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From: "Gibbens, Curtis A CIV WHS ESD (US)"
Date: Mar 25, 2015 11:33:26 AM
Subject: OSD/JS FOIA 15-F-0372 Final Response - The North American Petroleum Renaissance Study
Cc: "Council, Suzanne F CIV WHS ESD (US)"

Sent by electronic mail

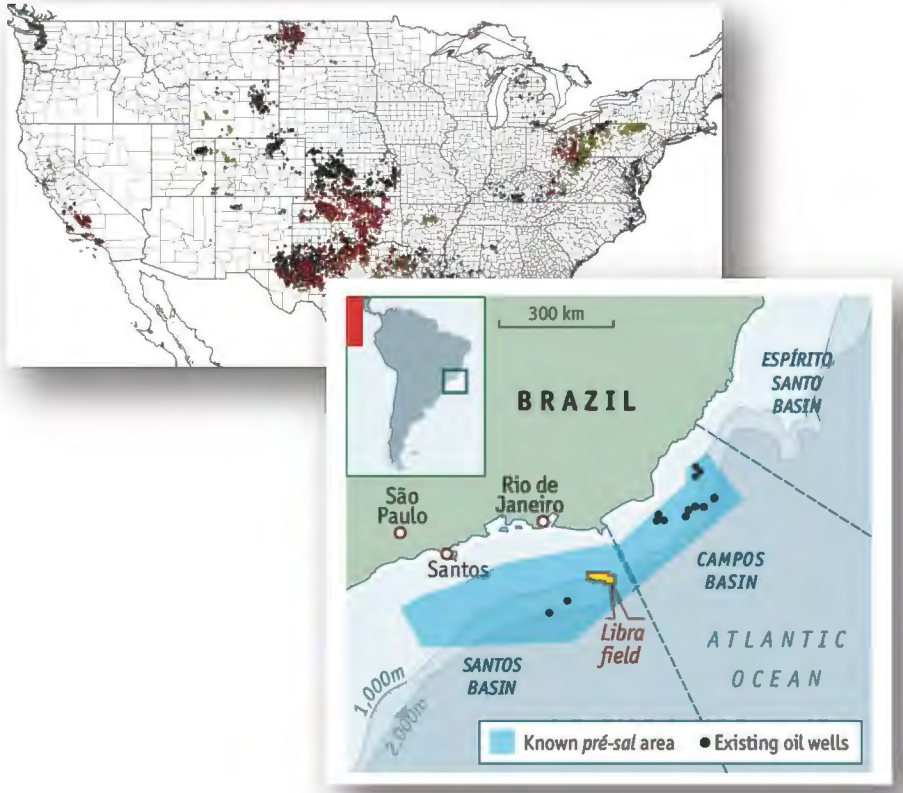
This is in response to your attached Freedom of Information Act (FOIA) request, case number 15-F-0372.

The Office of the Director, Net Assessment (ODNA) provided two responsive documents on the attached compressed file and determined that it is appropriate for release. This constitutes a full grant and I am closing your file in this office. There are no assessable fees associated with this response in this instance.

Sincerely,

Curtis Gibbens, FOIA Analyst
For Suzanne Council
on behalf of M.L. Wahling, Acting Chief, Freedom of Information Act Division
Office of Freedom of Information OSD/JS FOIA Office

Determining the Americas' Crude Oil Balances



Deliverable 1
Contract HQ0034-13-C-0131
Energy Policy Research Foundation, Inc. (EPRINC)
for the Office of Net Assessment
January 24, 2014

Task 1 Objectives: Determining North America's Supply Disposition

- U.S. oil and natural gas production and sustainability (infrastructure and regulatory)
- Canada's crude exports and possible growth routes
- U.S. crude exports
- LNG export prospects

- South American prospects (and role of NOCs)
  - Brazil
  - Argentina
  - Venezuela
  - Colombia

- Regulatory risks and uncertainty

Presentation Outline

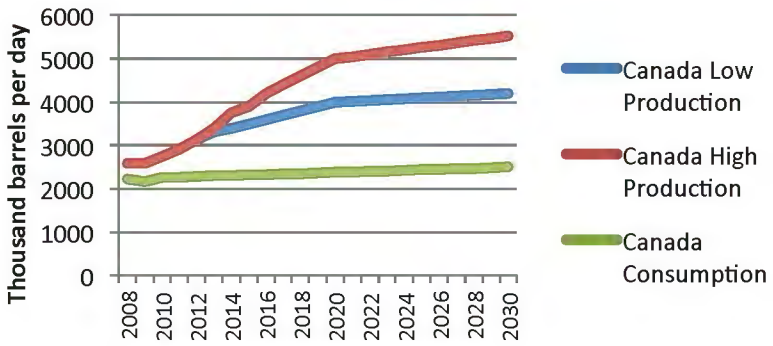
- Long-term Americas outlook
  - North and South American crude oil supplies and imports to 2030
  - The (expensive to produce) low hanging fruit of global supply potential
- North America – background analysis, outlook and issues
- South America - background analysis, outlook and issues

Summary of Conclusions

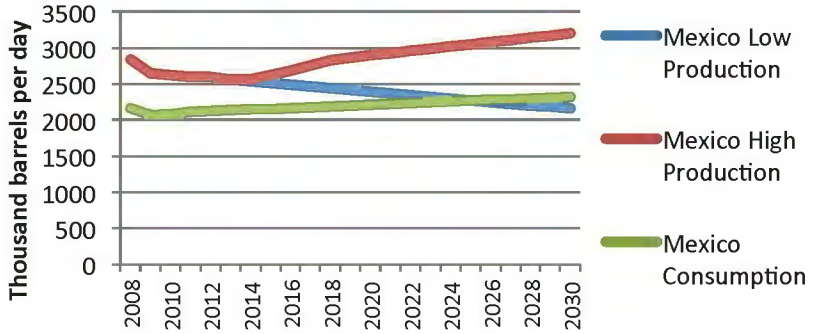
- North and South America have the potential to increase production by a combined 10 mm bd (million barrels per day) above current levels
  - Perhaps the largest foreseeable swing worldwide over the next 15 years
  - The impact on global trade flows could be massive. Net 5 mm bd would flow out of the Americas, nearly no oil would be required from the ME and Russia
- There are serious risks and uncertainty but they are largely not related to geology
  - Cost of production – most NA and SA supplies at the high end of the cost curve. Therefore, efficient regulatory systems needed
  - Infrastructure risk in NA (inability to move production to market, i.e. Keystone XL, dependence on rail)
  - Resource nationalism in SA

North American Production and Consumption Forecasts

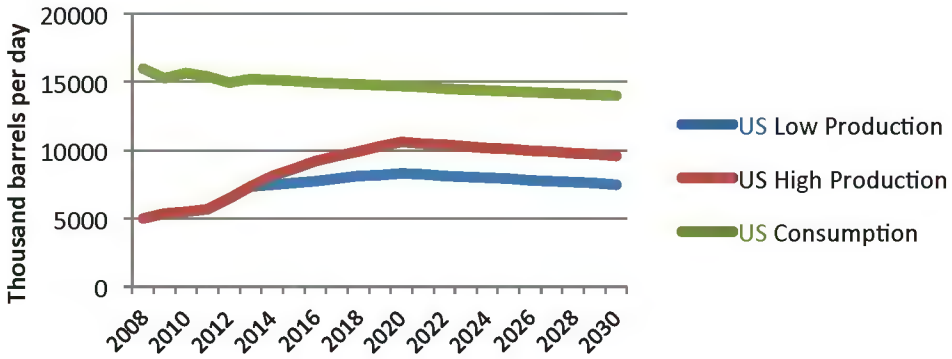
Canada Forecast to 2030



Mexico Forecast to 2030



U.S. Forecast to 2030

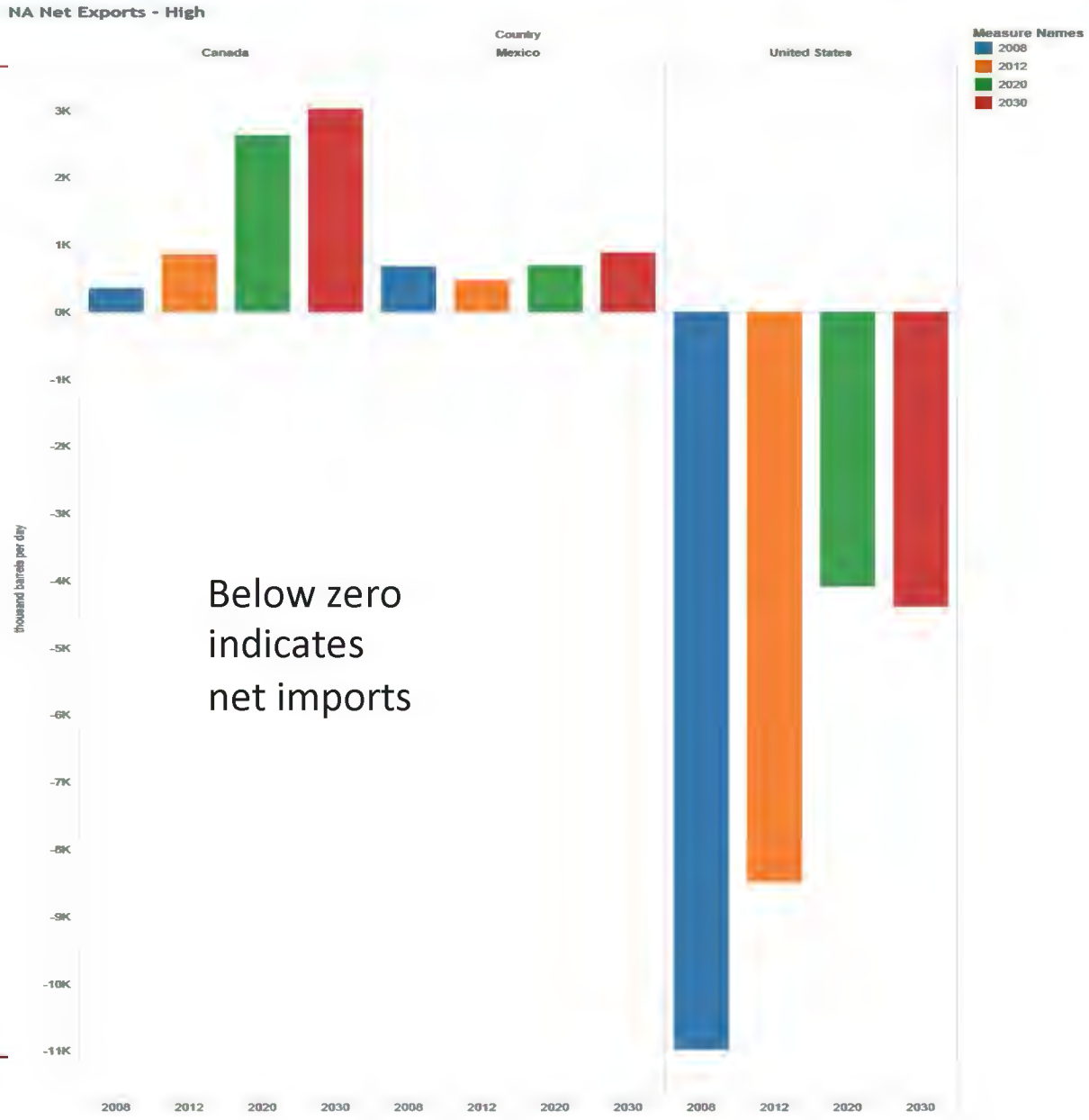


These forecasts serve as the foundation for the net export analyses in the following slides

North American (NA) Production

- US: 2 mm b/d difference in high and low case
  - Depends on producer ability to reduce costs, expand to new plays and/or producing zones in existing plays, more robust and efficient transportation options
- Canada: requires additional transportation options to improve well-head values, investment and reach higher production levels
- Mexico: reforms, which were passed by the Mexican Congress in December, must be fully implemented and allow for foreign investment and expertise to enter the petroleum sector
  - If reforms fail, could become a net importer around 2020

Net Exports – High Production Case



Below zero indicates net imports

- Canadian exports triple to 2030
- Mexican exports reverse fall and recover to 1 mm bd
- U.S. imports drop to half of 2012 levels

Net Exports – High Production Case - 2012

Net petroleum exports, inclusive of refined products, for 2012

The U.S. imported 8.5 mm bd net in 2012. Canada and Mexico each exported close to 1 mm bd.

Net Exports – High Production Case - 2020

Net petroleum exports, inclusive of refined products, for 2020

U.S. exports drop to 4 mm bd in 2020. Canadian and Mexican exports increase.

Net Exports – High Production Case - 2030

Net petroleum exports, inclusive of refined products, for 2030

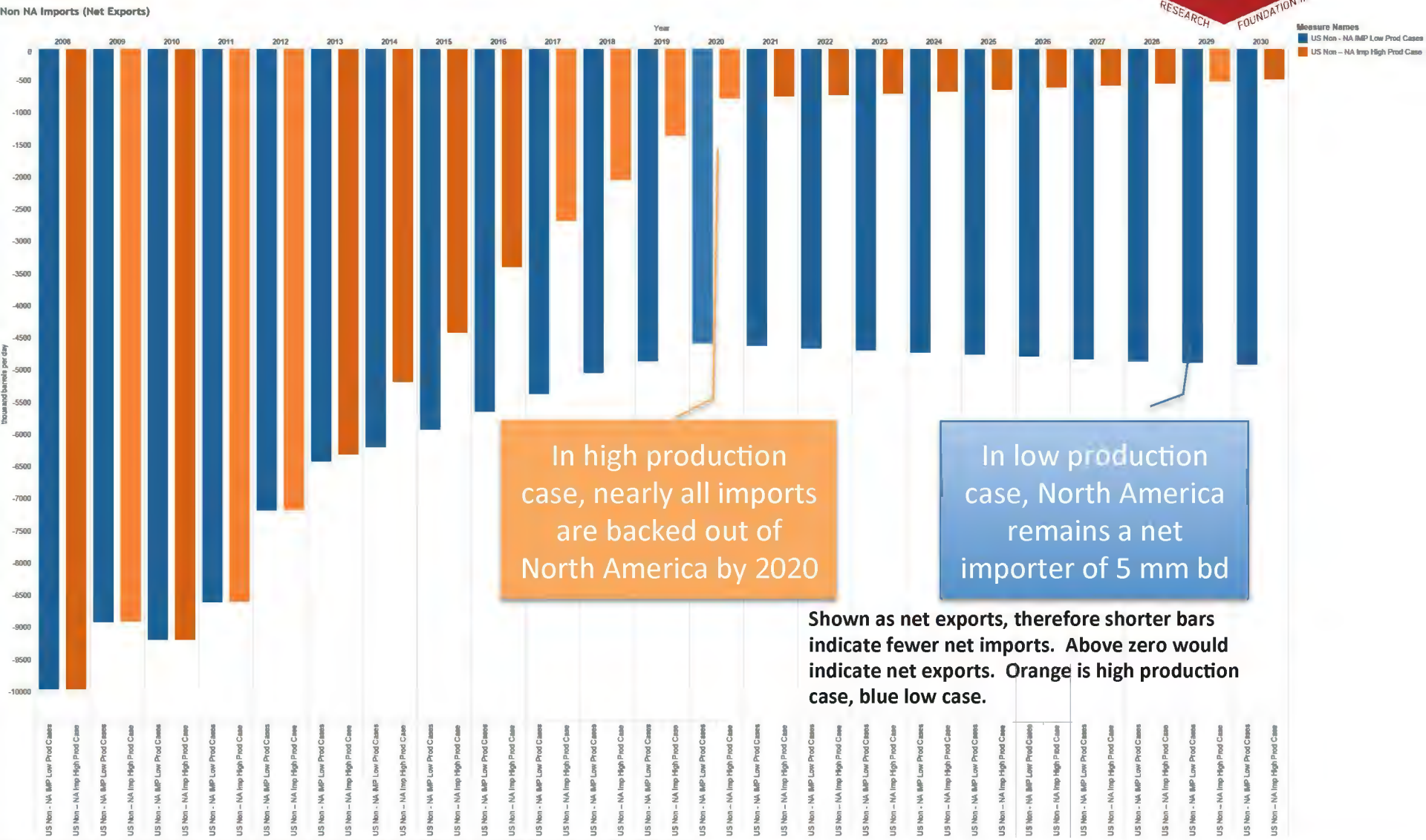
U.S. imports stabilize near 4 mm bd. Canadian and Mexican exports grow steadily to 2030.

Non – NA Imports

- In high production case (following chart, orange bars), North America self sufficient*
  - U.S. effectively backs out all non-NA imports
  - Mexican and Canadian crude well matched to U.S. refining capacity
- Most U.S. production growth in form of light sweet crude oil, even condensate
  - Some will have to be exported to balance capacity
  - U.S. would remain net exporter of refined product, continue to produce appx. 1 mm bd of biofuels

*Refinery gain not included. Its inclusion increases U.S. production by about 1 mm bd over levels shown in chart, making NA a net exporter. When a barrel of crude oil is processed at a refinery its volume grows by about 7%. I.e., the volume of refined products, made up of molecules which are less dense than crude oil molecules, are greater than the crude oil from which they were derived. The U.S. processes 15 mm bd of crude oil and gains 7% volume, or about 1 mm bd of product.

Non-NA Imports into U.S. under two production cases



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Non – NA Import Scenario Requirements

- The high production, self-sufficiency scenario is not necessarily unlikely but is dependent upon 3 key factors – two of which are directly tied to govt's:

1) Ability of independent producers to reduce costs, improve cash flow, and eventually expand to new plays and producing zones
2) Efficient transportation of oil and products within U.S. and across borders (interstate pipeline, cross border, Jones Act)
   (This directly impacts 1) by improving efficiency and therefore wellhead values, producer revenue and cash flow, in both U.S. and Canada)
3) Mexican reforms, which have been passed, must be carried out effectively so that foreign $ and expertise can lift the sector

Resources are in place but relatively high cost or constrained by resource nationalism (Mexico). An efficient system is required in all three countries. Nearly 5 mm b/d at risk.

North American (NA) Production – Low Case

- In the low production case:
  - Canadian market access remains constrained due to a lack of pipelines.
  - U.S. producers are unable to reduce costs and/or are hampered by infrastructure induced discounts
    - A sustained oil price above $120/bbl could cure this
  - Mexican reforms do not take shape, PEMEX continues to bleed and is unable to invest.

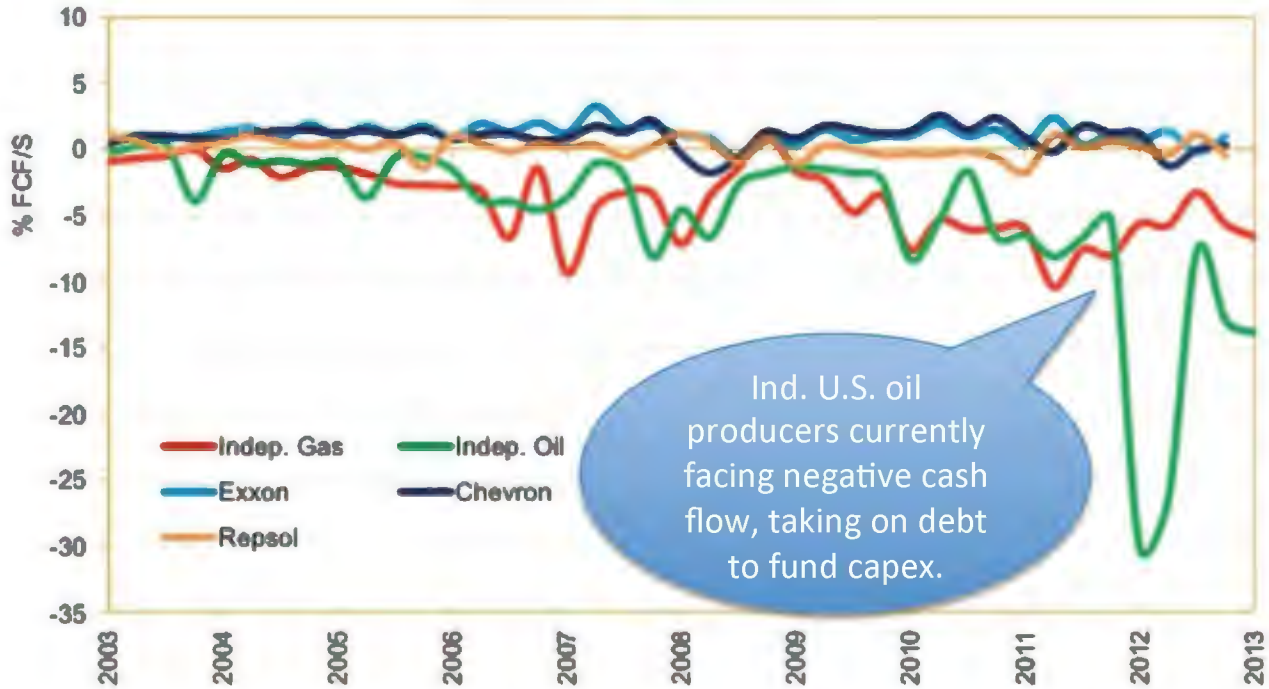
The North American Cost Issue (negative cash flow)

Análisis Micro en EE.UU.

