/y in 2013), and growing flows from Cushing via Marketlink, Seaway twin, others
  - Pipes into Cushing also growing in 2H'14, notably Flanagan South, Pony Express
  - Rail receiving capacity in PADD III has grown to ~2-m b/d
- Why large new refineries won't be built: expense; uncertainty; history

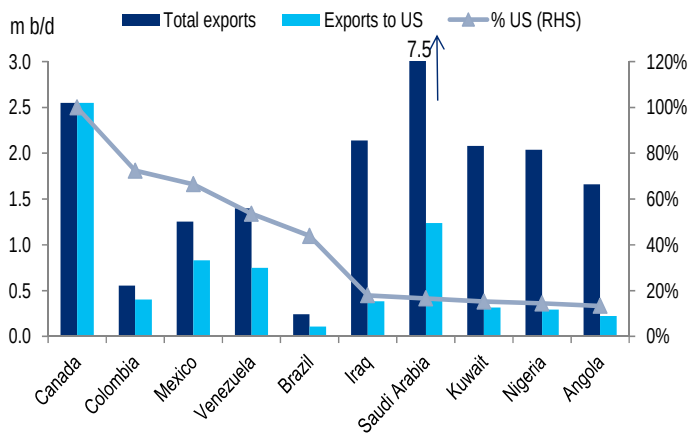
		Existing	2014	2015+
MDU/CLMT Dakota Prairie	Dickinson, ND		20	
Three Affiliated Tribes, Makoti	Dickinson, ND			20
Dakota Oil Processing	Trenton, ND			20
American Energy Holdings, Bison Oil	Devils Lake, ND			20
North Dakota refinery additions			20	60
BASF/TOTAL	Port Arthur, TX	75		
Kinder Morgan condensate splitter	Galena Park, TX		50	50
Marathon condensate splitters	Canton, OH	22	38	
	Catlettsburg, KY			
Martin Midstream Partners LP	Corpus Christi, TX			100
Magellan Midstream	Corpus Christi, TX			100
Castleton Commodities Int'l	Corpus Christi, TX			100
Condensate splitters		**97**	**88**	**350**
Valero expand light crude processing	Port Arthur, TX		15	
Valero topping unit	Houston, TX			90
Valero topping unit	Corpus Christi, TX			70
Valero refinery expansion	McKee, TX		25	
NCRA refinery expansion	McPherson, KS		15	
Tesoro refinery expansion	Salt Lake City, UT		4	
HollyFrontier refinery expansion	Woods Cross, UT			14
Western refinery expansion	El Paso, TX			25
Husky refinery revamp	Lima, OH			
Alon refinery expansion	Big Spring			5
Expansions			**59**	**204**
Total		**97**	**167**	**614**

Source: Company reports, Citi Research

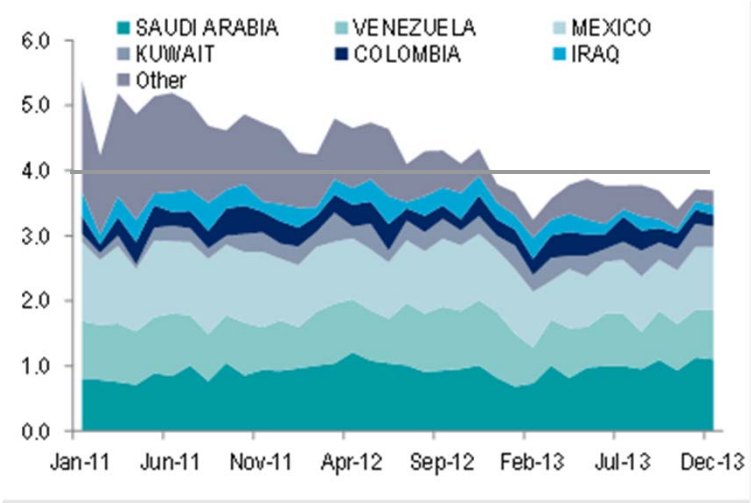
The US market for imported crude oil is shrinking

US Gulf Coast crude imports have fallen to <4 m b/d, of which 3-m b/d come from Mexican, Saudi Arabia and Venezuela

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)

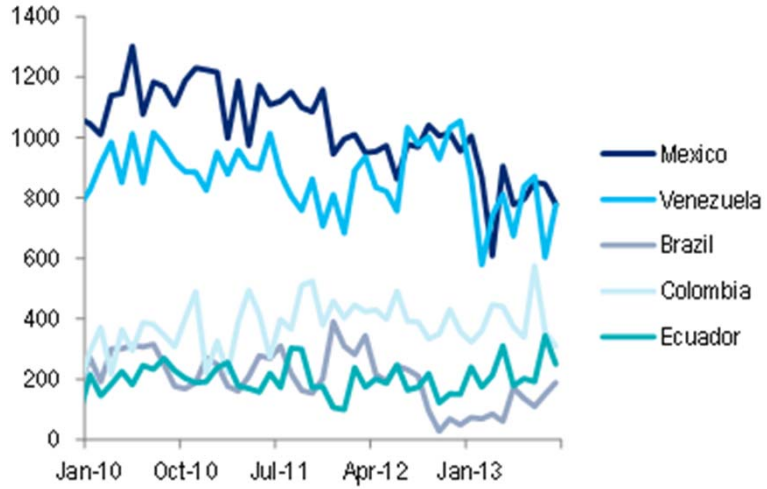


- Venezuela has already dropped 50% of its US market share, by diverting its sales to South and East Asia
- Mexico has shrunk exports to the US by 15% and increased shipments to Asia and Europe by >100-k b/d; this year expect a surge in Pacific deliveries of up to 100-k b/d via Salinas Cruz and 50-k b/d to Europe
- Saudi Arabia is finding it difficult to shift out of the US export market without restructuring contracts, but recent shifts in OSPs to the US may signal the beginnings of a diversion elsewhere

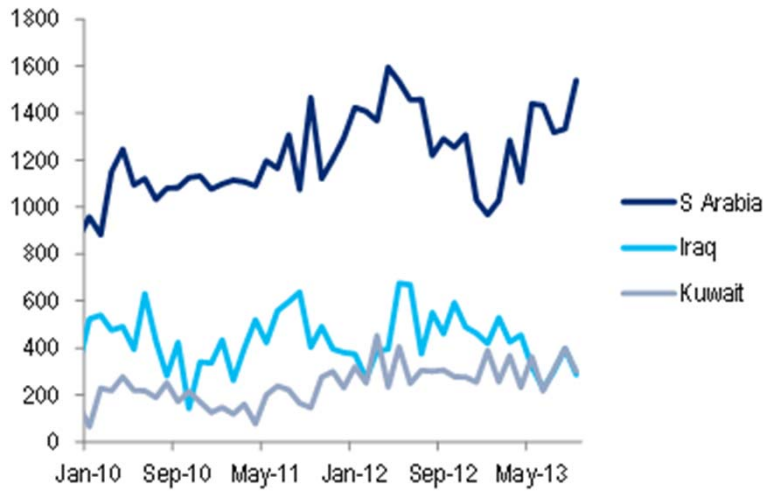
Source: EIA, Citi Research

Mex., Ven. exports should continue diverting to Pacific, S. Asia

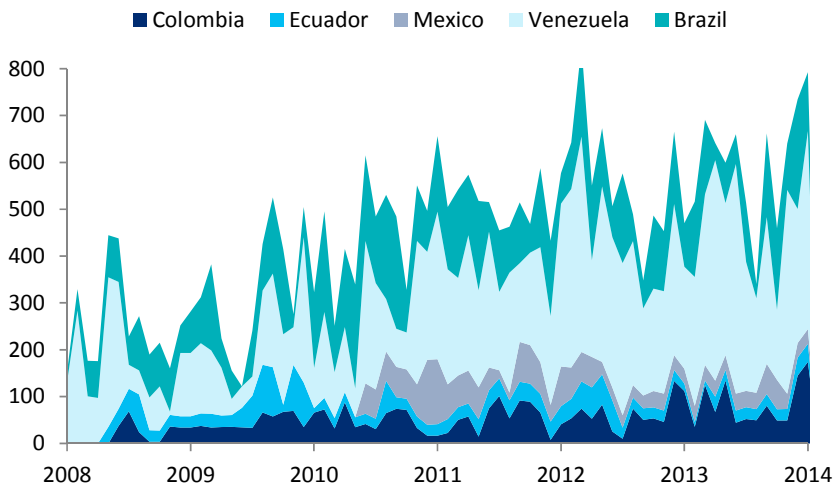
US crude imports from Latin America (k b/d)



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



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

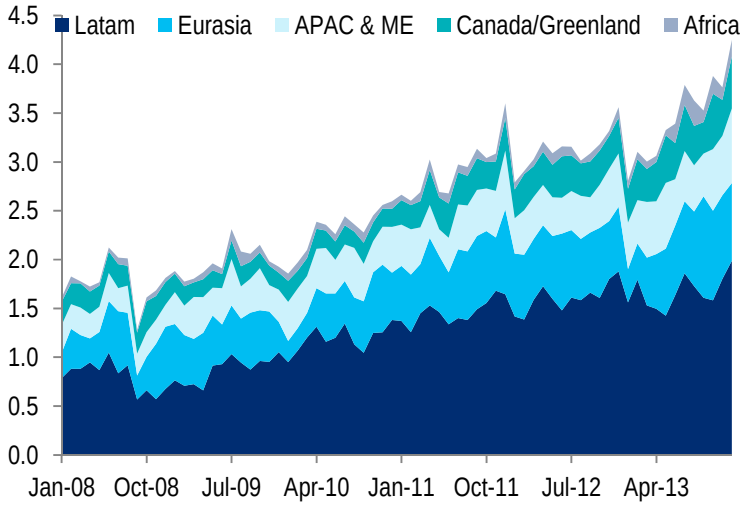


US crude imports from N. and W. Africa (k b/d)

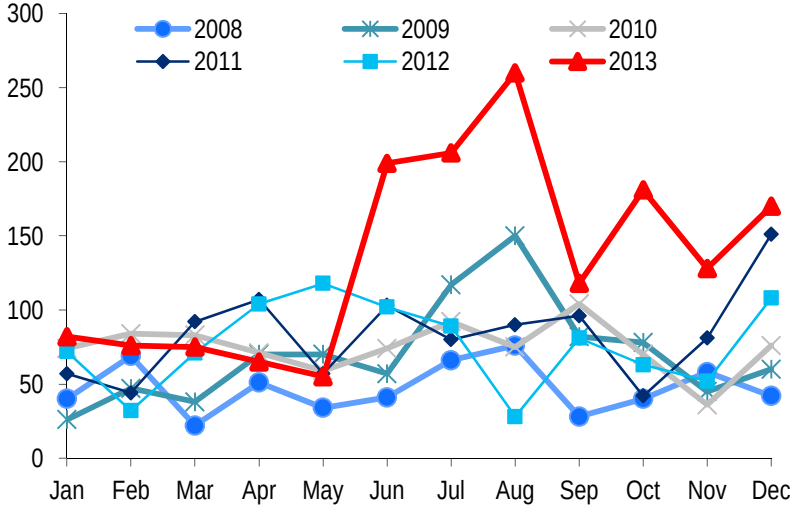
Source: EIA, China Customs, Citi Research

US petroleum product exports already growing to all regions

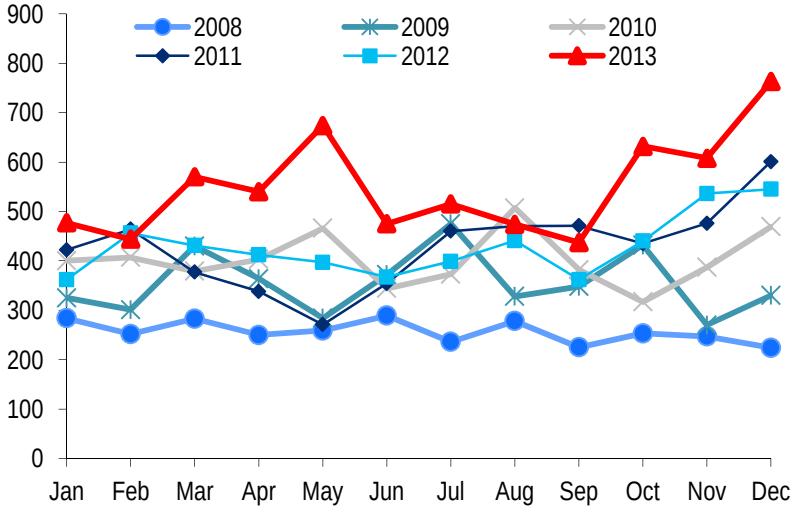
US product exports by region (m b/d) (2008-13)



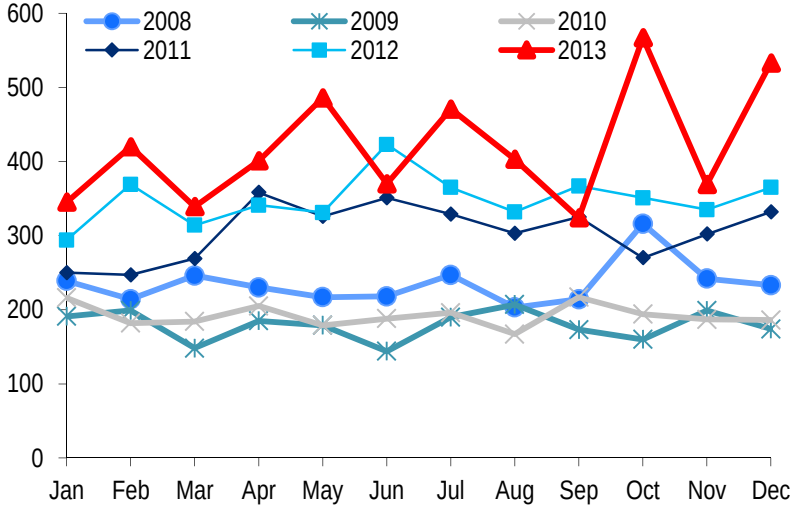
US product exports to Africa (m b/d) (2008-13)



US product exports to APAC/ME (m b/d) (2008-13)



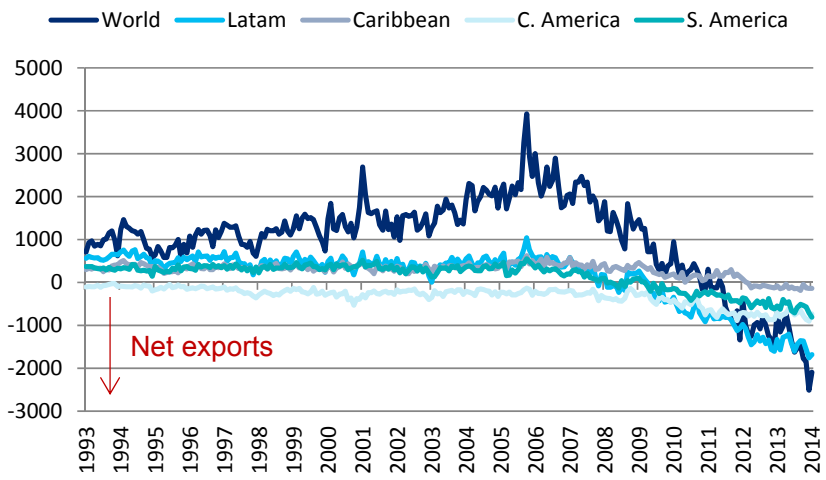
US product exports to Canada (m b/d) (2008-13)