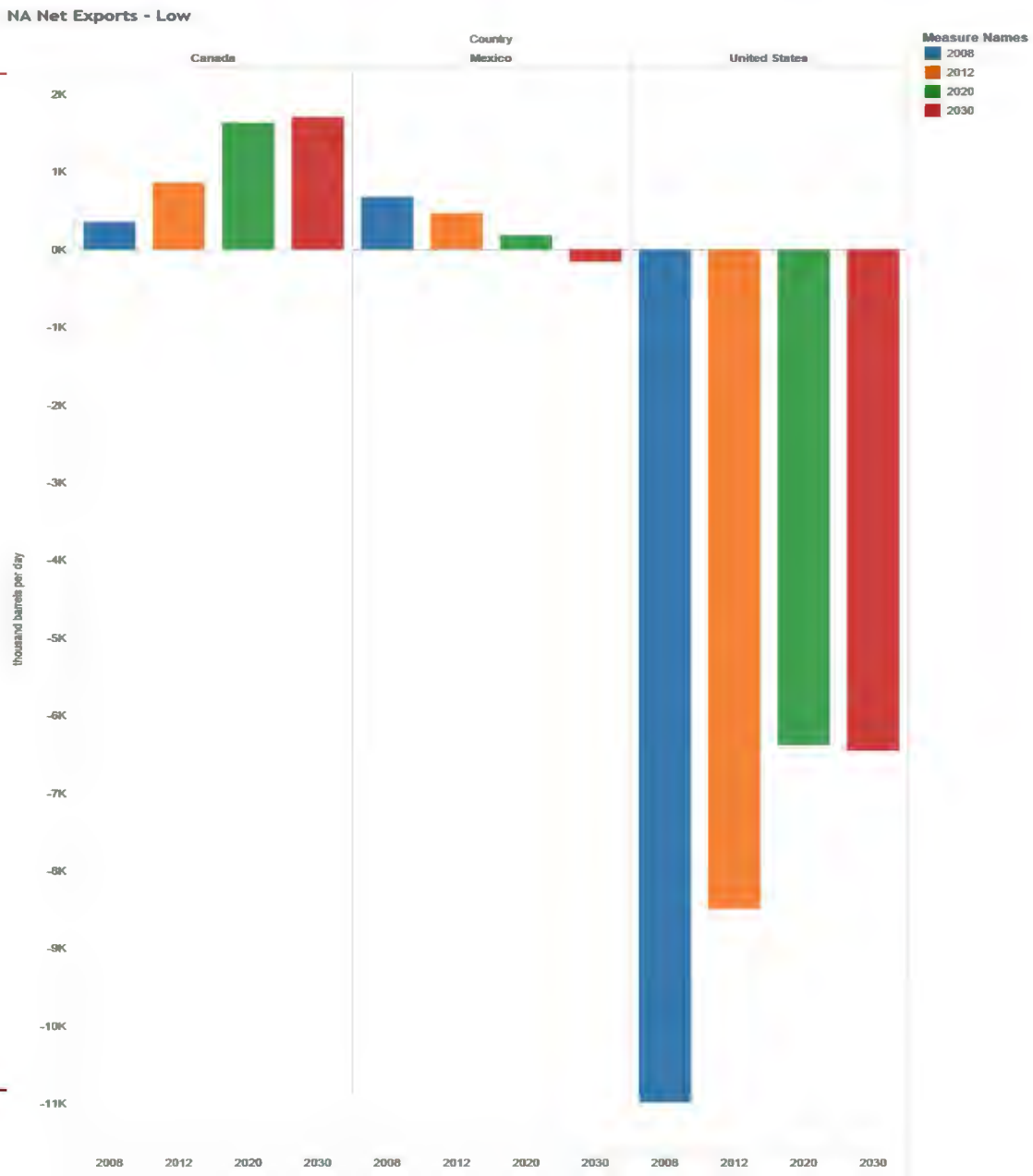
Free Cash Flow

REPSOL

Free Cash Flow por acción



Net Exports in Low NA Production Case



- Canadian net exports plateau at 2 mm bd
- Mexico turns to a net importer after 2020
- U.S. imports 5-6 mm b/d over long term

Net Exports in Low NA Production Case - 2030

In this low production case, U.S. imports about 6.5 mm bd net in 2030, roughly current levels.

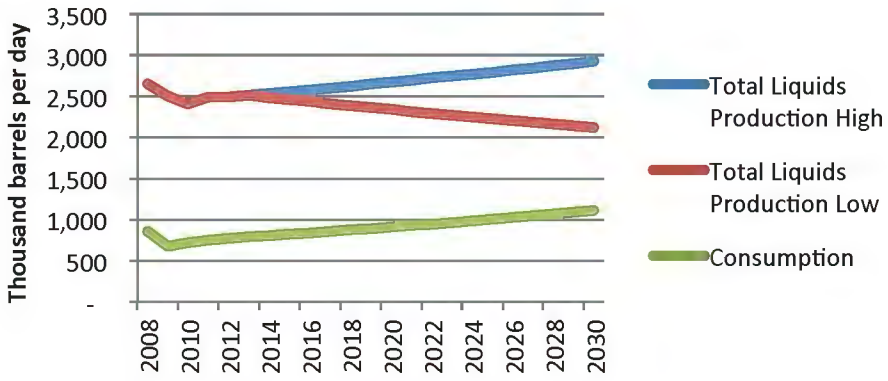
Mexico become a net importer as production continues to decline.

Canada exports 1.7 mm bd.

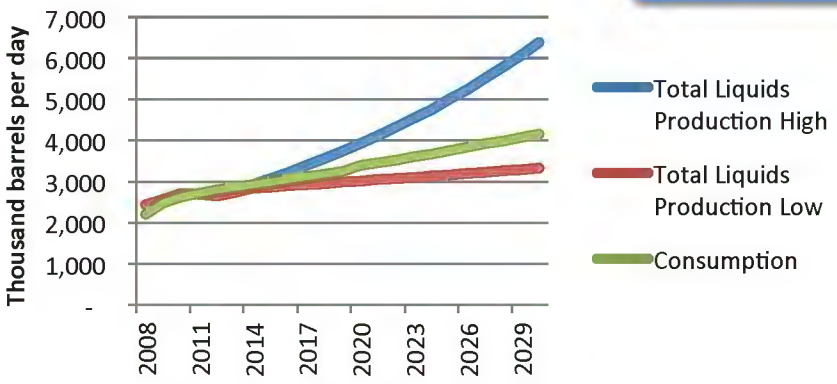
South American Production and Consumption Forecasts

EIA IEO 2013: Brazil 8 mm bd by 2040

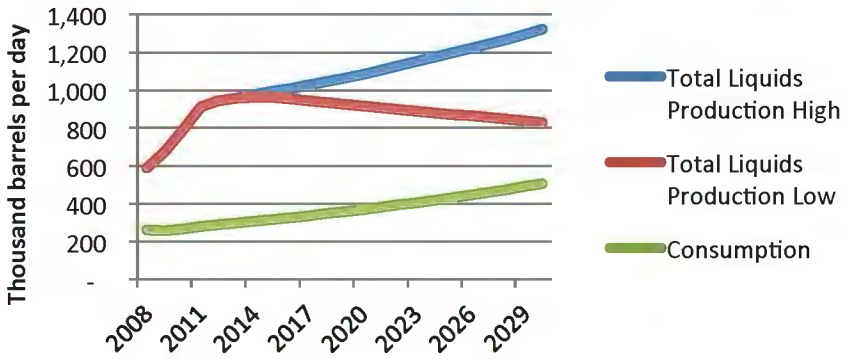
Venezuela



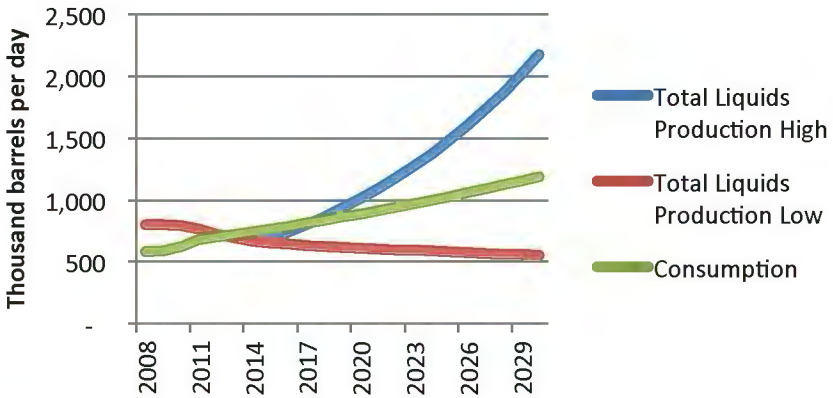
Brazil



Colombia



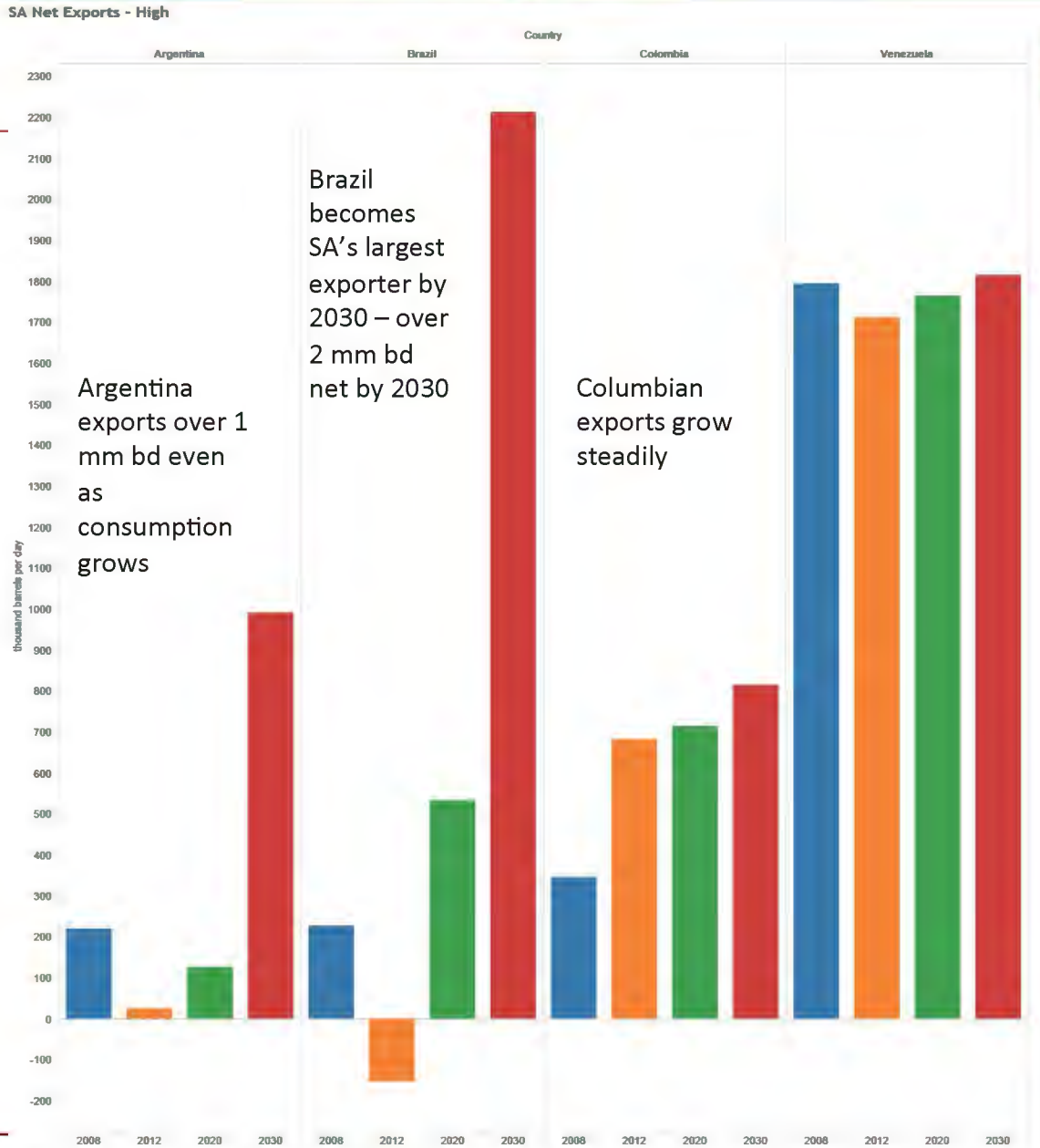
Argentina



South American (SA) Production

- South America: 6 mm bd of uncertainty from now to 2030
  - Venezuela: will the gov't ever enable/allow even a modest oil sector recovery
    - Exploitable reserves are in place
  - Brazil: Resource and economic nationalism risk huge offshore potential, high cost of production
  - Columbia: Will modest growth make significant contributions to SA supply?
  - Argentina: Resource nationalism hindering investment in large shale potential. Some uncertainty regarding geology (although optimism prevails).

Net Exports in High SA Production Case



Argentina exports over 1 mm bd even as consumption grows

Brazil becomes SA's largest exporter by 2030 – over 2 mm bd net by 2030

Columbian exports grow steadily

Venezuelan exports overcome years of decline. (Upside remains here should serious investments be made in Orinoco belt.

Bear in mind that consumption has grown in all four countries in recent years. In this chart, net exports grow despite growing consumption. Overall production gains are larger than the growth in net exports.

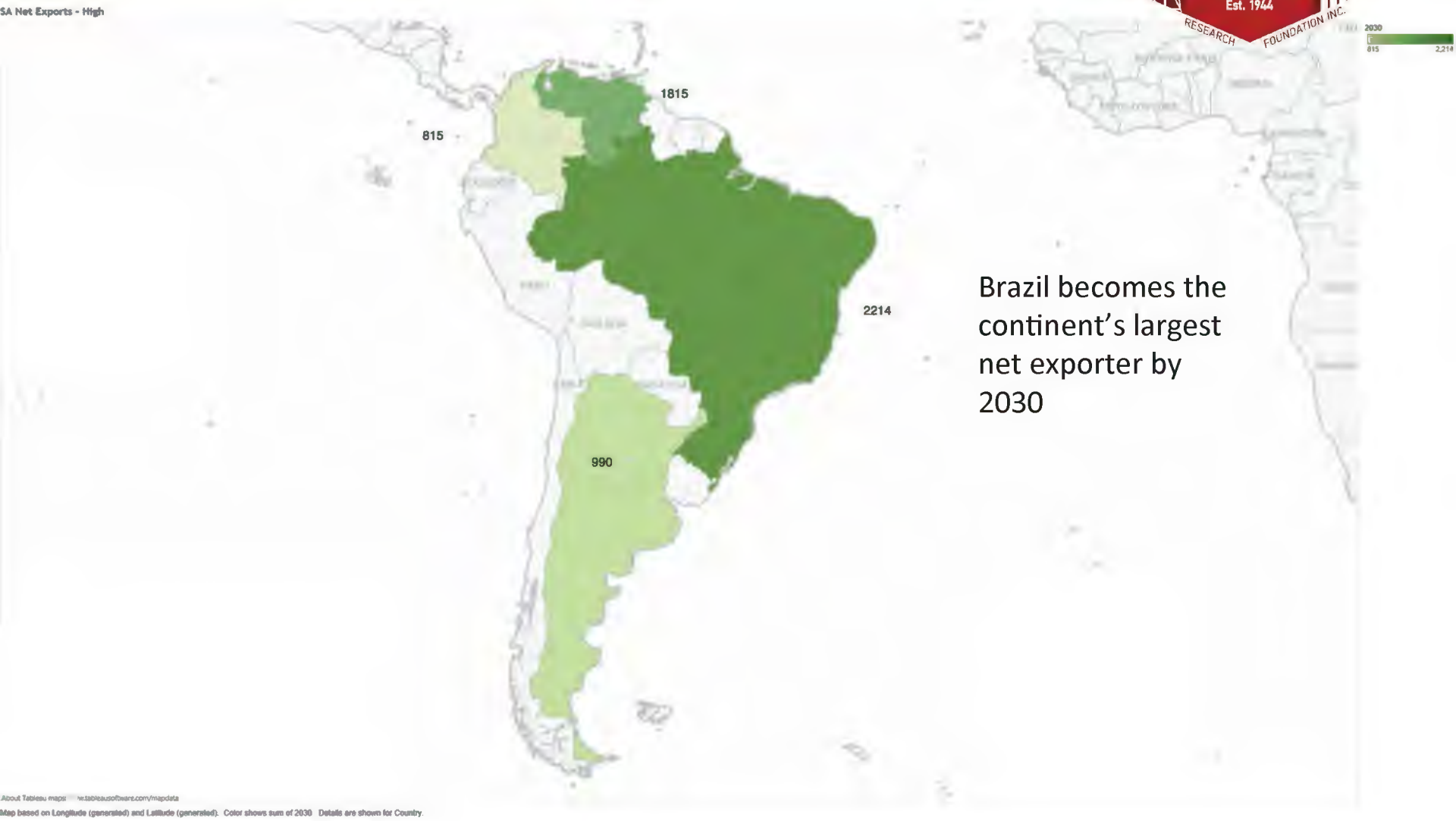
Net Exports in High SA Production Case - 2012

Columbia and Venezuela are the largest exporters in South America. Ecuador exports about 300,000 bd. This production is largely offset by consumption in the remaining SA countries not highlighted here. Brazil has recently become a net importer.

Net Exports in High SA Production Case - 2020

By 2020 all countries are net exporters.