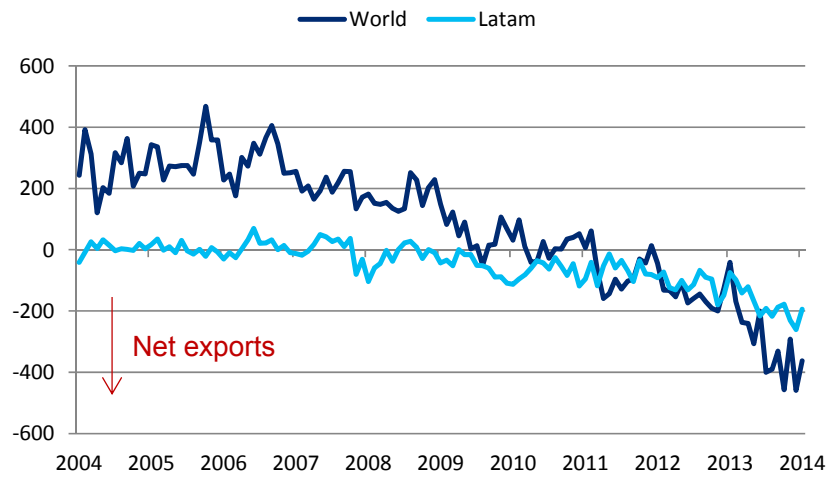
Source: EIA, Citi Research

Rising product exports to Caribbean, Central and South America

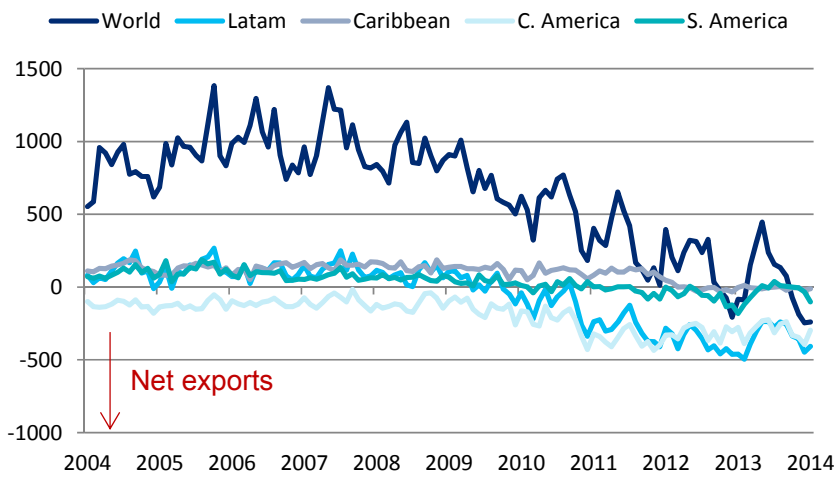
US net petroleum product imports (k b/d, 1993-2014)



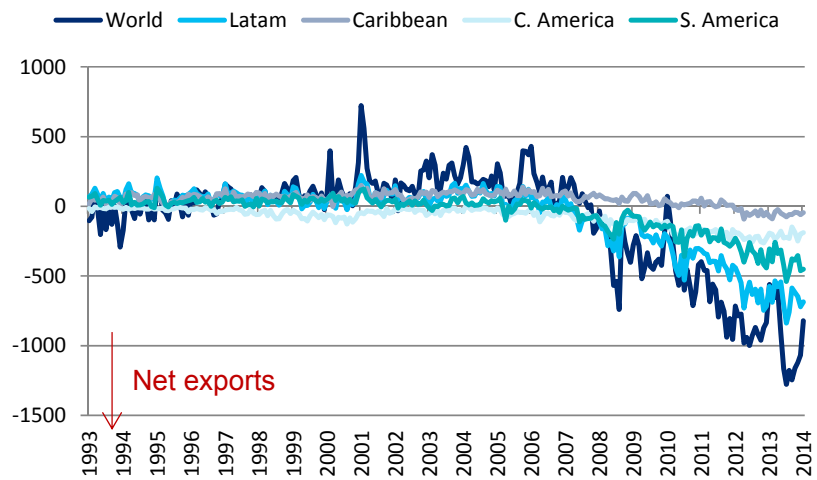
US NGL net imports (k b/d, 2004-13)



US net gasoline imports (k b/d, 2004-14)



US net distillate imports (m b/d, 1993-14)

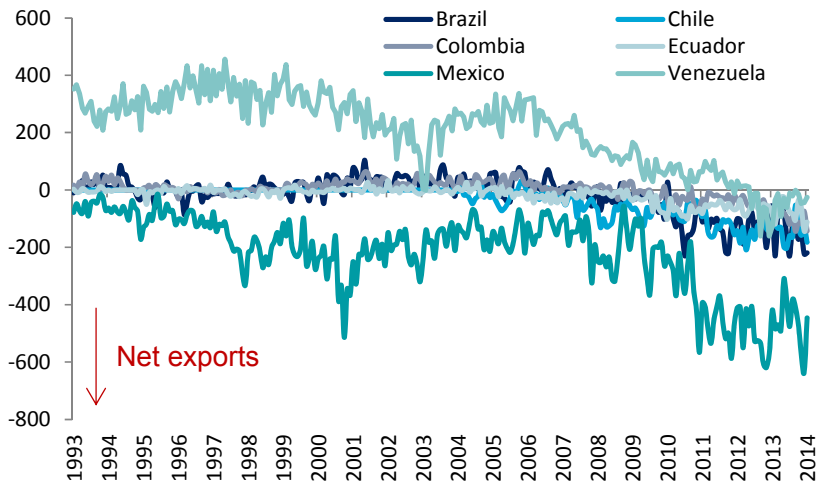


Source: EIA, Citi Research

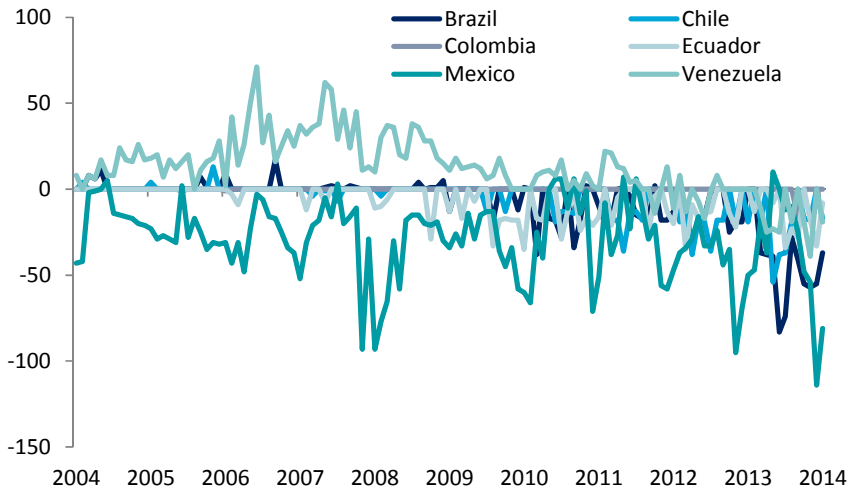
* For these graphs, "Latam" is treated as the sum of Caribbean + Central America + South America

Rising product exports to key Latin American countries

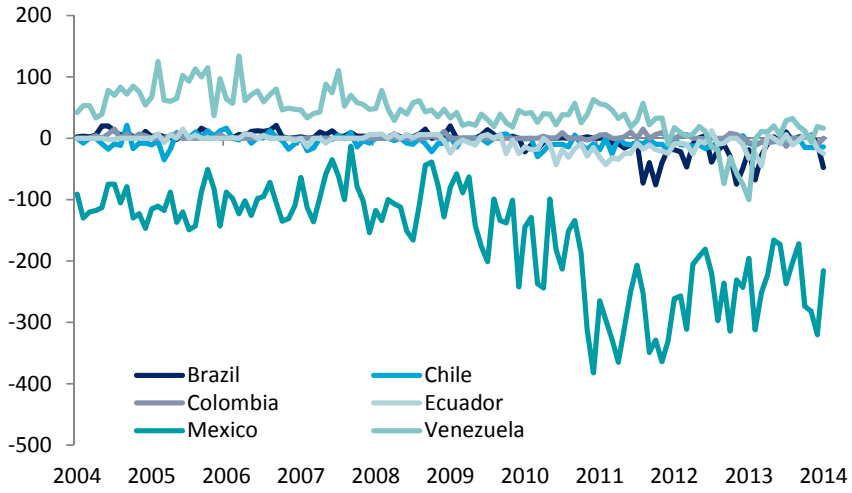
US net petroleum product imports (k b/d, 1993-2014) – Ven swings to net importer of US products



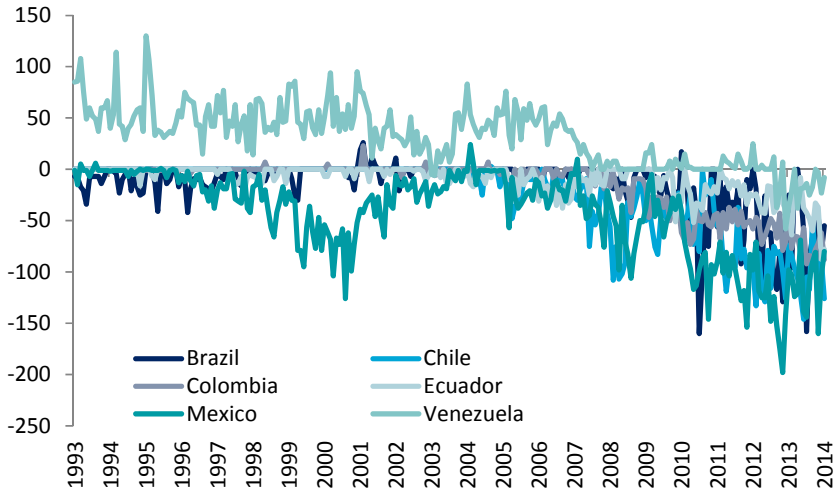
US NGL net imports (k b/d, 2004-13) – Venezuela swings to net importer of US NGLs too



US net gasoline imports (k b/d, 2004-14) – Mex is a major export market, US saw net exports to Ven through 2H'12 and still close to net balance



US net distillate imports (k b/d, 1993-14) – US net exports growing across Latin America

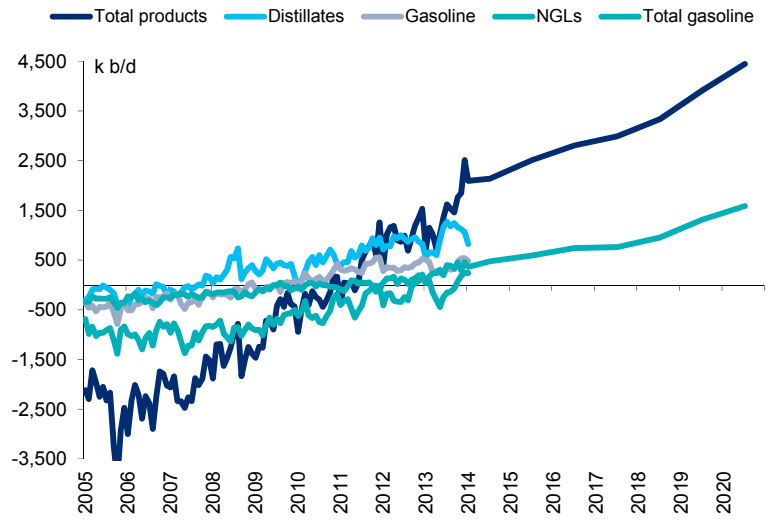


Source: EIA, Citi Research

* For these graphs, "Latam" is treated as the sum of Caribbean + Central America + South America

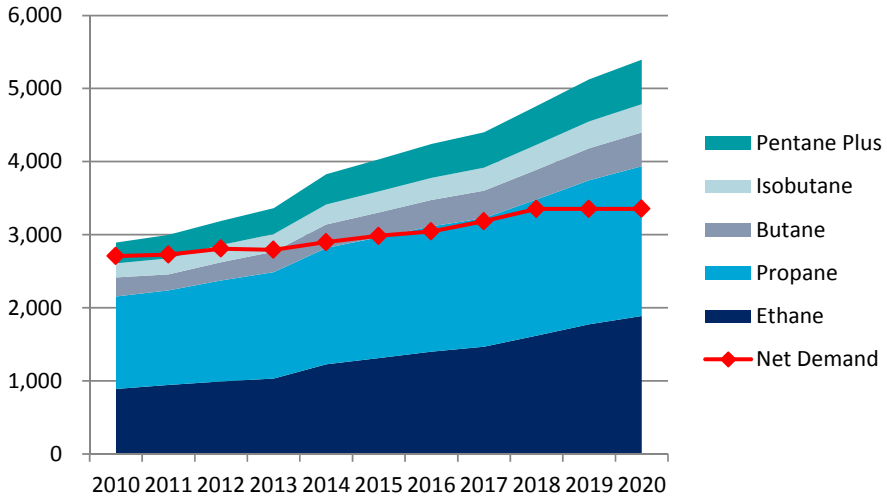
US: from world's largest product importer to largest exporter

US net product exports surge, with more to come

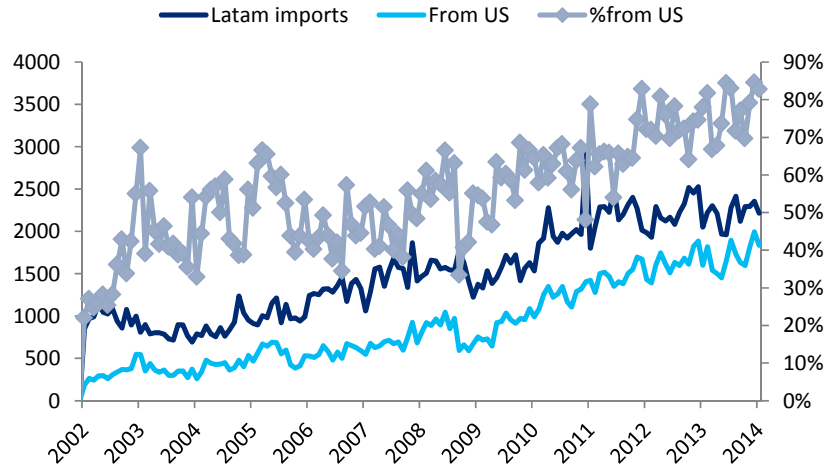


- US should overtake Russia as world's largest net product exporter by 2015
- The surge in exports should continue in middle distillates and light products, up ~300-k b/d per year for next two years
- The biggest push lies ahead, in NGLs starting with +900-k b/d in new export capacity this year, as US exceeds Saudi Arabia as largest NGL exporter

NGL supply: outpaces demand thru 2020



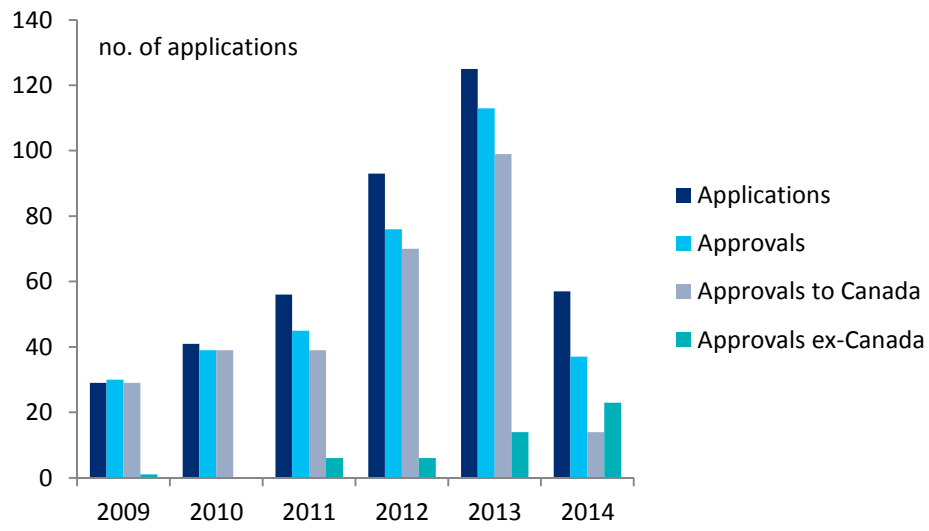
Total Latin America petroleum product gross imports, and proportion from US (k b/d, 2002-14)