Net Exports in High SA Production Case - 2030

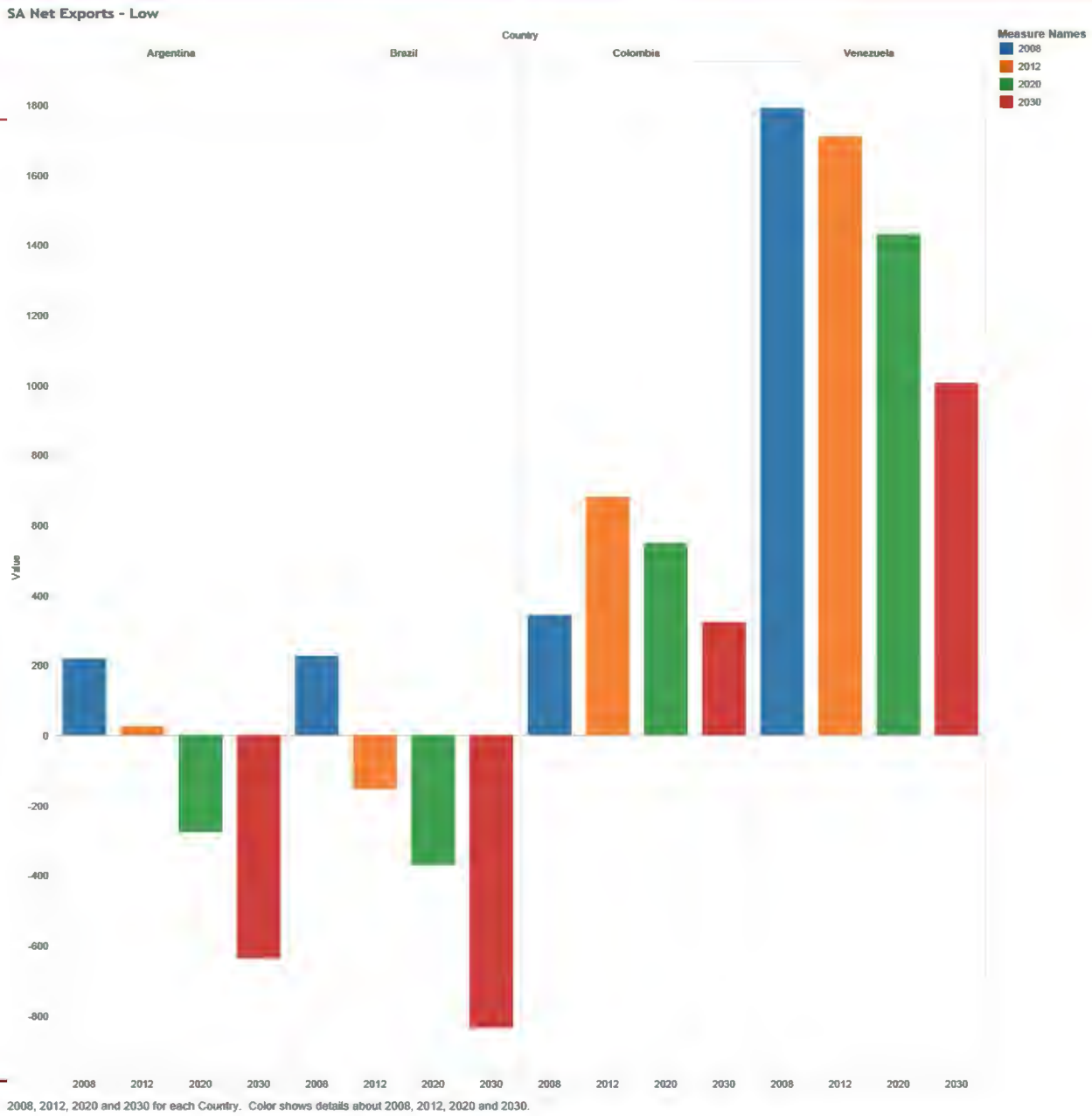


Brazil becomes the continent's largest net exporter by 2030

South American Production – Low Case

- In low production case:
  - Venezuela continues downward trajectory
  - Brazil's pre-salt remains grounded due to resource and economic nationalism and/or cost issues
  - Argentina's shale faces a similar fate and/or cost and geological issues
  - Columbia meets only modest growth targets
  - These four major swing countries are all expected to experience consumption growth. Even if extremely moderate, consumption growth will eat into trade balances.

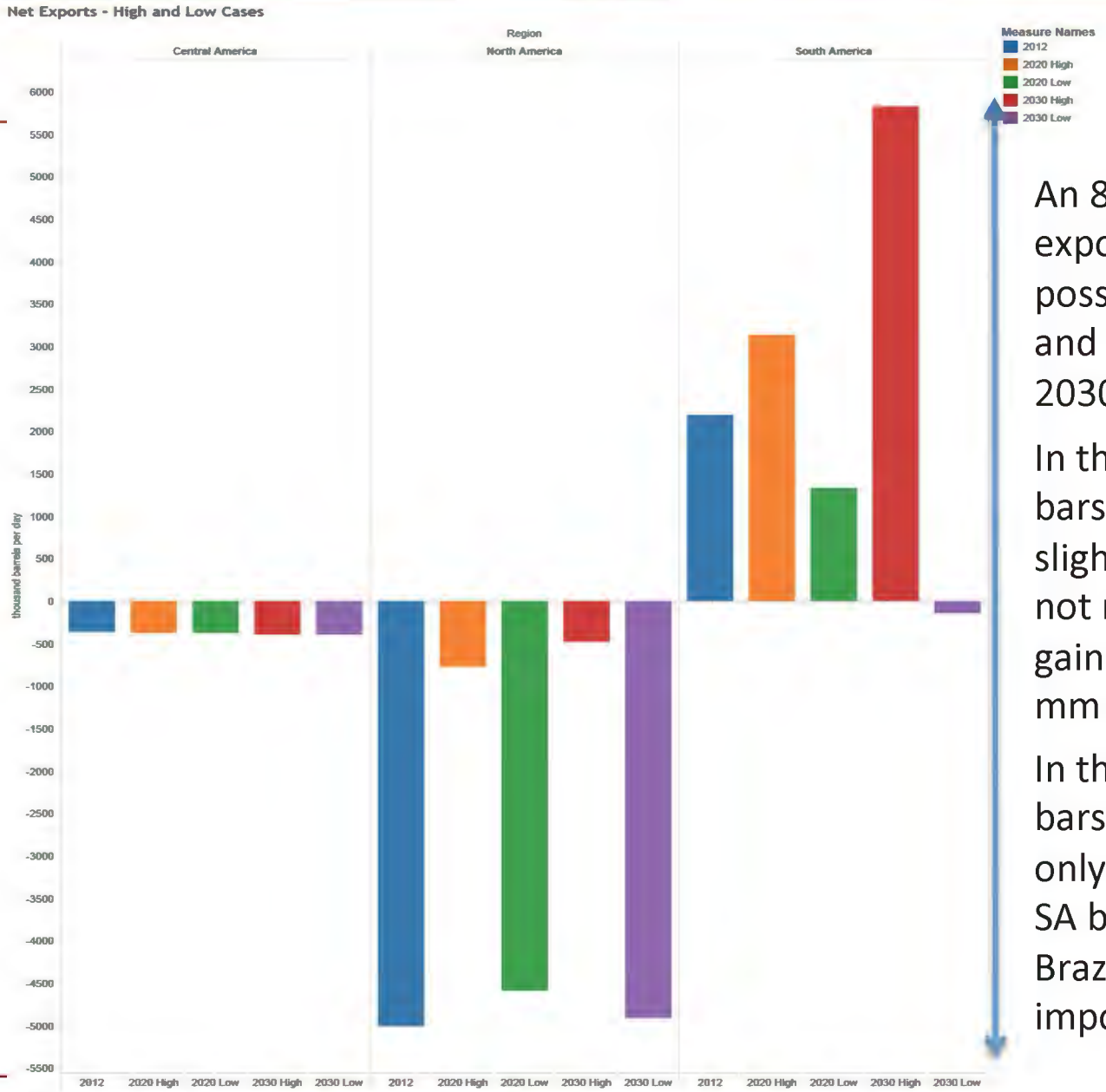
Net Exports in Low SA Production Case - 2030



- By 2030, the South American continent is a net importer (currently exports about 2 mm bd)
- Venezuela exports drop to 1 mm bd

Net Exports in Low SA Production Case - 2030

The American Swing

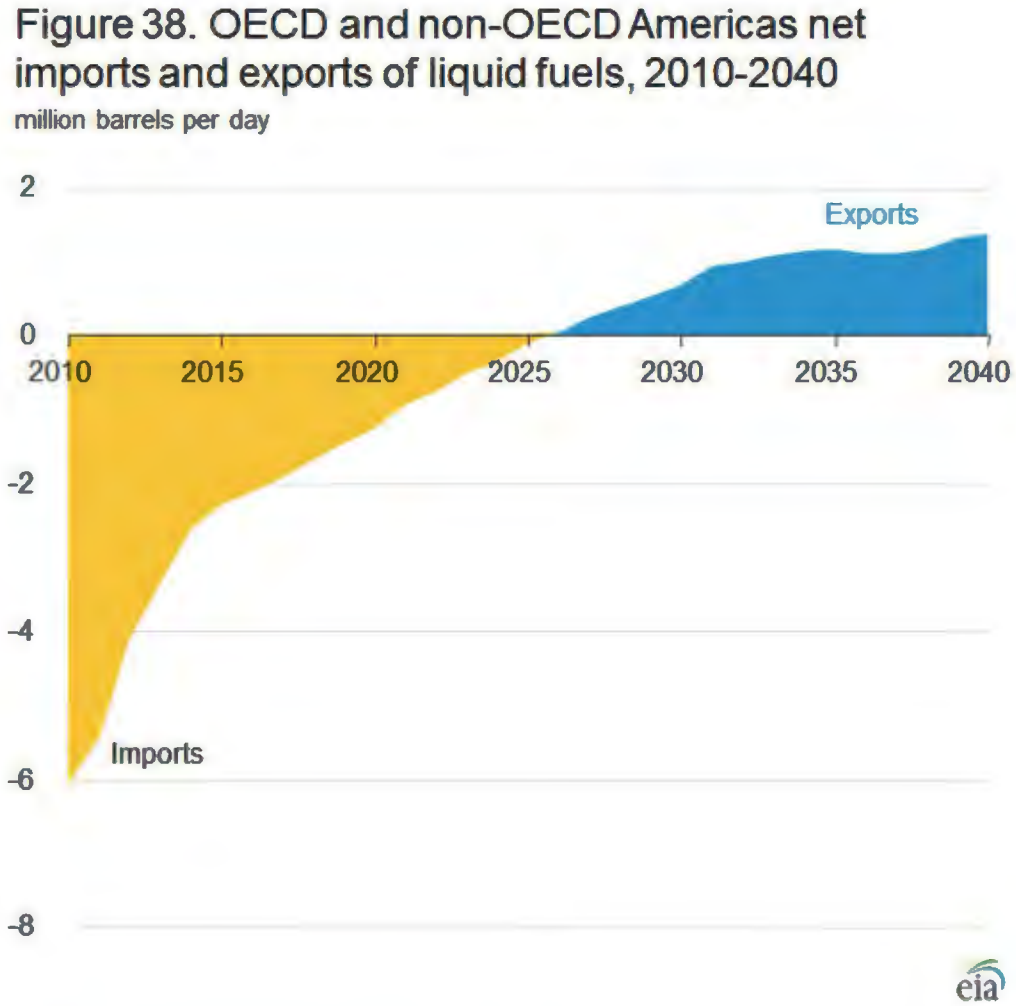


An 8-10 mm bd swing in net exports across NA and SA is possible between our high and low production cases by 2030.

In the high case 2030 (red bars) NA is self sufficient or a slight net exporter (chart does not reflect 1 mm bd of refinery gain) and SA exports over 5 mm bd net.

In the low case 2030 (purple bars), NA imports 5 mm bd, only Canada is a net exporter. SA become a net exporter with Brazil and Argentina increasing imports.

EIA *expects* an 8 mm bd positive swing



EIA IEA 2013, Reference Case

In Conclusion

- The potential swing in American (NA and SA) oil output could have a transformative impact on global trade flows
  - The Americas could be a net supplier to the world of 5 mm bd (currently net import ~3 mm bd)…
  - Or net imports could grow to 5 mm bd – a difference of 10 mm bd
- Dependent upon the sustainability of U.S. plays, efficient regulatory policy and Mexican reforms
- SA plays are too early to call: resource nationalism has thus far prevented investment and E&P activity on a large scale. The costs and potential of the pre-salt, Argentine shale (and stability of Venezuelan gov't) are not yet known.
- Equally compelling arguments can be made for either +/- 5 mm bd case.

Proposed Task 2 Objectives

- Address how trade flows and supplier relationships adjust to the North and South American supply balance
  - Oil and LNG trade flows to the Americas – now and in the future given the production scenarios outlined here
  - Where do current sources of U.S. imports divert supplies to, given the likely reduction in American imports?
  - New waterborne trade flows: which critical shipping routes, such at the Strait of Hormuz, become less important? Do new routes emerge?
  - Identification of major demand shifts, European oil demand declining while Asia and ME increase (or decrease)
  - Examine new, non-American production frontiers (Iraq, east Africa, etc.)
  - Identify potential new supplier/customer relationships, dependencies, etc.
  - Which countries might be susceptible to lower exports/revenues and where is political stability threatened as a result (ME exporters growing internal demand)

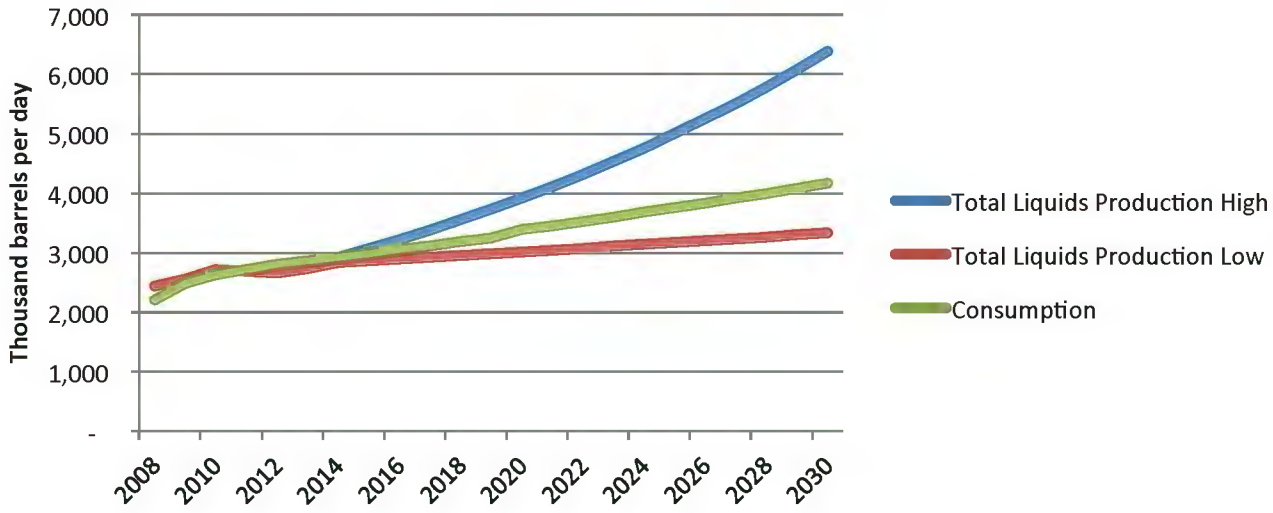
South America – Background and Analysis

Brazil

Brazil

- Produced 2.7 mm b/d in 2012
- Forecasted to produce between 3-4 mm b/d by 2020
  - Brazil's production increases are directly tied to the development of pre-salt fields. A high production scenario assumes Brazil can allocate its resources properly and manage the technological challenges of deepwater drilling
  - Brazil is currently a net importer of oil, but will slowly start to shift to a net exporter in 2015

Forecast to 2030



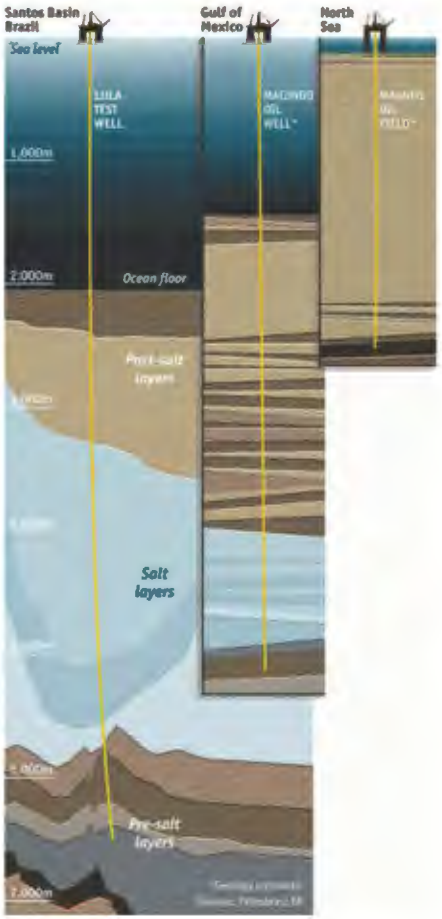
Source: EIA, IEA World Energy Outlook

Brazilian Pre-Salt

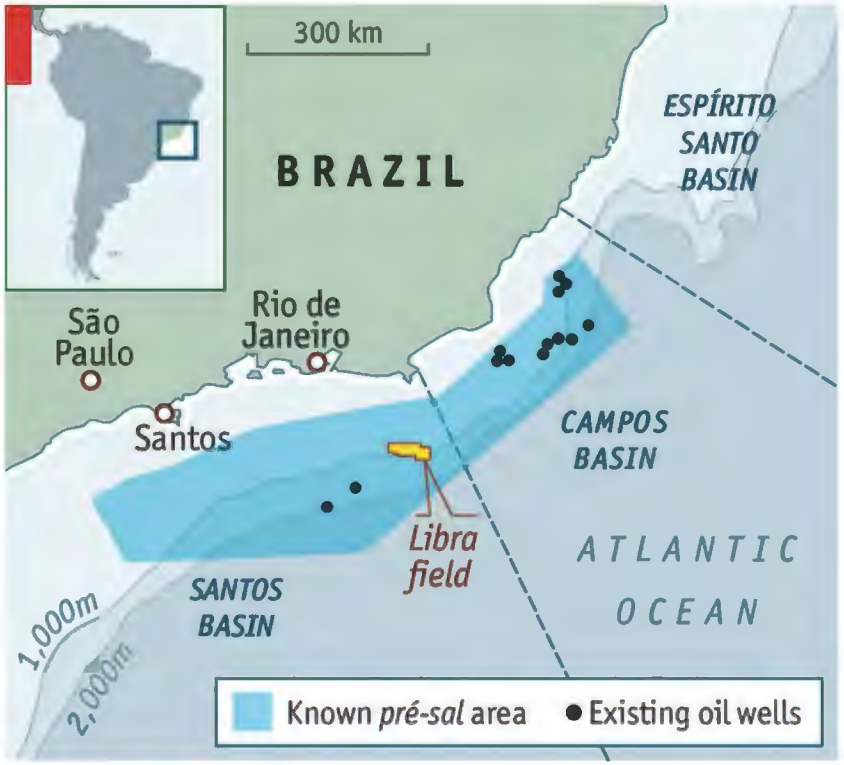
- With pre-salt production, Brazil is projected to become one of the top 10 producers of oil in the world
- IEA's estimate of total proven oil and gas reserves are around 18 billion boe, while current estimates for the Libra field alone are 8-12 billion barrels of oil
  - Other estimates put pre-salt reserves at around 60 billion barrels, comparable to the North Sea
- As of August 2013 oil production from pre-salt fields was just over 300,000 barrels per day, an increase of 40,000 barrels per day from January 2013

Source: EIA, IEA World Energy Outlook

Brazilian Pre-Salt Drilling Activity



Source: Economist Print Edition (online), Brazil's oil boom, Nov 5th 2011



Source: Economist Print Edition (online), Cheap at the Price, Oct 26th 2013

Challenges of Brazilian Pre-Salt Development

- Deepwater drilling
  - The progress of deepwater drilling and other sub-sea technologies will directly affect the success of pre-salt development.
  - Deepwater drilling in the pre-salt fields requires new floating drilling platforms, new floating production storage and offloading units (FPSOs), underwater vehicles, highly specialized equipment that can withstand the corrosion of the thick salt layers, and a slew of other materials that must be produced and potentially modified to overcome unforeseen challenges.
    - Petrobras is in the middle of a 5-year $237 billion divestiture plan in order to allocate capital to pre-salt development.
- Regulatory framework (production-sharing system)
  - Under the production-sharing agreements Petrobras is required by law to hold a minimum 30% stake in every pre-salt project and act as the sole operator.
    - Brazil runs the risk of spreading its resources too thin, and slowing the rate of development.
  - Each company part of the winning consortium pays its share of a "signing bonus" plus a percentage of profit once production begins.
    - The terms of the production-sharing contracts provide little incentive for companies to invest – only 11 out of the expected 40 companies placed bids for the most recent licensing round (2013).
      - Private investment from major oil companies is crucial for developing pre-salt fields to full potential.

Challenges of Brazilian Pre-Salt Development

- Local Content Requirement
  - In an effort to strengthen the national economy, Brazil implemented a local content policy. The new infrastructure needed to drive growth in pre-salt production will be greatly influenced by Brazil's ability to produce new equipment and provide proper services.
  - The influx of business from the oil and gas sector will put considerable strain on the supply chain. Any short comings in production capacity and human capital management have the potential to cause delays in the development of pre-salt fields.
    - The local content requirement also diminishes the purchasing power for operators and service providers, likely driving up production costs.
- Oil Royalties
  - The law that designates the distribution of revenues from oil royalties to Brazilian states and municipalities has been overturned. Non-producing states will now receive a larger portion of revenues from existing production. Producing states stand to lose billions of dollars in revenue in the near term.
    - This should not affect the upstream, unless the producing states "exercise their own tax-raising powers to make-up any shortfalls." If this does happen, it could change the economics of future projects.

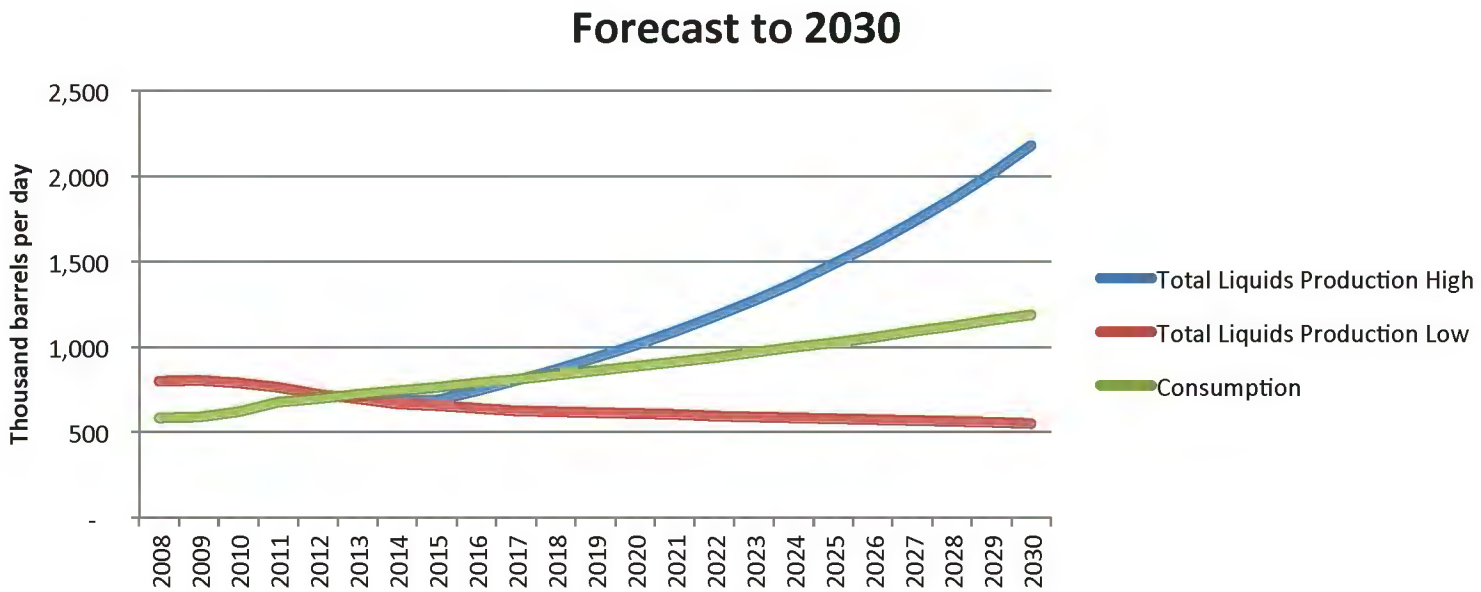
Downstream

- Because of the growth in domestic demand, refineries are currently running at full capacity
  - Brazil has a relatively simple refining sector, and therefore exports some of its heavy crude oil and imports light crude oil. Depending on production from pre-salt fields, Brazil will be able to cut down imports of light oil given the pre-salt fields will produce light sweet crude oil
- Petrobras plans to add over 3.2 mm b/d of refining capacity by 2020 to satisfy domestic markets
  - Petrobras is planning on building 5 new refineries. One of those refineries was originally planned to be a joint venture with Petroleos de Venezuela (PDVSA), but due to a lack of financial capability Petrobras took full control of the project. Construction was put on delay, and is currently 82% completed. Completion is scheduled for May 2015
- Brazil's plans to build more refineries are most likely driven by political desire
  - Brazil has been dependent on refined products from the Gulf Coast. New refineries will allow Brazil to produce more value-added products, even though there is not a need for more global refining capacity

Argentina

Argentina

- Energy demand in Argentina continues to outpace production
  - Argentina is projected to become a net-importer of oil through 2020
- New shale discoveries have the potential to reverse declining production



Vaca Muerta

- Vaca Muera is estimated to hold 16.2 billion barrels of shale oil resources and 308 Tcf of shale gas
- "Vaca Muerta is thicker and has more reservoir pressure than the south Texas Eagle Ford, making it among the world's greatest tight oil plays for production potential"
- YPF and Chevron engaged in a joint venture in July of 2013 to develop shale oil and gas in Vaca Meurta
  - Chevron has committed $1.5B for the first phase. The goal is to drill over 100 wells through 2014.
  - Phase two would require an addition $16B of investment to drill 1,500 wells and produce 50,000 barrels per day of crude oil by 2017
- Investment commitments will need to increase significantly to replicate the U.S. shale boom.
  - YPF has a $37B program to increase oil and gas production 32% by 2017
  - Estimates on the amount of capital needed to develop Vaca Muerta range from $30B to $300B

Source: Platts, Argentina readies for shale boom, Jan 8th, 2014

Vaca Muerta

Regulatory Reform

- In July 2013, Argentina announced a change in the tax structure for oil exports
- Companies are now allowed to export 20% of oil and gas produced tax free, as long as they invest $1B over the next 5 years
  - If there is a shortage in the domestic markets, companies must provide sufficient supplies of oil and gas to the local market before exporting
- Argentina has raised the export price of oil from $42 to $70
- Developers no longer have to repatriate foreign earnings

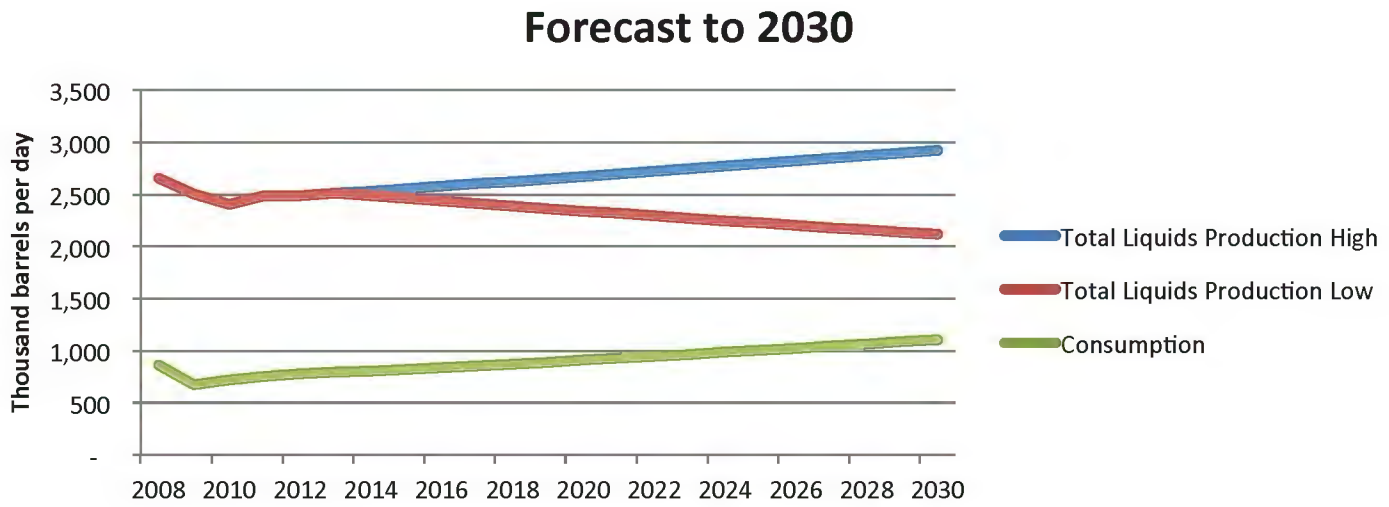
Challenges

- The current regulatory reforms do not confirm there has been a radical shift away from the anti-business climate that have been in place for so long
  - "A lot of the investment in Vaca Muerta is driven by expectations that a new government will take power in 2015 that will improve the investment climate"
  - Between the recent nationalization of YPF, historical financial troubles, and inflation, Argentina is still a risky place to invest
- Labor disruptions are common due to the uncertainty in the oil and gas sector
  - Separate labor disputes in 2010 and 2011 caused a production loss of 100,000 barrels per day
  - Most recently, in 2012, production at Argentina's largest oil field, Cerro Dragon, was interrupted after 500 workers took over Pan American Energy's facilities

Source: Platts, Argentina readies for shale boom, Jan 8th, 2014

Venezuela

- Venezuela's net-exports of oil were 1.7 mm b/d in 2012
  - The US imported 960,000 barrels per day of Venezuelan oil in 2012 – slightly below oil imports from Mexico
- Net-exports have declined since 2000 due to a 39% increase in domestic consumption and declining production



Venezuela

Downward Trend

- Despite 211 billion barrels of proven oil reserves, the second most in the world, Venezuelan oil production has declined since 2000
- IEA reports "PDVSA must spend some $3 billion each year just to maintain production levels at existing fields, given decline rates of at least 23 percent"
  - Declining production is a direct result of PDVSA's inability to provide steady investment into mature fields
- Venezuela's economic struggles puts more pressure on PDVSA
  - Oil accounts for 95% of total exports and provides 45% of the state's budget
  - PDVSA's financial commitments with the Venezuelan government makes it extremely difficult to invest into new production
    - PDVSA could only invest a third of its capital investment budget in 2013
    - "PDVSA sold an estimated $47 billion to the central bank in 2013"
      - Venezuela depends on PDVSA to fund its social programs

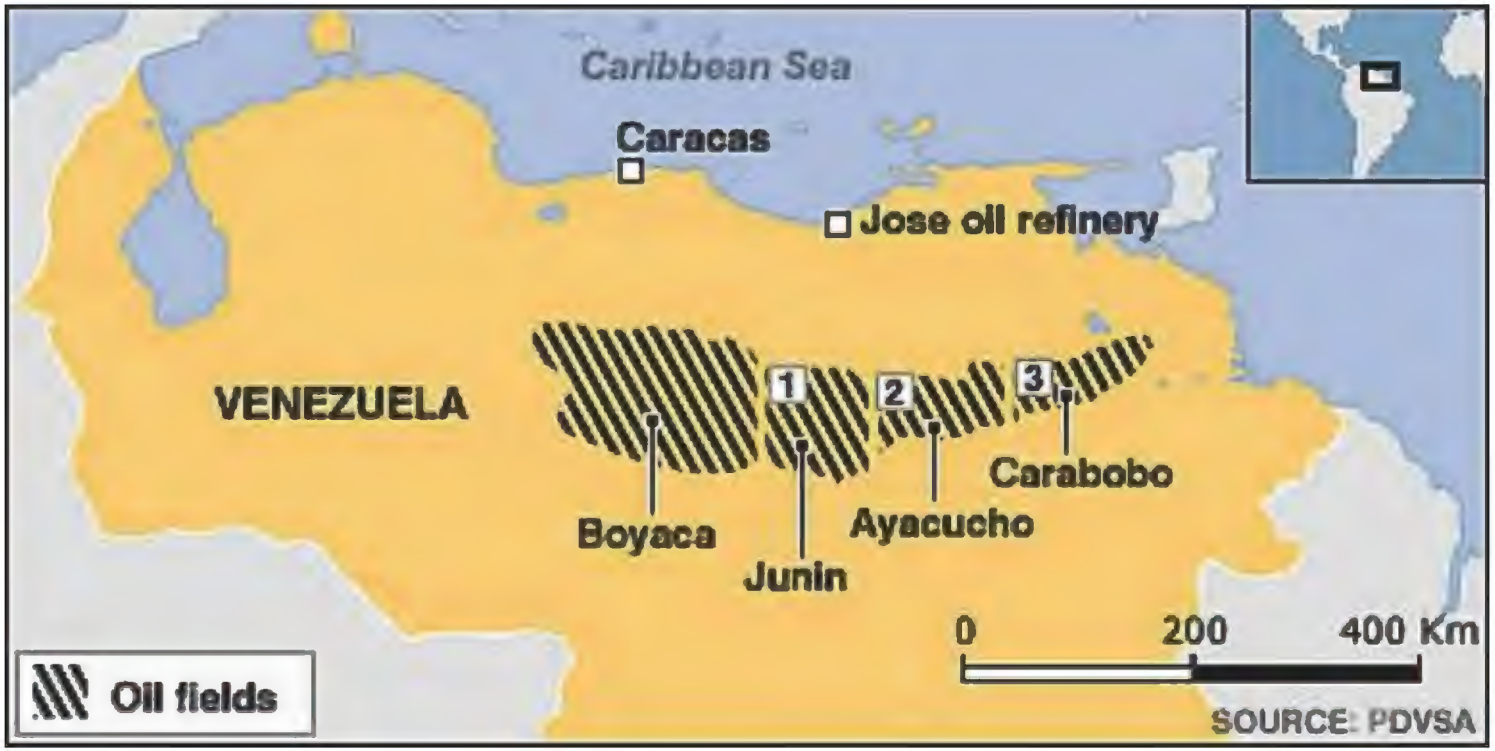
Source: Bloomberg News (online), Venezuela Output Declines in December as Funds Slow to Arrive, Jan 2nd 2014;
The New York Times (online), Dwindling Production Has Led to Lesser Role for Venezuela as Major Oil Power, Mar 8th, 2013

Orinoco Belt

- The average estimate of recoverable oil reserves from the Orinoco Belt is 513 billion barrels of oil
- The crude oil from the Orinoco Belt is extra-heavy
  - The extra-heavy crude must be treated so it can then be transported and sent to traditional refineries
    - Currently, Venezuela is producing more extra-heavy crude than it can upgrade. Upgrading capacity is at 500,000. Alternatively, Venezuela's refineries are not capable of producing sufficient amounts of naphtha, which is used as a diluent. A lack of investment has hindered the ability to expand upgrading capacity and naphtha production
- PDVSA is part of 7 different joint ventures in the Orinoco Belt
  - Venezuela has plans to develop the Orinoco Belt further with at least three more joint ventures in the next several years
  - The new projects will require an estimated $108 billion in investment

Orinoco Belt

- The Orinoco Belt is divided into four development areas that are further broken down into 28 blocks



Source: EIA

Challenges

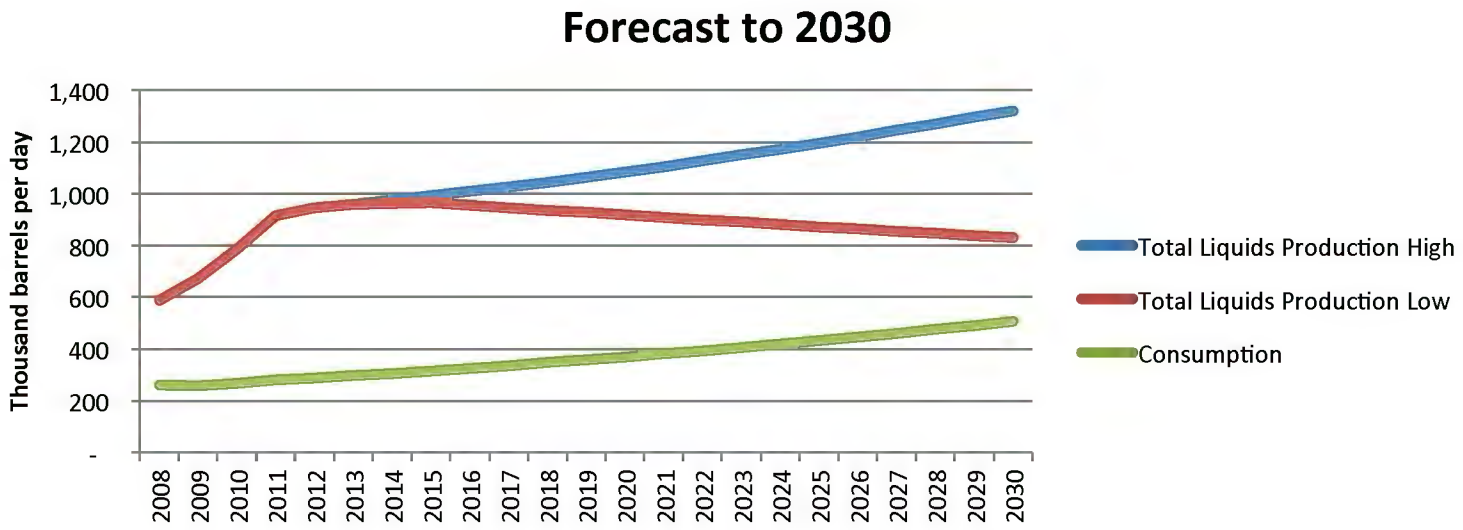
- Financial woes
  - Venezuela's dependency on PDVSA's revenues does not allow for proper allocation of capital towards new production in mature fields or new projects in the Orinoco Belt
    - Venezuela often borrows money for non-operational purposes. In a recent bond sale, PDVSA issued $4.5B in bonds - $1.5B of that went to the central bank. In 2012 PDVSA's debts to service companies amounted to $16.8B
    - The biggest source of financing has come from China. In 2012, debt to China reached $32B, or 40% of total debt. Venezuela engaged in a oil-to-loan program with China to secure financing. In 2012 Venezuela was sending as much as 430,000 barrels per day of oil to China to cover its debts.
- Business Climate
  - The nationalization of the oil sector in 2007 required PDVSA to take a 60% stake in all oil projects. This has done little to attracted business. ConocoPhillips and ExxonMobil pulled out of two separate projects in the Orinoco Belt, specifically because of the new policy. Venezuela expects production from the Orinoco Belt to reach 2,000,000 by 2020. Venezuela must provide more incentive for companies to do business with PDVSA, or else these projects will not be developed.

Source: Reuters(online), Venezuela expands China oil-for-loan program to $8 billion, May 22nd 2012;

Colombia

Colombia

- Oil production was 969,000 barrels per day in 2012, up 61% since 2008
- Recent regulatory changes and increased investments into Colombia's oil industry provides a promising outlook for oil production
  - In 2012, the US accounted for half of Colombia oil exports



Source: EIA, IEA World Energy Outlook

Production Growth

- Energy sector reform in the early 2000's allowed for a more competitive energy industry and triggered new exploration and development
  - A new regulatory body was created to handle administrative and regulatory function; a task that used to belong to Ecopetrol
  - Foreign oil companies were allowed to own a 100% stake in new ventures and compete directly with Ecopetrol
- Colombia reversed a trend of declining production in 2008 due to new discoveries and a better investment climate
  - The oil sector accounted for $5.39B of foreign direct investment, or 34% of total FDI in 2012
- Colombia has an estimated 2.38 billion barrels of reserves in 2012
  - Ecopetrol and Canadian company Talisman Energy just announced a discovery of 1.3 billion barrels of oil in December of 2013

Sustaining Production

- Colombia's government has set target levels of production at over 1 mm b/d in the near future
- Colombia needs more exploration and discovery
  - 80% of proven reserves and 70% of production are in the Llanos Basin
- Production from the Rubiales heavy oil field, the largest producing field in Colombia, is projected to decline to 80,000 b/d by 2018 from current levels of around 200,000 b/d
  - The decline of the Rubiales field is due to water cuts (water injection is a widely used practice in Colombia)
  - Despite declining production from the Rubiales field, Colombia is expecting growth from other producing fields to sustain production levels
- Shale
  - There is a lot of interest, but little drilling activity in Colombia shale right now
  - "Colombia's government has reduced royalty fees on unconventional drilling, and to facilitate oil field services imports the country has signed a number of free trade agreements including one with the US that came into force in May 2012"
  - The commercial and geological factors still aren't favorable enough to extract wide scale development

Source: IEA Medium Term Oil Market Report 2013

Challenges

- "The lack of crude transport capacity has the potential to delay investment and keep production below 1 mm b/d"
  - Current pipeline capacity does not meet the needs of regional production
    - 27% of oil from the Rubiales field is shipped by truck
  - Expansions are on the way, but substantial capacity will not be added until 2016
- Security risks
  - Violence involving the Revolutionary Armed Forces of Colombia (FARC) and the National Liberation Army continues
    - Rebels attacked Colombian pipelines 151 times in 2012 – up 80% from 2011
    - Kidnappings are still occurring. Although down significantly from the turbulent times of the early 2000's when kidnappings averaged 10 per day, 21 oil field workers were kidnapped in 2012

Source: IEA Medium Term Oil Market Report 2013

North America – Background and Analysis

Overview

The upside potential in the U.S., Canada, Mexico, and South America is indeed substantial; however, there exists many risks to this production, especially in South America.

The promise for decades of strong production in both the U.S. and Canada is clear and will likely take place. However, risks to rising production volumes include substantial regulatory uncertainty on Canadian crude oil exports to the U.S. and abroad, the high cost of production for both the U.S. and Canada coupled with regional discounts, the increasing scrutiny facing crude by rail shipments, and the promise as well as the uncertainty of U.S. crude exports.