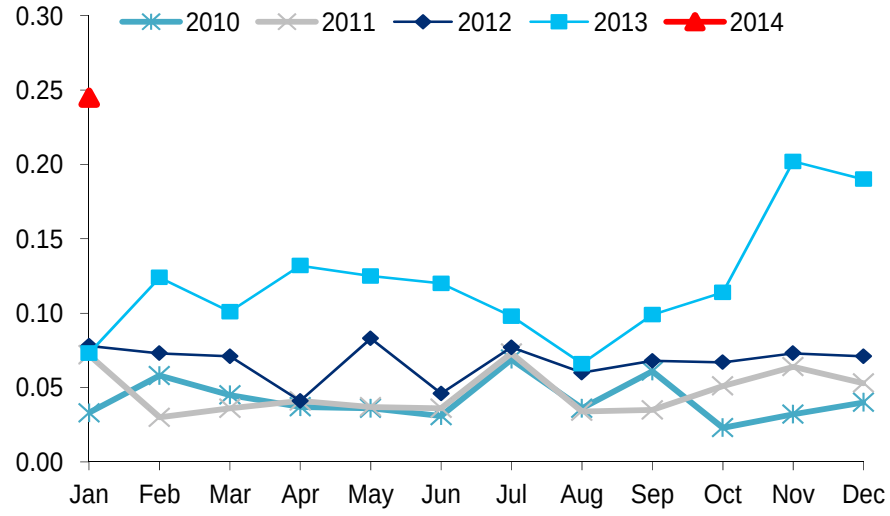
Source: EIA, JODI, Citi Research

How much crude could the US be exporting by end-2014?

US crude export applications and approvals (to 02/25/14)



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-k b/d 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 300-k b/d of condensates if reclassified as petroleum products.

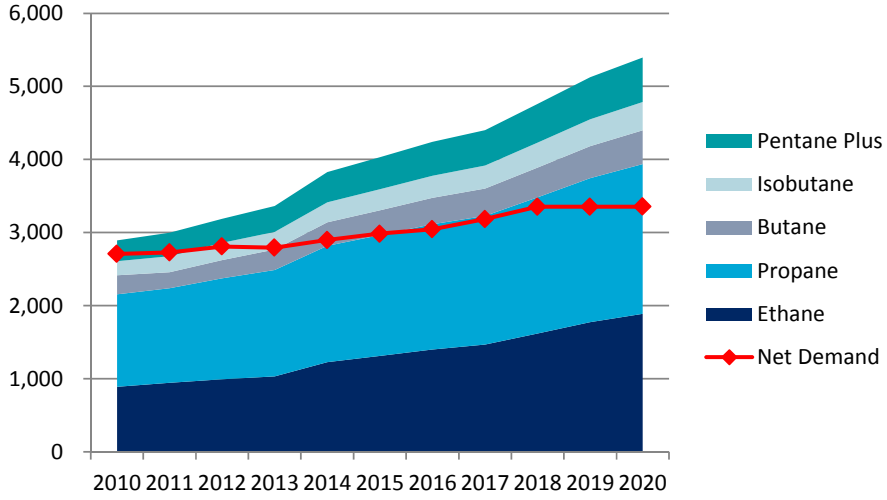
Source: EIA, BIS, Citi Research

Appendix

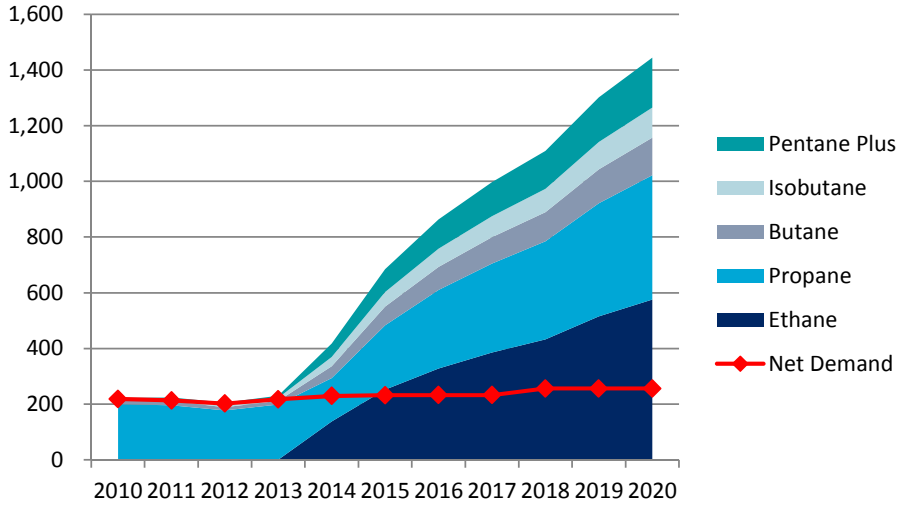
US NGL supply to exceed demand due to robust growth, too

Shale production yields natural gas liquids (NGLs) too, growing the US's exportable surplus and stimulating domestic demand for industrial uses such as petrochemicals

NGL supply growth could far outpace demand by 2020…



…with PADD I potentially having the most imbalance

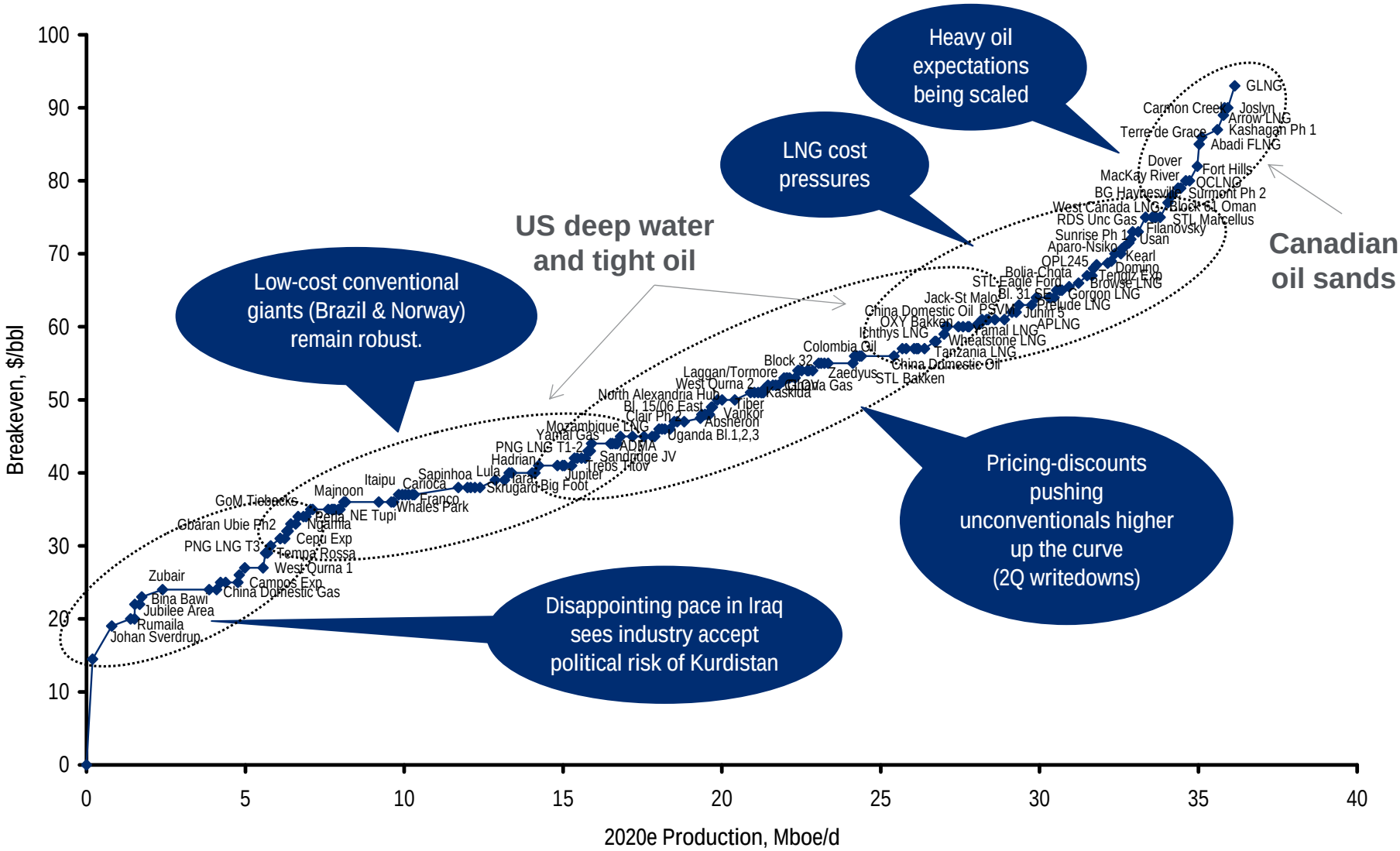


Source: EIA, Citi Research

* Ethane production does not include ethane rejection of around 300-k b/d in 2013. If add ethane rejection back, field production would increase by another 0.3-m b/d.