In light of Mexican reforms, Mexico may in fact curb the existing declines in oil production, but great uncertainty rests in the ability to increase production further which would likely require reducing tax burdens and increasing foreign investment.

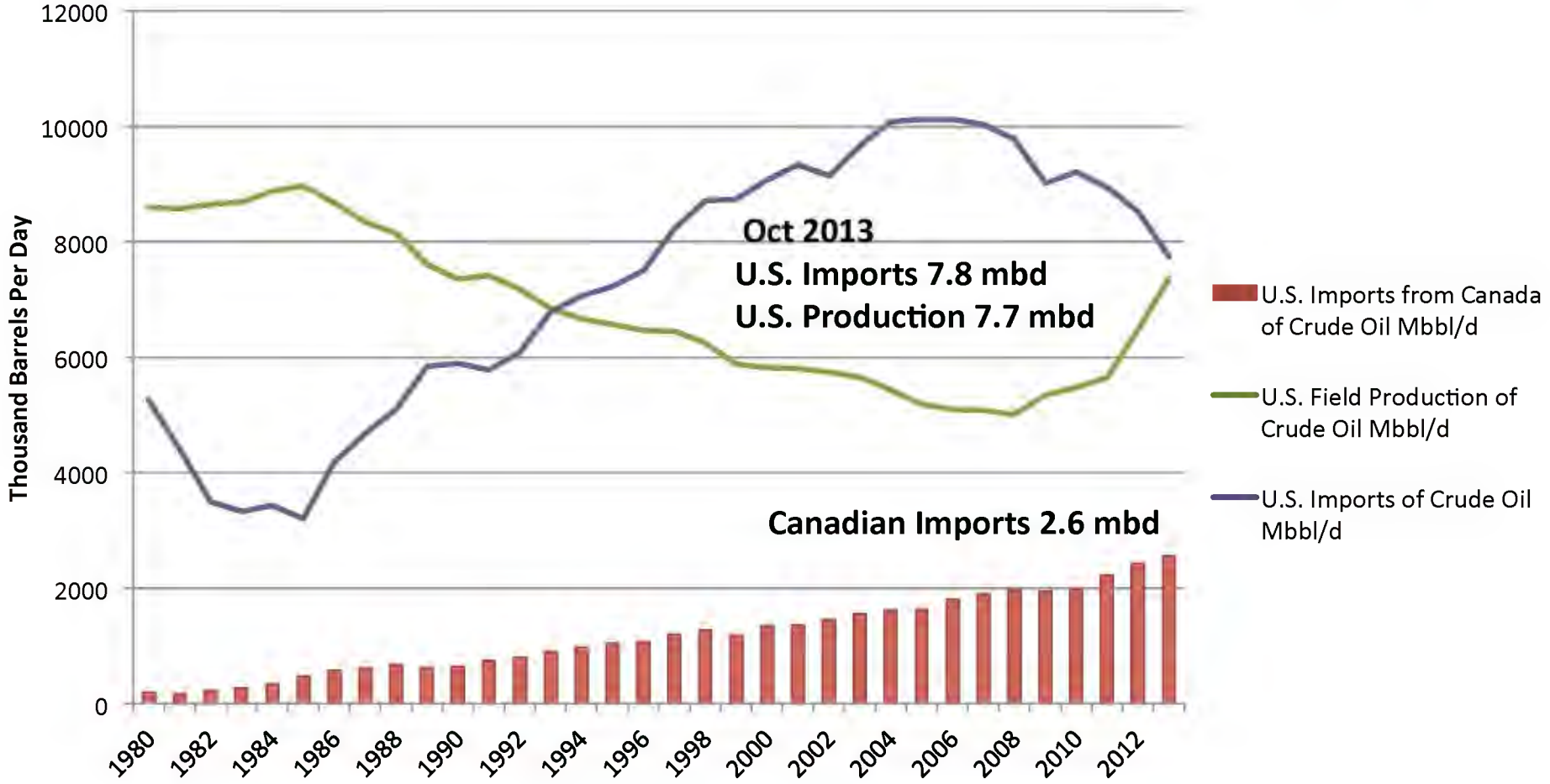
Current and Potential U.S. Import Portfolio by Volume, Nation, and Crude Quality

Top Importers	Countries	Type of Crude	Jan-Oct 2013 Imports (Thousand Barrels Per Day)	2000 Imports (Thousand Barrels Per Day)
1	Canada	Heavy Sour/Medium Sweet	2554	1348
2	Saudi Arabia	Medium Sour/Light Sour	1281	1523
3	Mexico	Heavy Sour/Medium Sour	826	1313
4	Venezuela	Heavy Sour/Medium Sour	749	1223
5	Iraq	Medium Sour	359	620
6	Colombia	Heavy Medium Sour/ Heavy Sour	388	318
7	Nigeria	Light Sweet/Medium Sweet	274	875
8	Kuwait	Medium Sour	316	263
9	Angola	Medium Sweet/Light Sweet/Heavy Medium Sour	220	295
10	Brazil	Heavy Medium Sour/Medium Medium Sour	110	5

Countries	Potential 2020 Import Scenario with Flat Consumption Growth*
Canada	3500
Saudi Arabia	600
Mexico	300
Venezuela	300
Iraq	100
Colombia	100
Nigeria	0
Kuwait	100
Angola	0
Brazil	0

Source: 2000 Imports EIA, Crude quality ENI World Oil and Gas Review, *Import scenario with flat consumption growth, no crude oil exports, continual Canadian imports via rail or via pipeline, and 10 mbd US production – assumes 15 mbd consumption

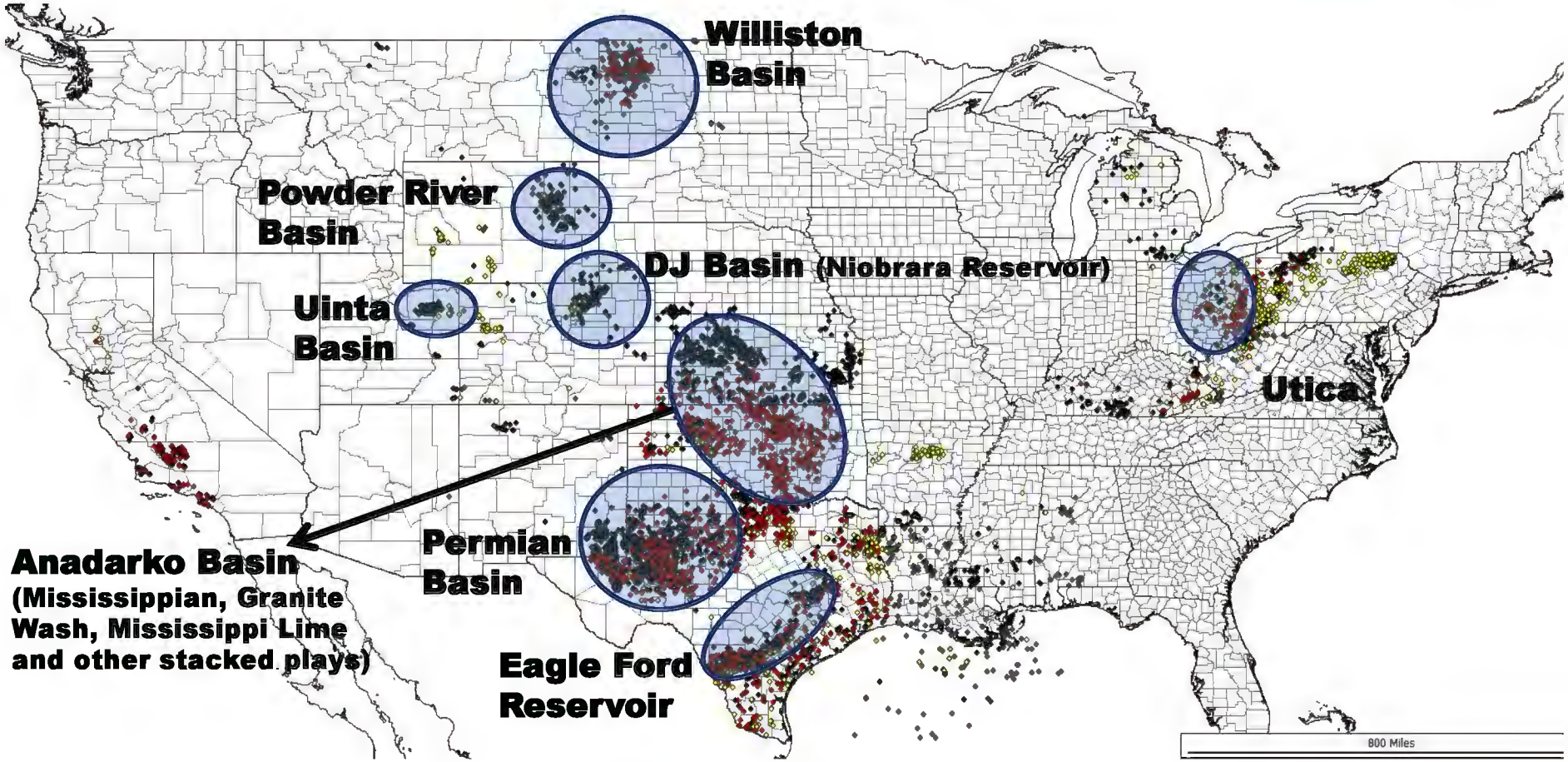
U.S. Total Imports, U.S. Production, U.S. Canadian Imports



Source: EIA

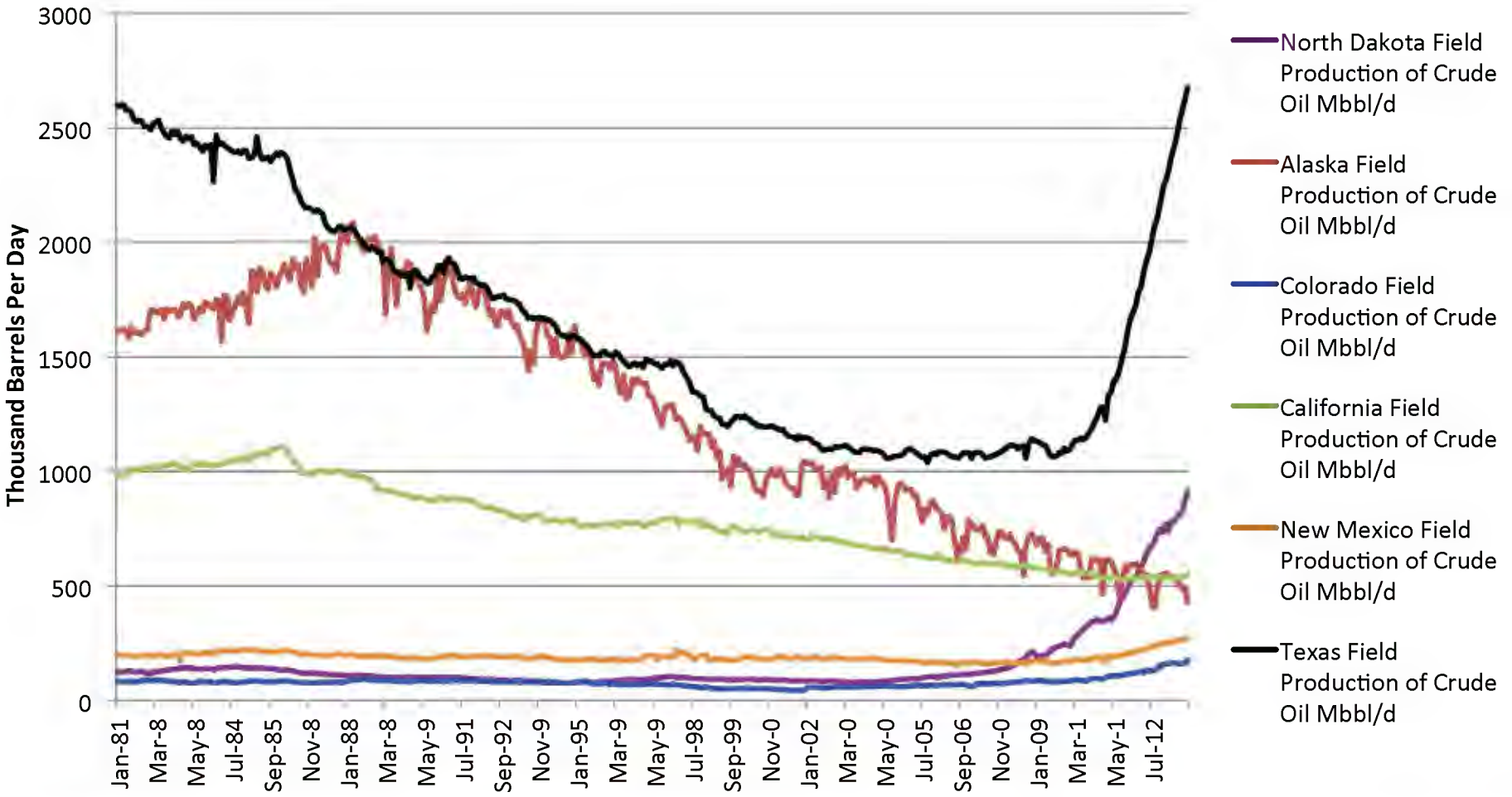
U.S. Activity

Permit Activity



Source: HPDI January 18 2014, Past 90 Days

State Production Trends

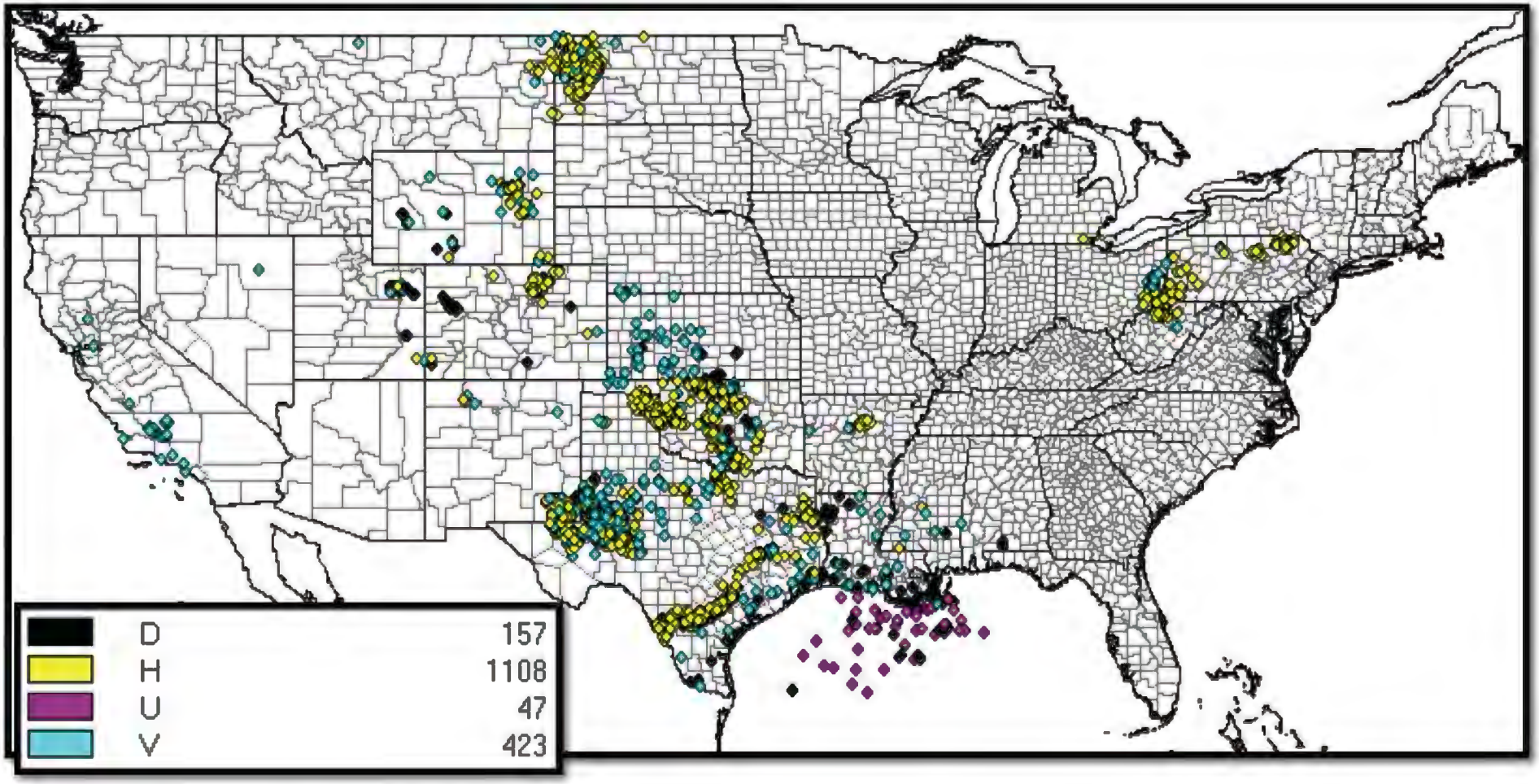


Source: EIA

U.S. Rig Count

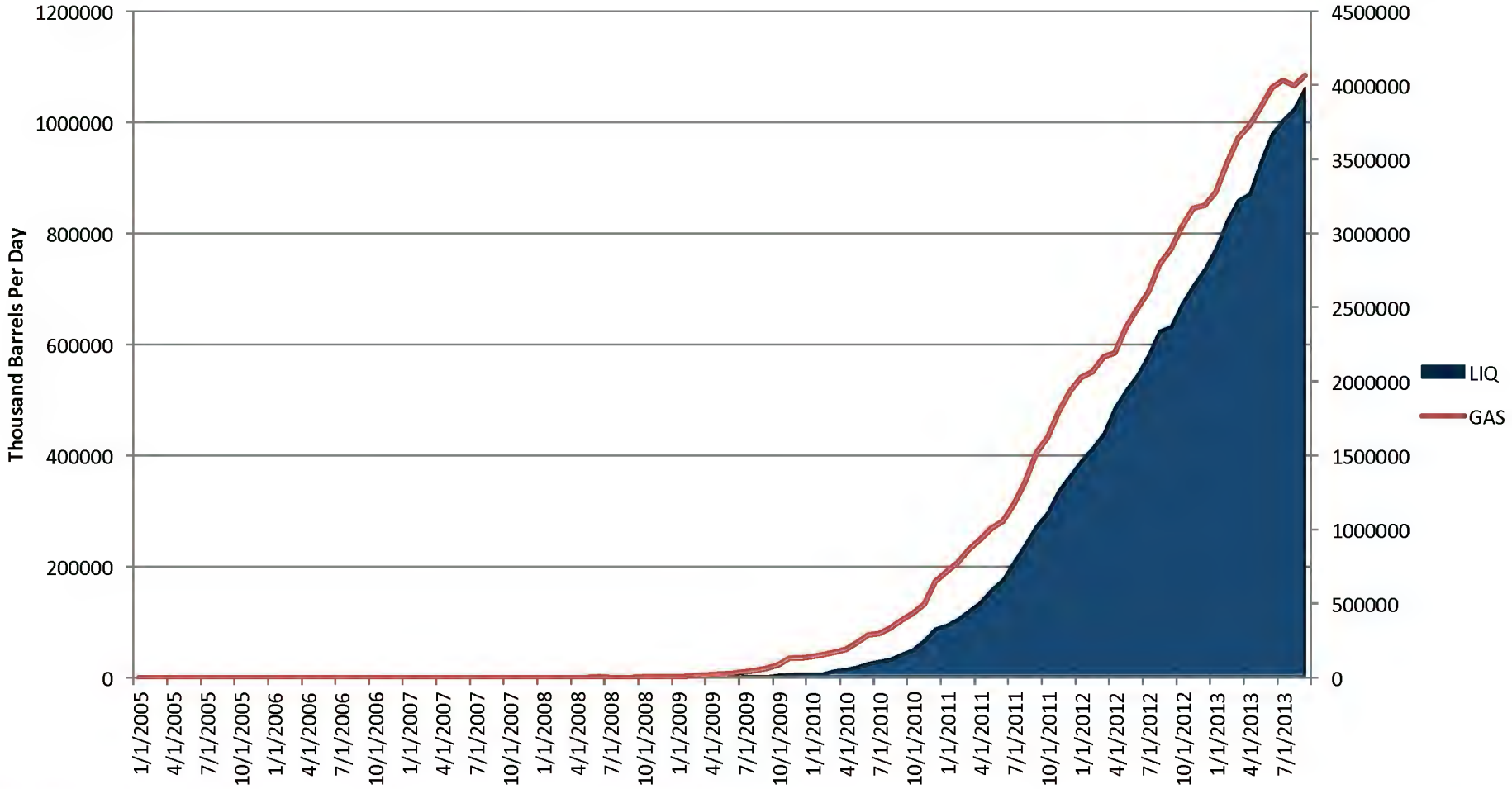
Source: Baker Hughes

U.S. Rig Activity by Drill Type



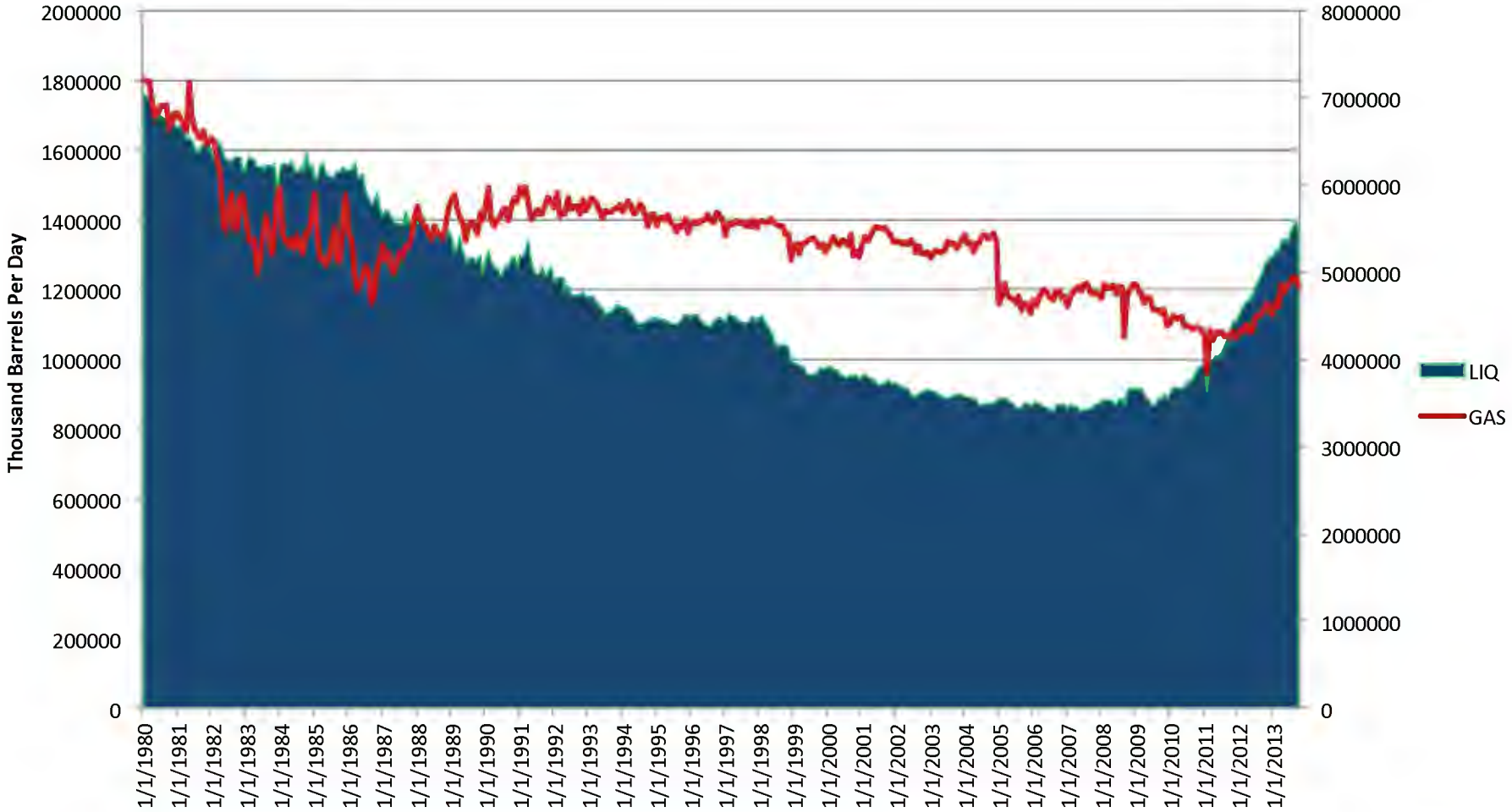
Source: HPDI Jan 18 2013 – Not 100% Complete

Eagle Ford Production



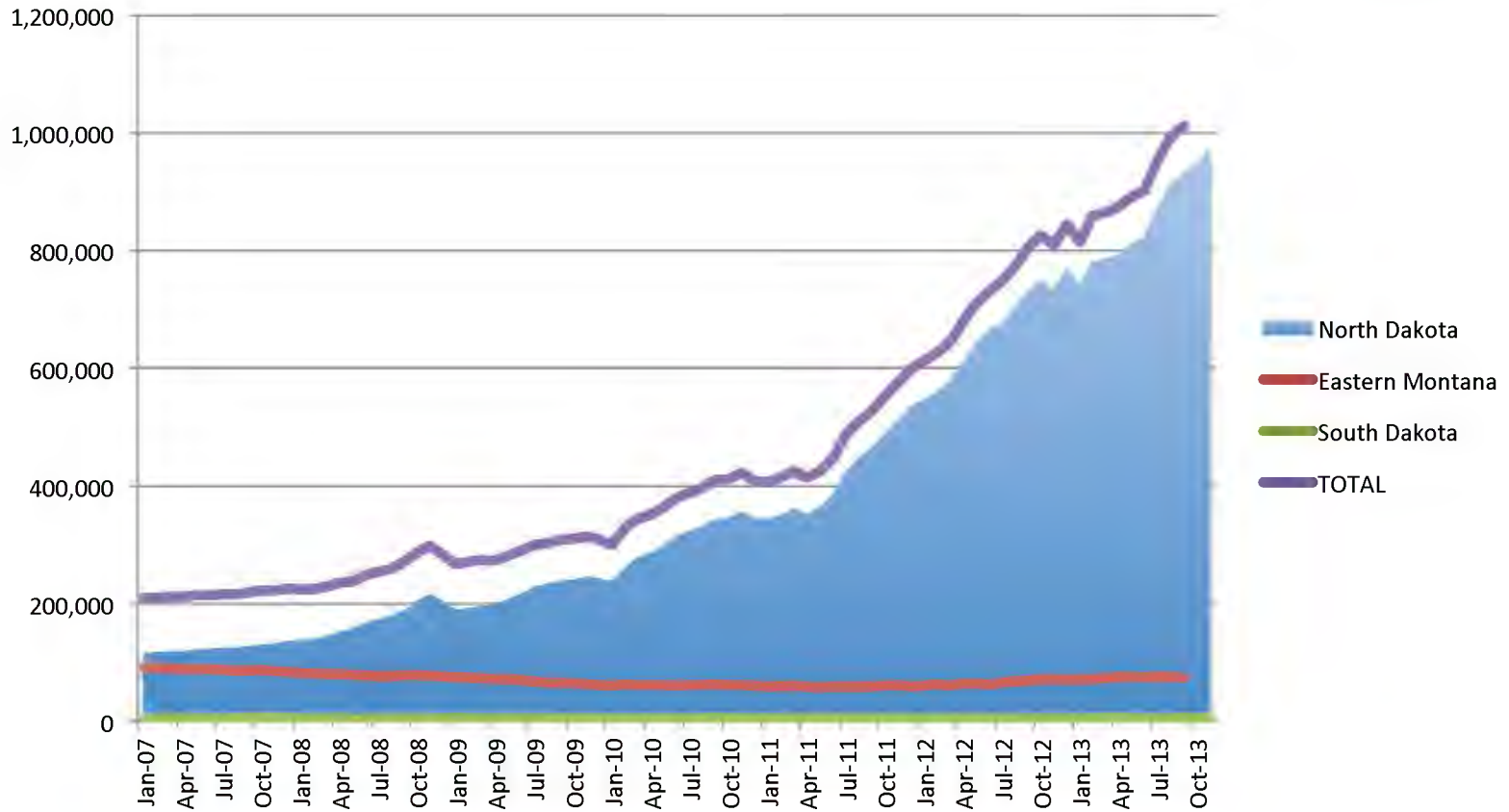
Source: HPDI Nov 2013

Permian Basin Production 1.38 mbd



Source: HPDI Oct 2013

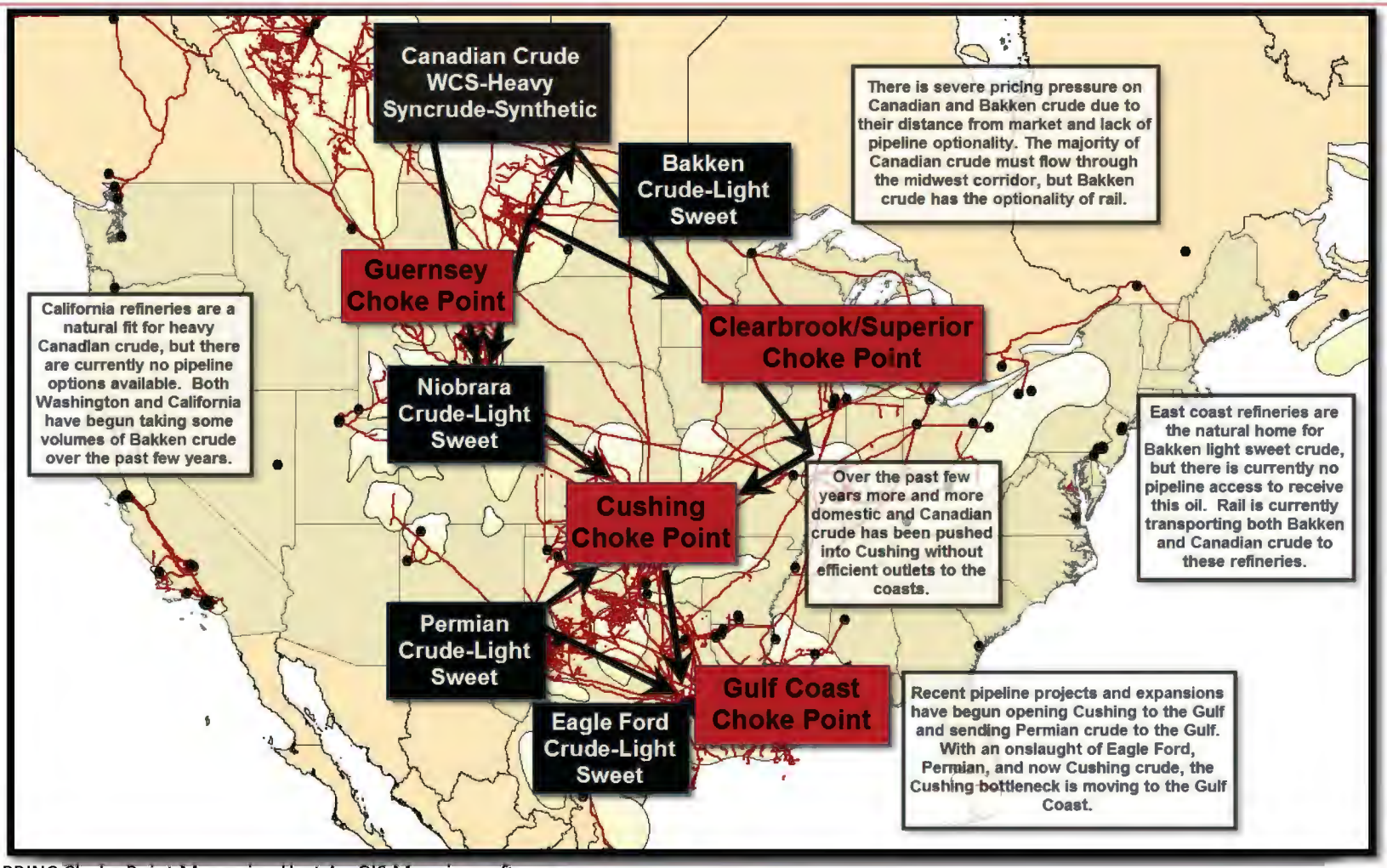
Williston Basin Production



Source: NDIC

Infrastructure Challenges

Pipeline Choke Points



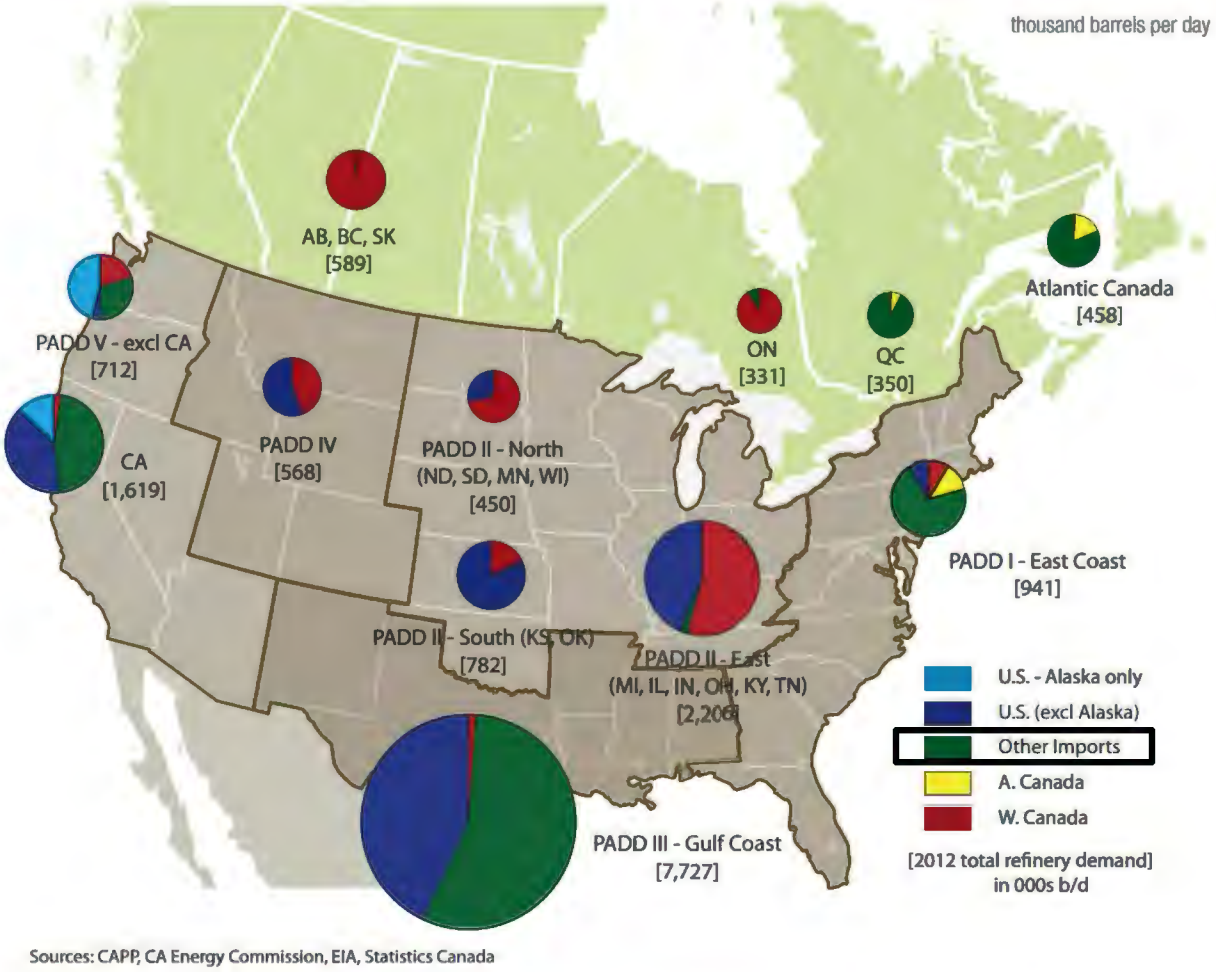
Source: EPRINC Choke Point Map using Hart ArcGIS Mapping software

All Canadian Pipeline Export Options are Full

- **Kinder Morgan's** Transmountain line off BC coast - currently 300,000 b/d capacity-recent announcements to expand up to 800,000 b/d (early 2017)
- **(Now Spectra)** Platte line to Wood River 280,000 b/d-full
- **Enbridge** mainline system currently transporting over 1.5 mbd with potential capacity around 2.5 mbd—Northern Gateway off BC coast planned 525,000 b/d, several other planned expansions, light oil access +400,000 b/d
- **TransCanada's** Keystone 581,000 b/d-full—XL would add 700,000 b/d, Energy East Pipeline Project 500 to 800k

Source: Canadian Energy Pipeline Association

Market Saturation

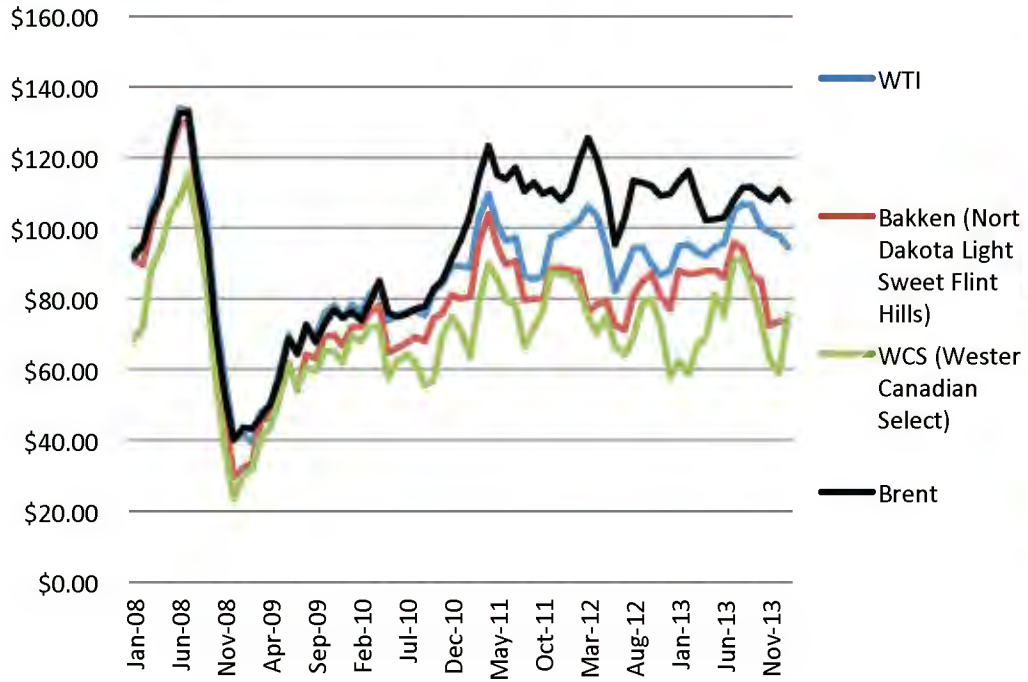


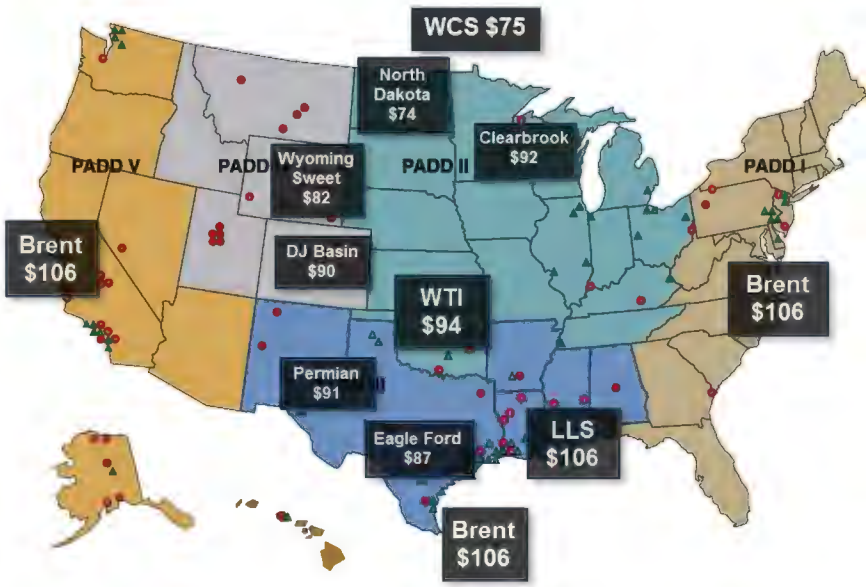
Source: CAPP Crude Oil Forecast June 2013