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.

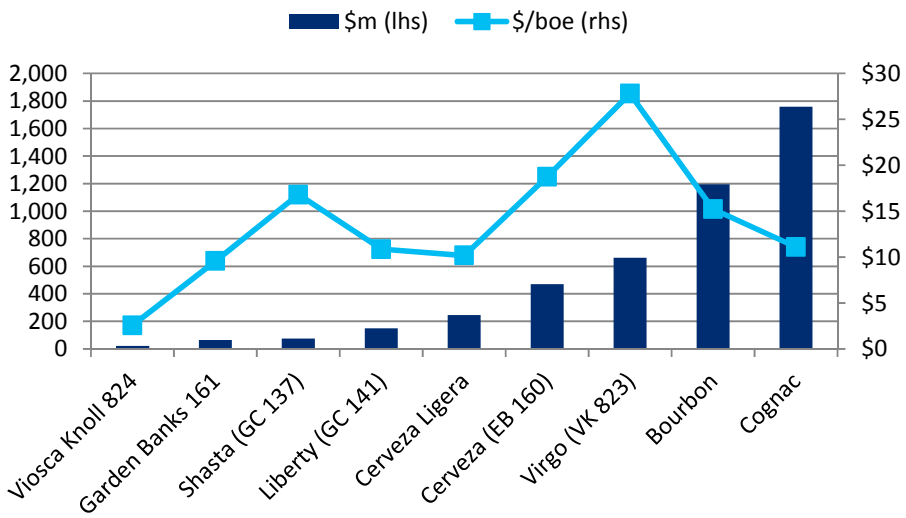


Source: Citi Research

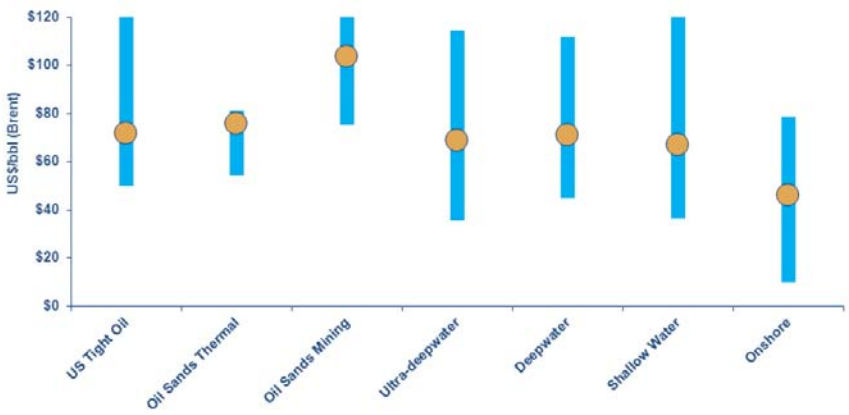
Mexico offshore shallow water

US Gulf of Mexico begins to add meaningful volumes on top of shale; could Mexico also surprise?

US oil and gas shallow water fields by total capex (produced and remaining) in $m and $/boe terms



Project breakevens (Brent equivalent) for new oil developments see global shallow water in the $40/bbl level and up



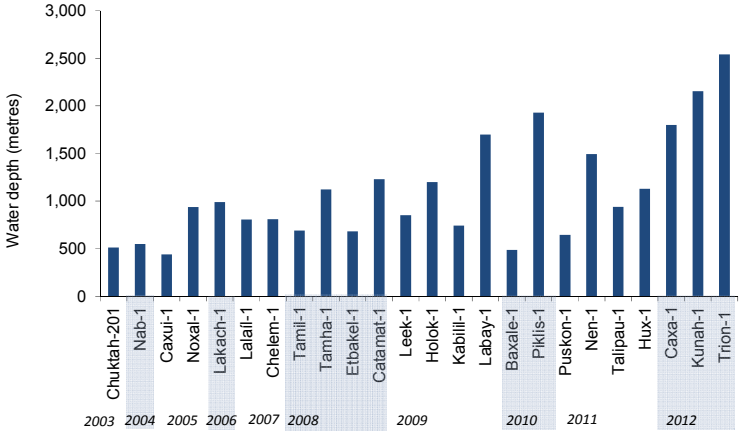
- Shallow water oil and gas projects on the US side have capex up to $2 bn, and up to the $30/boe level
- Planned Mexican shallow water projects, like Abkatun-Pol-Chuc, Cantarell, KMZ, Lankahuasa, Litoral de Tabasco, see much higher capex levels into the $20-40 billion range in produced and remaining capex, as assessed by Wood Mackenzie.

Source: Wood Mackenzie, Citi Research

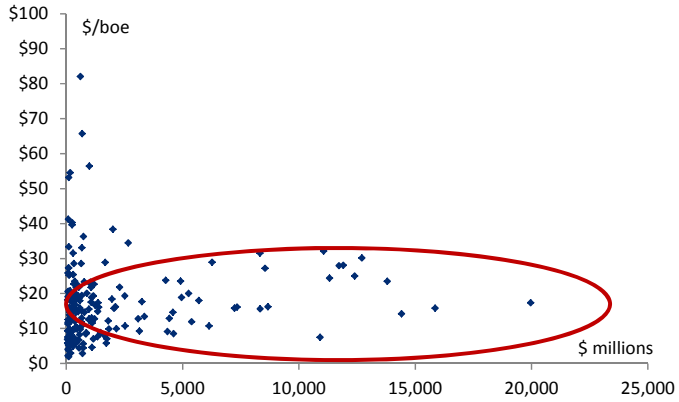
Mexico offshore deep water

With energy reforms, in the near-term, the Trion, Supremus and Maximino fields in the Perdido Basin, on the Mexican side of the Gulf of Mexico, could be producing quicker than expected.