Risks from Limited Export Options

- Due to the reasonably high costs of oil sands production and the severe discounts Canada has seen over the past two years, the sustainability of long-term Canadian production depends on the ability of the U.S. and foreign purchasers to be able to buy and consume Canadian crude
- Currently all Canadian export options are at capacity and while there exists several options to increase exports in the future, of the four proposed projects, none have been fully approved.
  - Northern Gateway continues to face considerable scrutiny amongst First Nations tribes who do not wish to increase crude tanker traffic along the coast
    - 525,000 b/d, likely heavy crude which would be sent to Asia
  - TransMountain's expansion to its existing line may well be approved because it holds the existing right of way; however, exports will have the same opposition as Northern Gateway
    - 800,000 b/d likely heavy crude to Asia
  - Energy East has yet to be approved, but holds the promise to significantly reduce light and medium crude imports into eastern Canada and potentially provide an outlet for future crude oil exports.
    - 500,000 to 800,000 b/d of light and medium grade crude to eastern Canadian refineries
  - Keystone XL still lacks a timeline for approval by the U.S. government. While many expansions by Enbridge will help to bring additional volumes of heavy oil to the Gulf, significant rail volumes will be needed to help supplant the volumes that Keystone XL would have provided to the Gulf Coast.
    - 800,000 b/d of heavy crude oil to the Gulf Coast

Regional Pricing Disparities



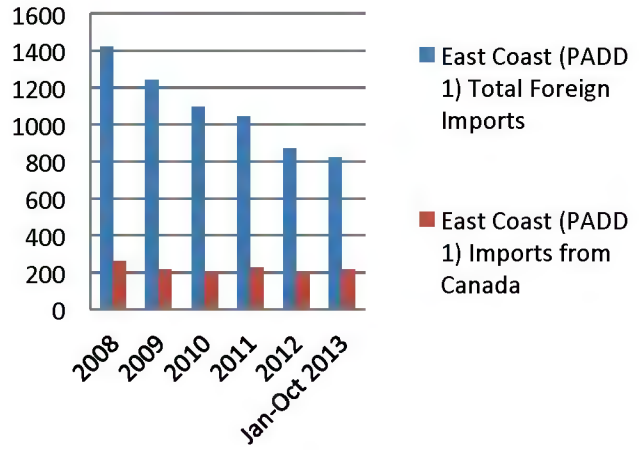


- **Western Canadian Select -$18.50 to WTI**

Source: Flint Hills, EIA, CME Group, and estimates

Canadian vs. Total Foreign Imports by PADD

PADD I



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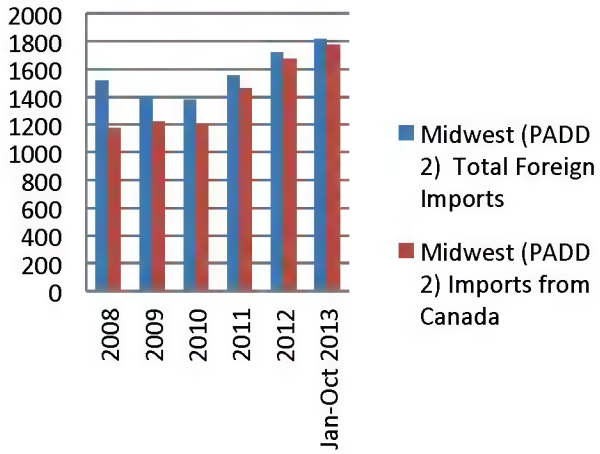

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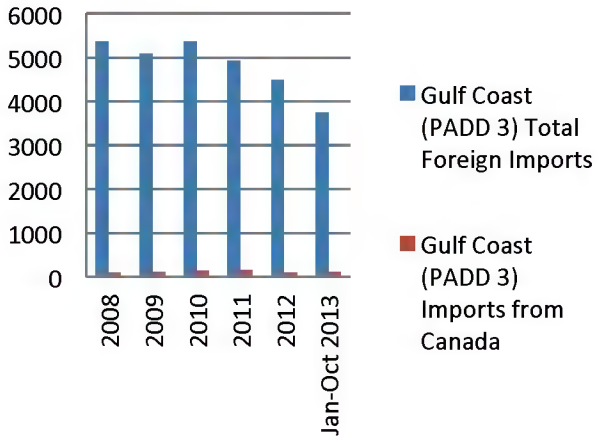

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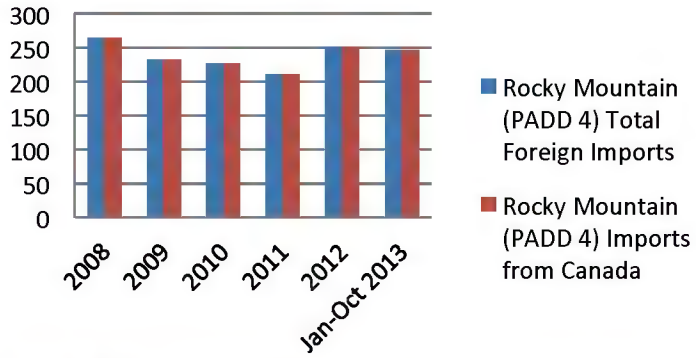

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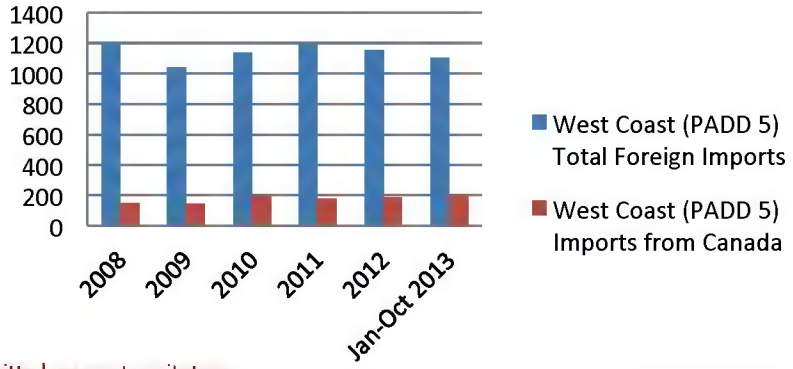
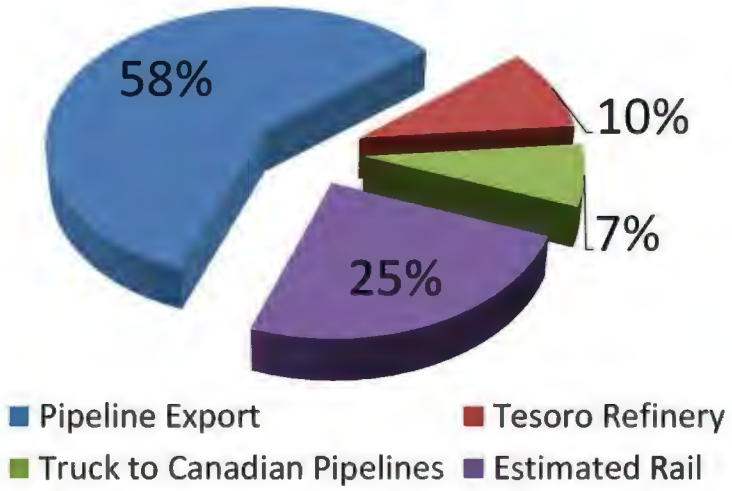


Source: EIA Data

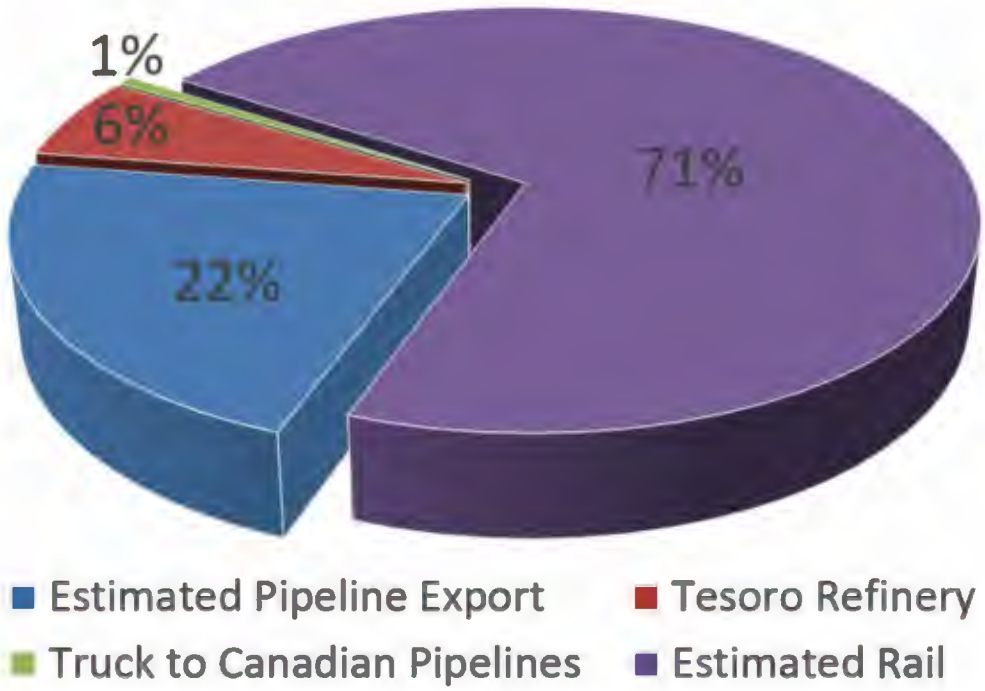
The Rise of Rail

North Dakota Crude Oil Transport

January 2012 Estimates



November 2013 Estimates



Source: North Dakota Pipeline Authority

Daily Crude by Rail Shipment in U.S. and Canada

Source: AAR; Crude and petroleum product includes liquefied gases, asphalt, fuel oil, lubricating oil, jet fuel, etc. U.S. operations exclude U.S. operations of CN and CP. Canadian operations include CN and CP and their U.S. operations. One carload holds 30,000 gallons (or 714.3 barrels).

Crude by Rail Accidents

- July 6, 2013, a run-away train crashed and exploded in Lac-Mégantic, Quebec, killing 47 people and destroying parts of the town
- November 8, 2013, about 12 cars derailed in a unit train of 90 cars carrying crude oil near Aliceville, Alabama (45 miles SW Tuscaloosa). Nobody was injured, but three of the cars exploded.
- December 30, 2013, a train hauling grain derailed near Casselton,(SE) ND hitting a 106 car unit train of crude oil which caused 18 crude tank cars to derail causing a massive explosion and fireball
- January 7, 2014, a Canadian National train jumped tracks in Plaster Rock, New Brunswick. 15 cars derailed and caught fire. The train was carrying propane and crude oil from Western Canada
- January 20, 2014, a CSX train derailed in Pennsylvania on a railroad bridge and close a busy expressway (Schuylkill), but did not leak any crude oil.

LAC MAGENTIC: AP PHOTO/THE CANADIAN PRESS, PAUL CHIASSON

http://usnews.nbcnews.com/_news/2013/12/30/22113442-mile-long-train-carrying-crude-oil-derails-explodes-in-north-dakota?lite

Future Crude by Rail Regulations

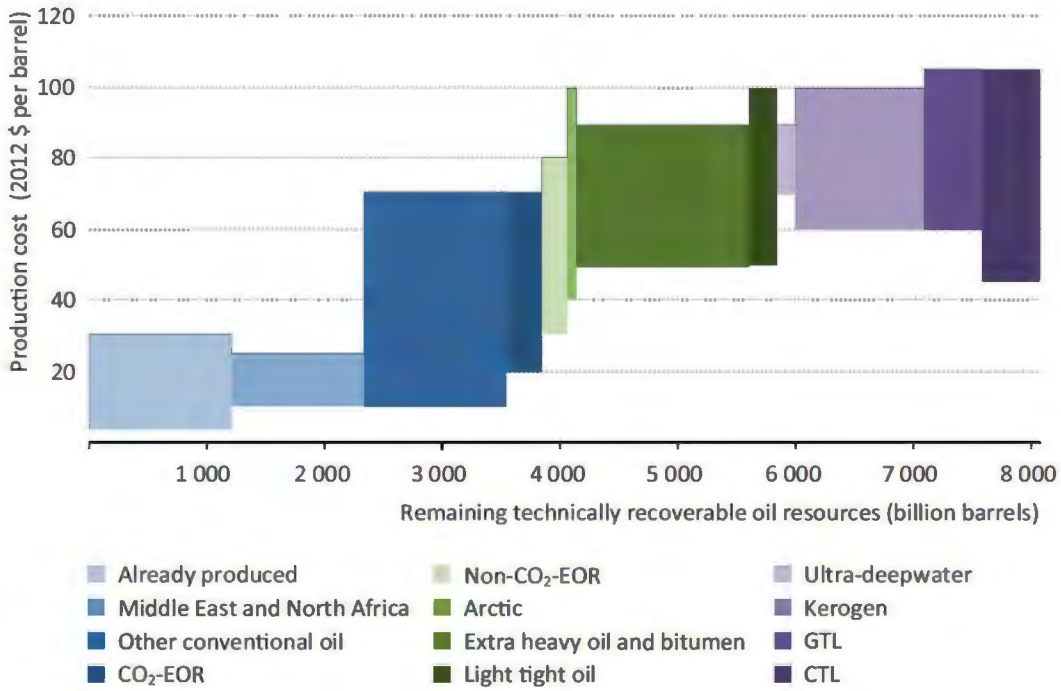
Several recent crude by rail accidents have put a spotlight on the safety of crude by rail movements and the volumes moving each day. Regulators have instituted immediate safety measures in the U.S. and Canada with regards to manned trains, parking and brakes, etc. However, the question of what is causing these rail cars to explode has called into question the composition and understanding of Bakken crude oil. Two significant regulatory questions, which could impact Bakken crude oil development, are taking place: 1) determining if Bakken crude oil is more volatile than other types of crude oil and whether or not it is safe to ship via rail 2) the quality of the current tank cars moving Bakken crude oil

The standard for newly manufactured tank cars, DOT 111A, has already been adopted and increases the strength of the car, the amount of release valves, and the walls and bumpers at the end of each car. However, 75,000 tank cars moving crude oil today do not qualify for DOT 111A standards. Regulators could require the retirement of these cars or the retrofitting of these cars which is estimated to cost roughly $20,000 plus per car. Unfortunately, the ability to manufacture new cars is not quick enough to supplant the amount of existing tank cars moving crude oil. And it is estimated that the industry does not have the capability to retrofit every car in a timely manner.

Risks due to High Cost of Production

While there exists significant upside to oil production in the Americas, these oil supplies, particularly U.S. tight oil, Canadian oil sands, and Brazil's presalt are costly to produce and companies and governments must be able to manage the cost of production in order to for production to continually rise or in the case of Brazil, take off.

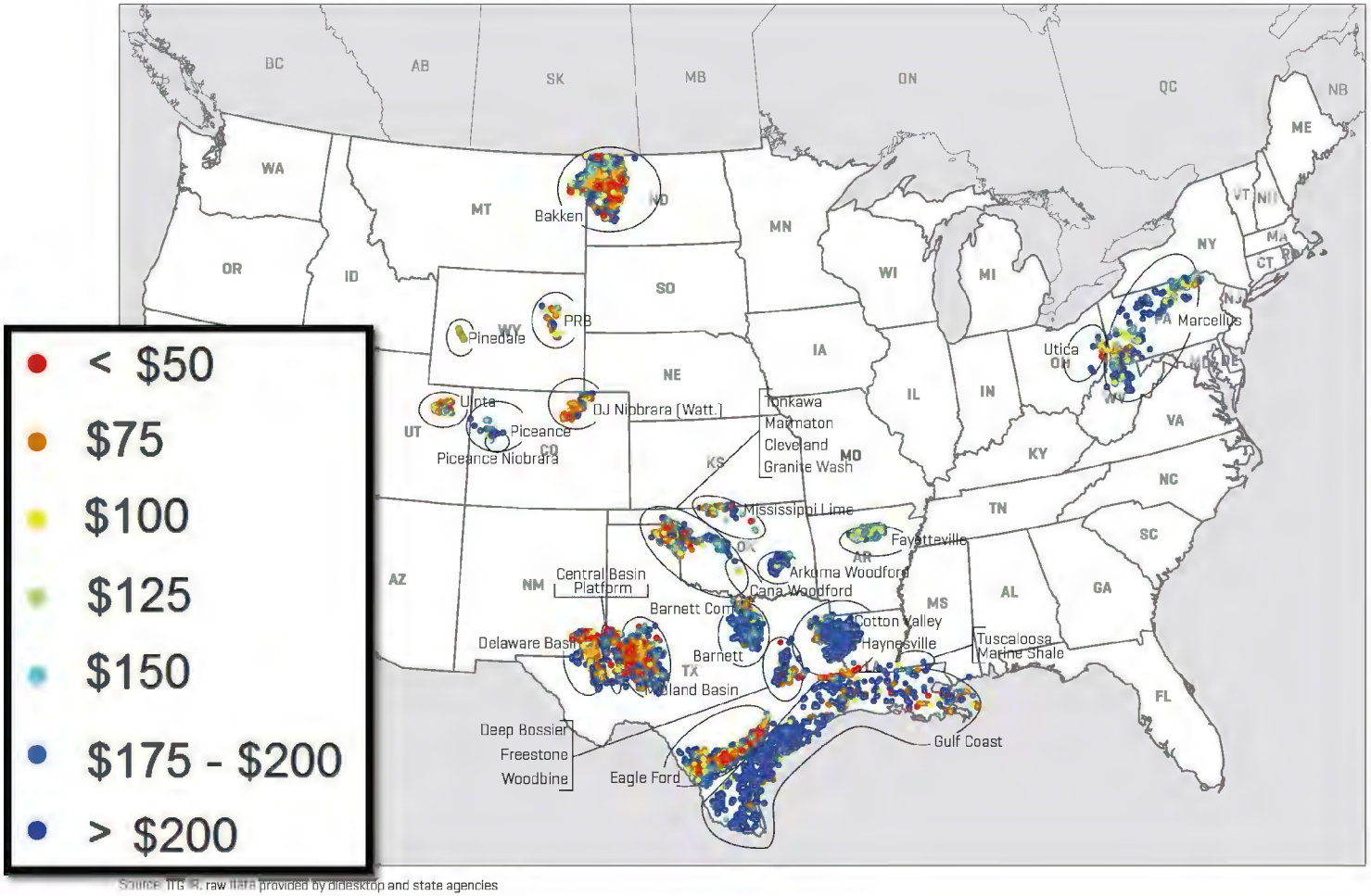
Figure 13.17 ▷ Supply costs of liquid fuels



Source: *Resources to Reserves* (IEA, 2013).