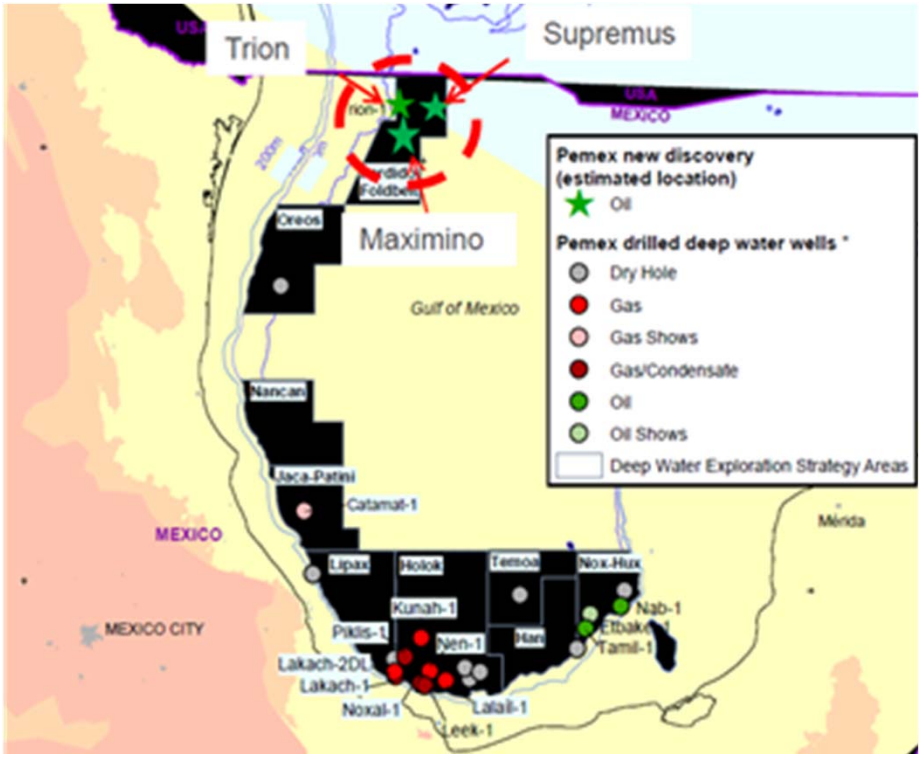
- Well costs at Trion, Supremus, Maximino could be $150-200 million each, taking place in the deepest waters Pemex has ever operated in, over 2,500 meters deep.



US deep water fields see capex of up to $20 billion, with per boe capex up to the $80 level, though much is sub-$60



Mexico could develop fields in the Perdido Basin

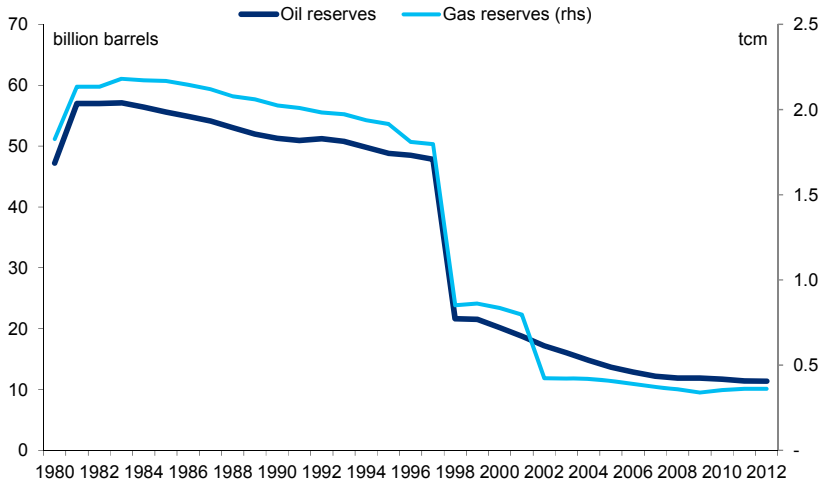


Source: Wood Mackenzie, Citi Research

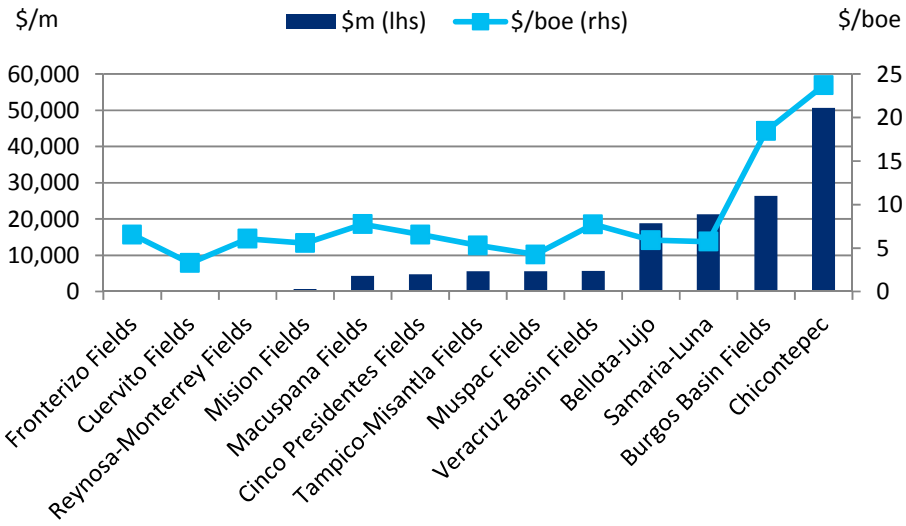
Mexican onshore conventional resources

Onshore conventional projects can cost from $5-100 million each, with global project breakevens for oil (Brent equivalent) in the ~$10-80/bbl range, with the weighted average at ~$40.

Mexican oil and gas reserves have been waning



Mexican onshore conventional play-level capex estimates in $m, $/boe

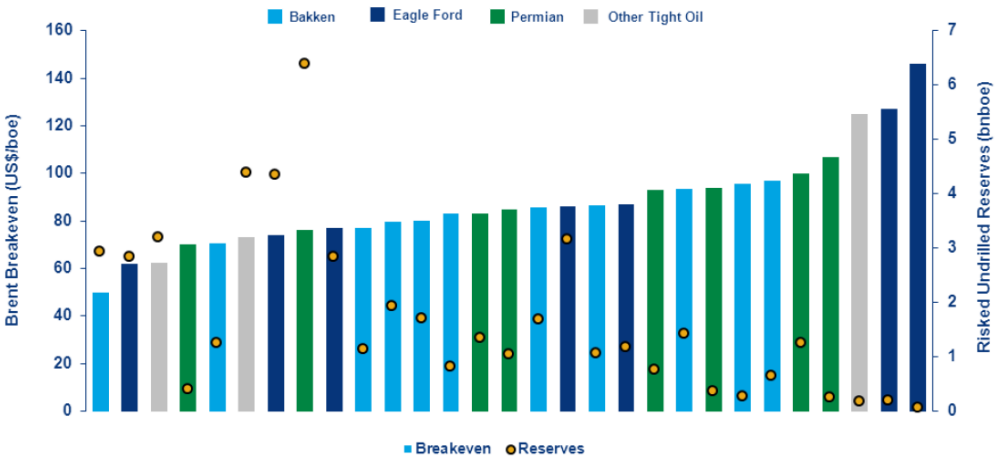


Source: BP, Wood Mackenzie, Citi Research

Mexican onshore unconventional resources

Mexico attempts to prove commercial viability of its shale, with five shale wells planned for 2014. The US Eagle Ford experience has seen breakeven costs as low as $40, similarly in the Bakken, and ~$50 in the Permian.

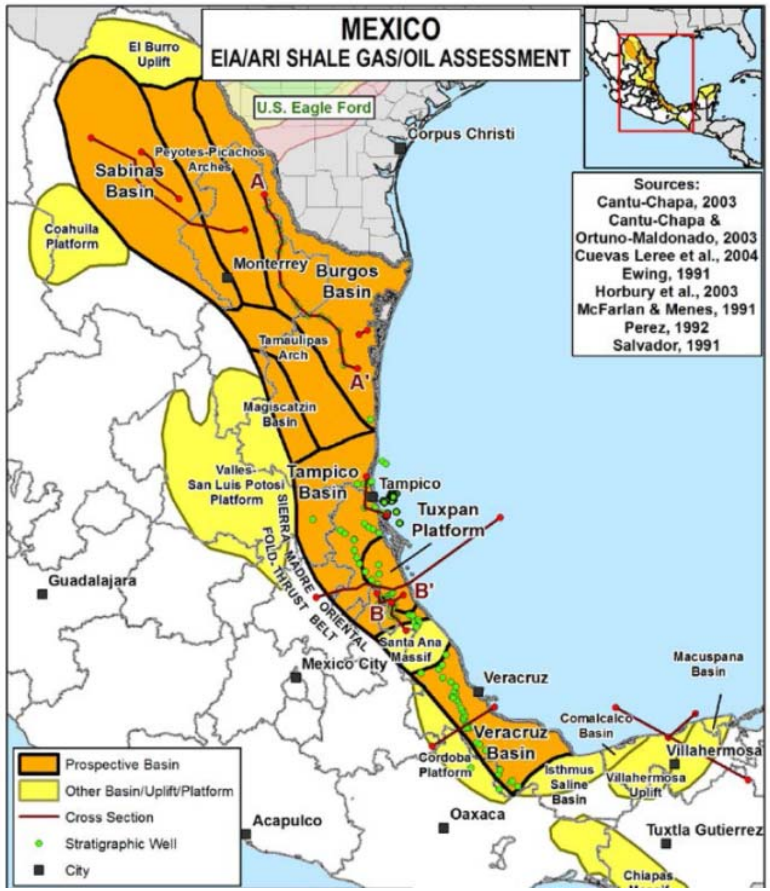
Brent breakeven costs, reserve estimates for US shale oil sub-plays



Global top 10 technically recoverable shale oil and gas reserves

Technically Recoverable 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

Map of shale resources

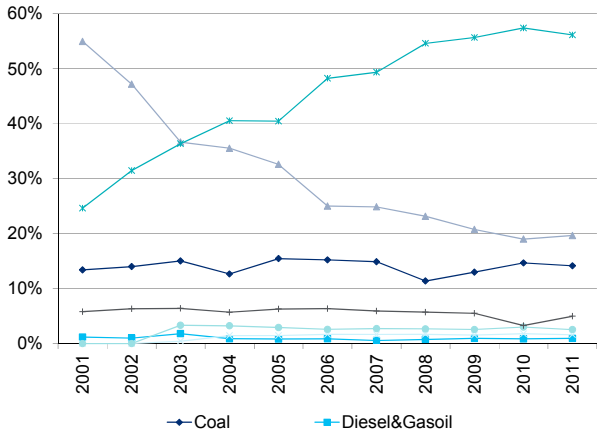


Source: EIA, Wood Mackenzie, Citi Research

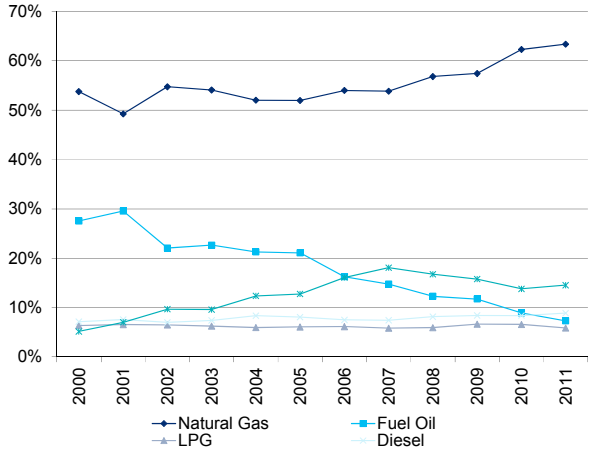
Pipeline exports of natural gas to Mexico

Contrasting seasonal demand and rising gas demand for power generation in South America makes US gas attractive; and US gas pipeline export capacity to Mexico is increasing rapidly to supply insatiable demand

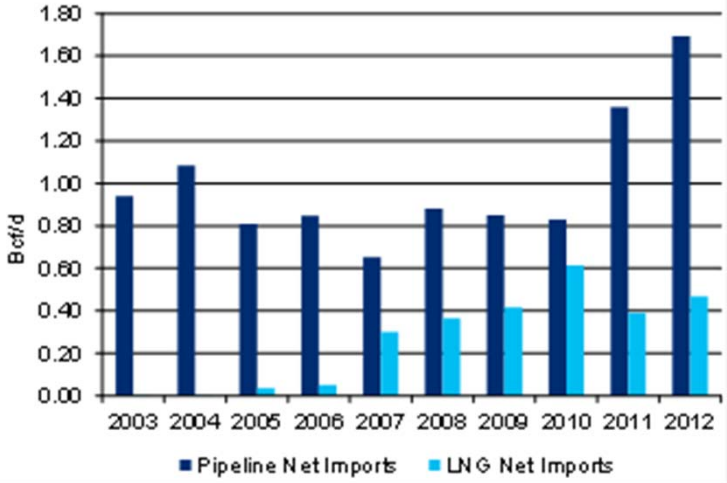
Fuel consumption share for electricity generation (2001-2011) – rising gas share



Fuel consumption share in the industrial sector (2000-2011) – rising gas share



Mexico's gas imports – piped gas from the US rising, but LNG imports remain sizeable despite high prices



Exports to Mexico could surge as pipelines are constructed

Pipeline Name	Expected Start Service Data	Capacity (MMcfd)	Pro rated	Year
Willcox Kinder Morgan Expansion	4/1/2013	185	139	2013
Chihuahua-Topolobampo Pipeline	8/1/2013	1087	453	2013
Mier Monterrey	4/1/2014	215	161	2014
Reynosa Border Crossing	6/1/2014	300	175	2014
Sasabe-Guaymas Pipeline	9/1/2014	770	257	2014
Los Ramones pipeline	2015	2100		
Ramones Fase I	6/1/2015	1000	583	2015
Ramones Fase II	12/1/2015	2100	175	2015
Sasabe Pipeline	10/1/2016	510	128	2016

Source: Waterborne, SENER, company reports, Citi Research

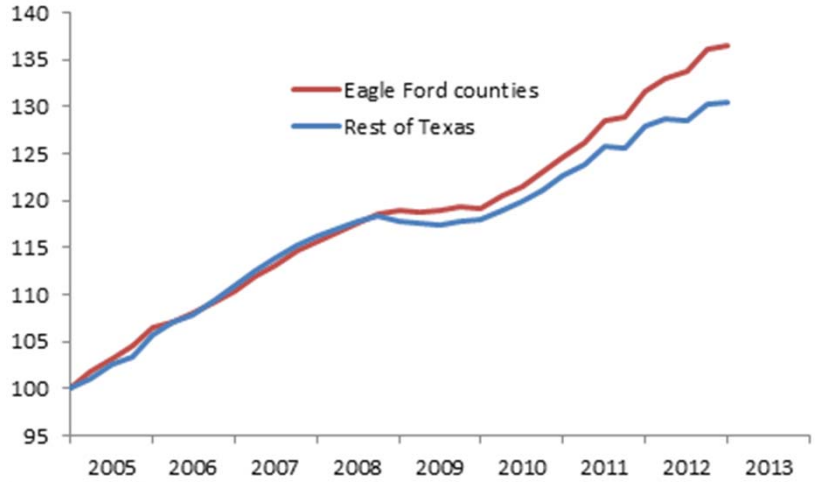
US also provides indicators of possible economic gains

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

- In the Eagle Ford in Texas, 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 in the rest of Texas.
- On average, every rig deployed creates 9 direct jobs and 20 indirect jobs.
- 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*

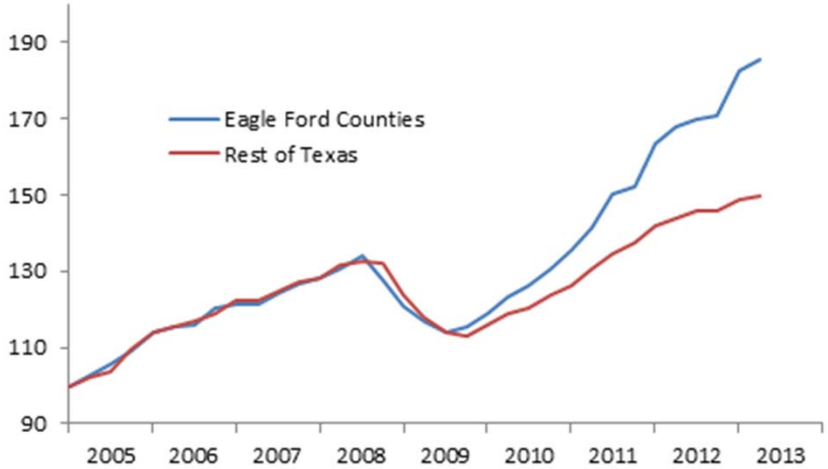


*4-quarter moving average.

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.

Appendix A-1

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