Source: World Energy Outlook, © OECD/IEA, 2013

Shale Oil Play Break Even Costs



Source: ITG IR, raw data provided by drilldesktop and state agencies

Source: ITG Investment Presentation Nov 2012

Cost of Oil Sands Production

Estimated Initial Capital Expenditure (CAPEX) and Threshold[(a)] Prices for New Oil Sands Projects

	CAPEX ($Cdn / bbl of capacity, Cdn$2010)	**Economic Threshold** (WTI US$ equivalent / bbl, US$2010)
Mining, Extraction and Upgrading	$85,000-$105,000	$85-$95
Mining and Extraction Only (No upgrading)	$60,000-$75,000	$65-$75
Steam-assisted Gravity Drainage (SAGD)/Cyclic Steam Stimulation (CSS)	$25,000-$40,000	$50-$60

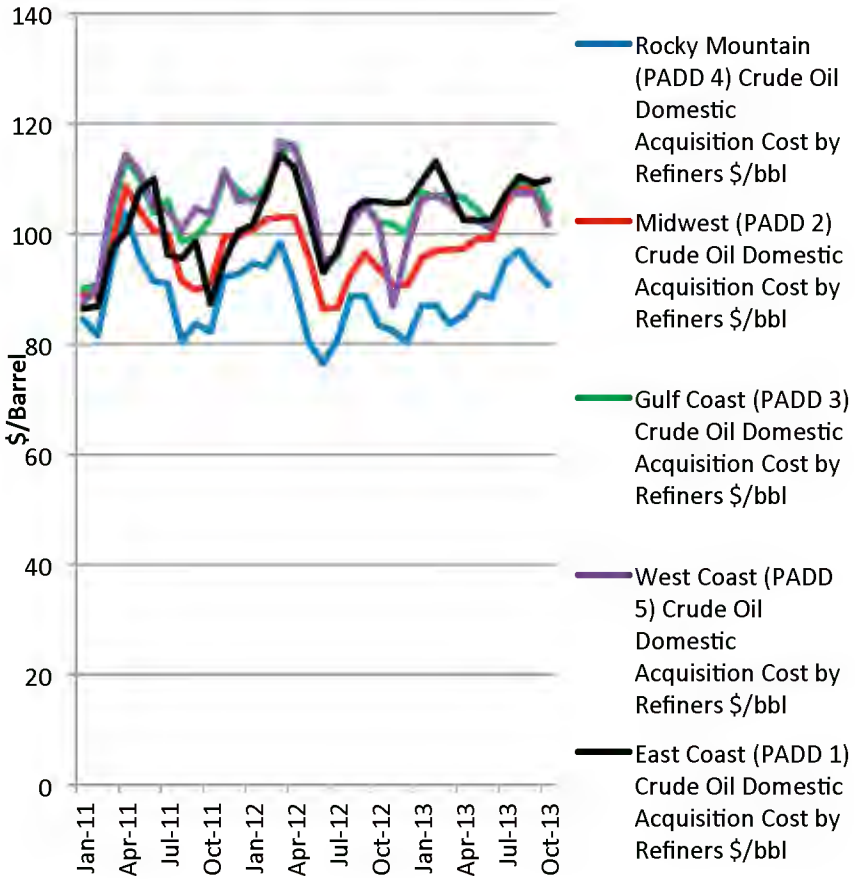
(a) Includes a realistic after-tax rate of return, commonly in the order of 10 to 15%.

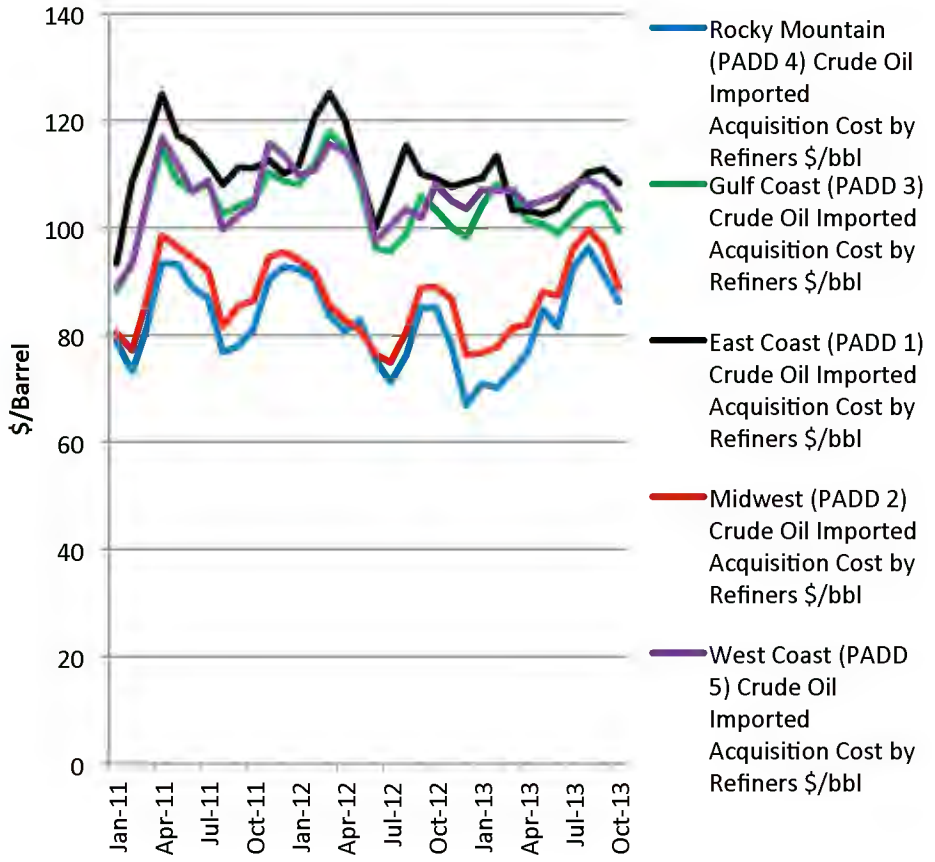
Source: "Canada's Energy Future: Energy Supply and Demand Projections to 2035." Nov 2011. NEB

Source: PacWest Consulting

Refineries Benefit

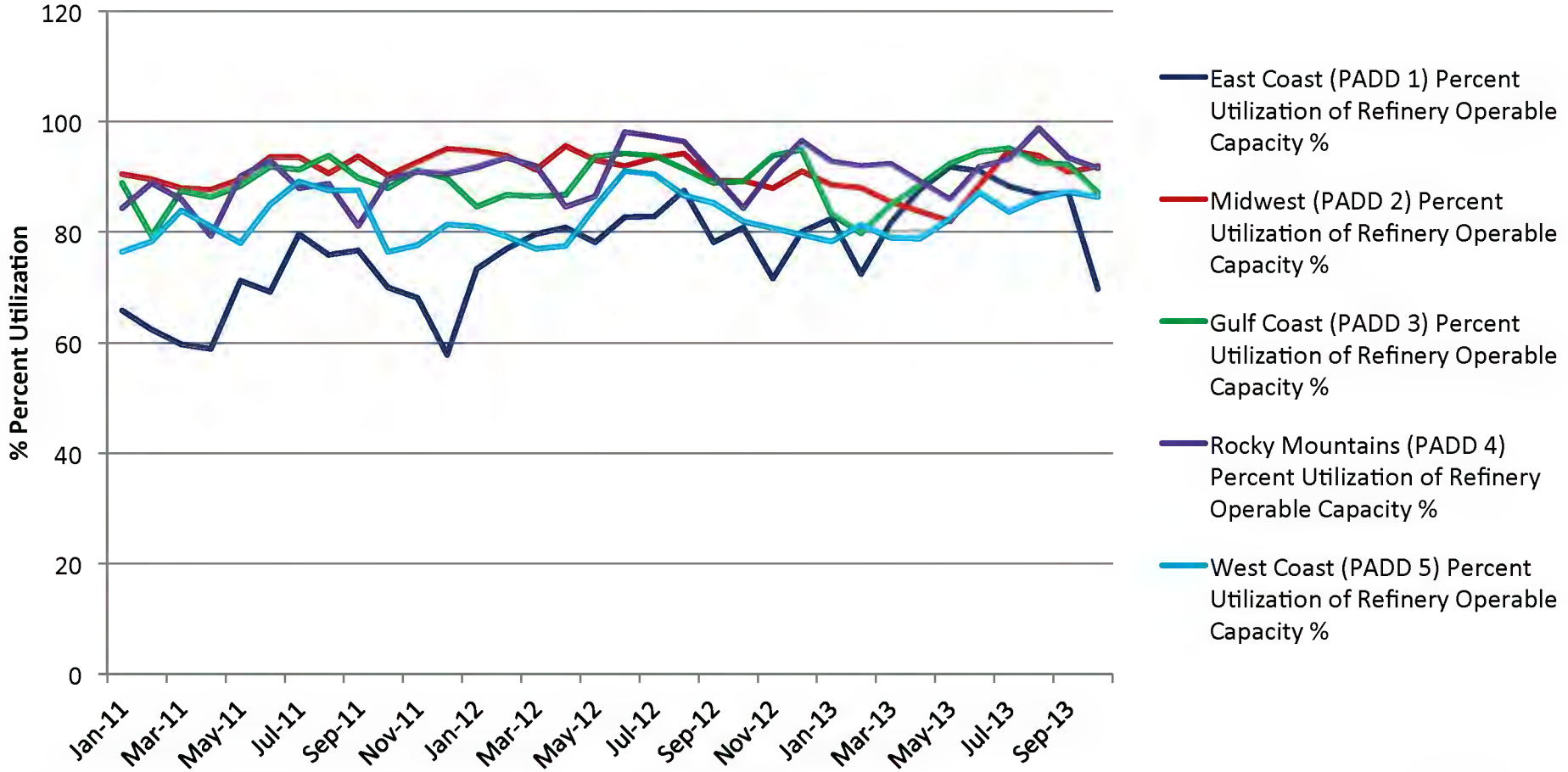
Domestic vs. Imported RAC





Source: EIA

Refinery Utilization by PADD



Source: EIA

But what about crude oil exports?

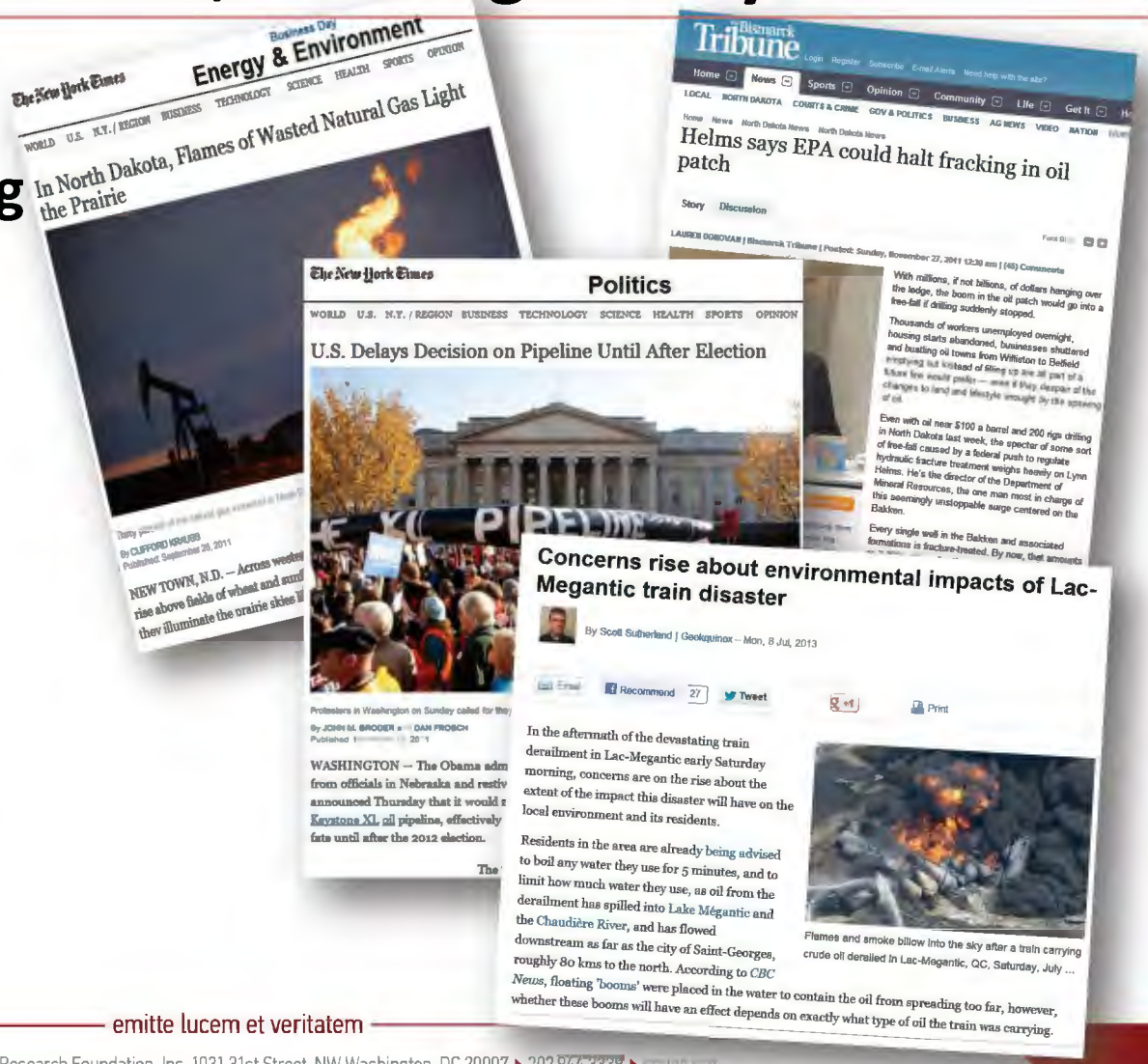
- Crude oil exports are not illegal, but they do require a special license granted by the Department of Commerce. Crude oil exports to Canada and from Alaska's cook inlet do not face the same restrictions.
- Major producers such as Shell and Exxon have come out in support of lifting the ban on exports, but refiners are mixed. Both PES and PBF of the East Coast have come out against crude oil exports while AFPM has come out in support of lifting the ban.
- While discussion and debate is beginning to take place both in the U.S. and abroad on this topic, word from the Commerce Dept. has been mute. Current discussions around crude oil exports in the U.S. are therefore *highly speculative*
- Should exports be allowed the impact on the market would depend on the transparency of the hydrocarbons exported i.e. crude or condensate and the volumes allotted
- The U.S. is currently exporting over 100,000 b/d to Canada via tankers from the Gulf Coast and via pipeline and rail from northern U.S.
- While there is potential to export small volumes from the East Coast and the West Coast of the U.S. the bulk of exports would likely be dispatched from the Gulf Coast

Crude oil exports?.....continued

- Both crude and condensate exports would advantage Gulf Coast producers in the Eagle Ford and the Permian Basin where there would be a relatively low cost to transport crude or condensate to the Gulf and then export it
- Condensate exports would highly benefit Eagle Ford (Gulf Coast) producers and potentially condensate production in the Utica (Ohio)
- WTI prices would likely increase, however, the degree to how much it would close the Brent WTI spread would depend on the volume and market impact of exports
- Gulf Coast prices would likely move up and stay at parity with Brent prices
- Crude exports would not likely solve the infrastructure dilemmas facing northern landlocked crudes in the Bakken and in Canada due to the lack of pipeline capacity from the region to the coasts
    - While WTI prices would likely increase there would still be a pricing differential for those crudes without adequate transportation means to Cushing or the Gulf Coast.
    - It could alter incentives to move crude oil into Cushing

Potential Issues, Hurdles, and Regulatory Concerns

- Oil prices
- Water Usage – Fracking and Recycling
- Oil spills (rail and pipeline)
- Environmental Concerns
- Regs on Federal Land-Fracking
- Infrastructure Delays-PERMITTING
- Costs incurred



U.S. LNG Prospects

What is the LNG Export State of Play

•Aside from **Sabine Pass Trains 1-4,** which has completed FERC permitting, there are only three projects that have exited the *pre-Filing* process: **Corpus Christi Liquefaction (Cheniere), Freeport LNG and Cameron LNG (Sempra).**

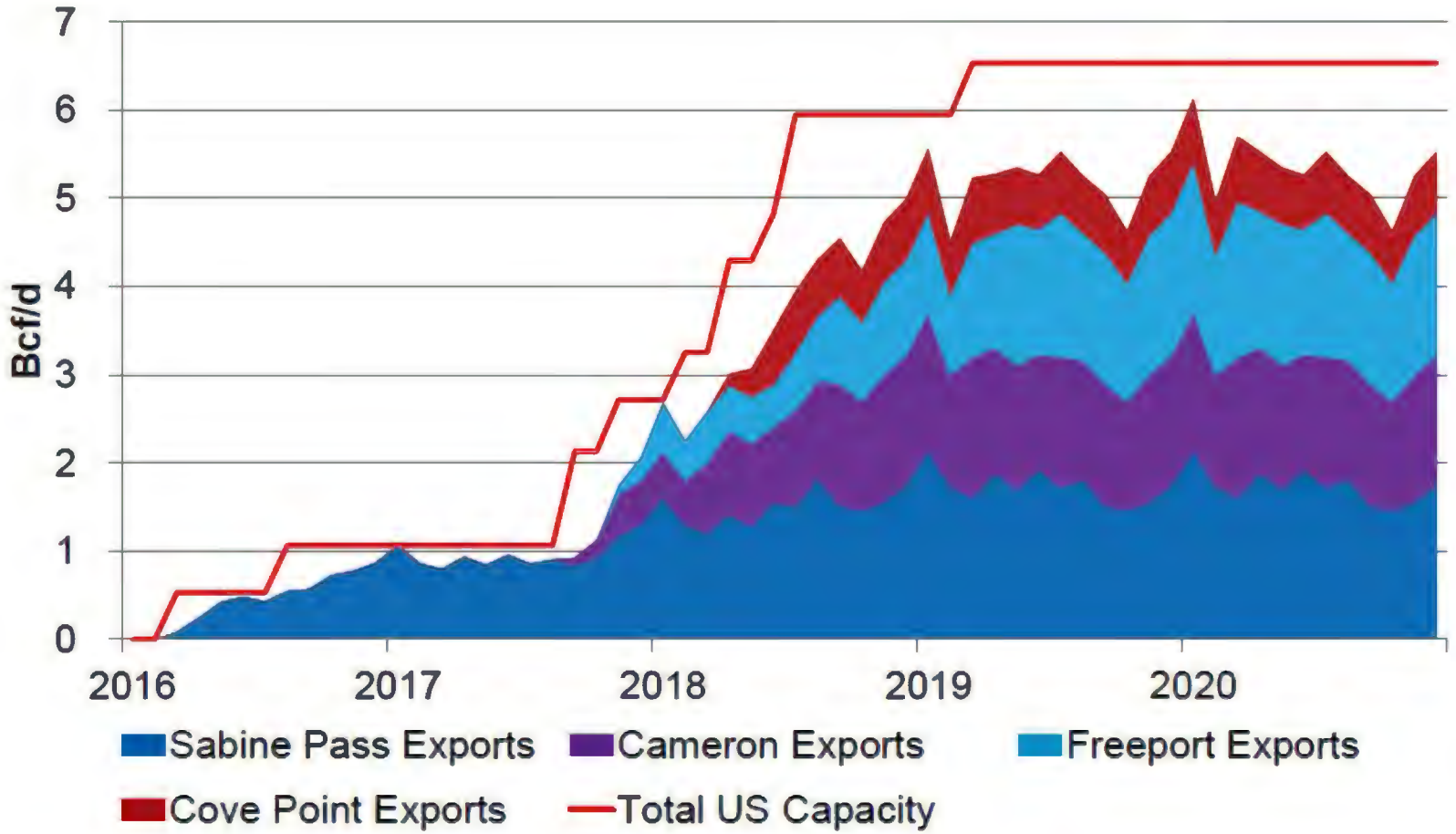
•Maximum of five to six projects, with a maximum of 12 bcf/d, but given world LNG competition, U.S. exports likely to be limited to 6-8 bcf/d over next 20 years.

•U.S. LNG exports highly unlikely to harm U.S. manufacturing advantage, supply curve will remain flat due to technology advances and continued access to natural gas on private lands. U.S. has massive natural gas expansion capacity.

• Only pay attention to those projects that exit the pre-filling process at FERC as this is where a major commitment is made, engineering and environmental assessment with an approximate cost of $100 million.

•DOE's first come, first served export permit process is flawed—some later projects may have better prospects (e.g., Cheniere T5 & T6).

US LNG Export Scenario



Source: Bentek

LNG Exports Risks

Many projects look good on paper, but the regulatory risks are very high for LNG exports

$/mmBtu	Supply, Liq. & Shipping Cost	
Henry Hub	$3.00-$5.00	$3.00-$5.00
Capacity Charge	$3.00	$3.00
Shipping	(Europe) $1.25	(Asia)$3.00
Fuel-Basis	$0.35	$0.35
Delivered Cost	**$7.60-$9.60**	**$9.35-11.35**

U.S. LNG Export Projects (Not All Will Make It)

Company	Quantity (Bcf/d)	DOE	FERC*	Contracts
Cheniere Sabine Pass T1 – T4	2.2	Fully permitted		Fully Subscribed
Freeport	1.4	FTA + NonFTA	✓	T1-T2
Dominion Cove Point	1.0	FTA	❖	Fully Subscribed
Jordan Cove	1.2/0.8	FTA	❖	
Cameron LNG	1.7	FTA	✓	Fully Subscribed
Oregon LNG	1.25	FTA	❖	
Cheniere Corpus Christi	2.1	FTA	❖	
Cheniere Sabine Pass T5 – T6	1.3	T5 Filed		T5 Subscribed

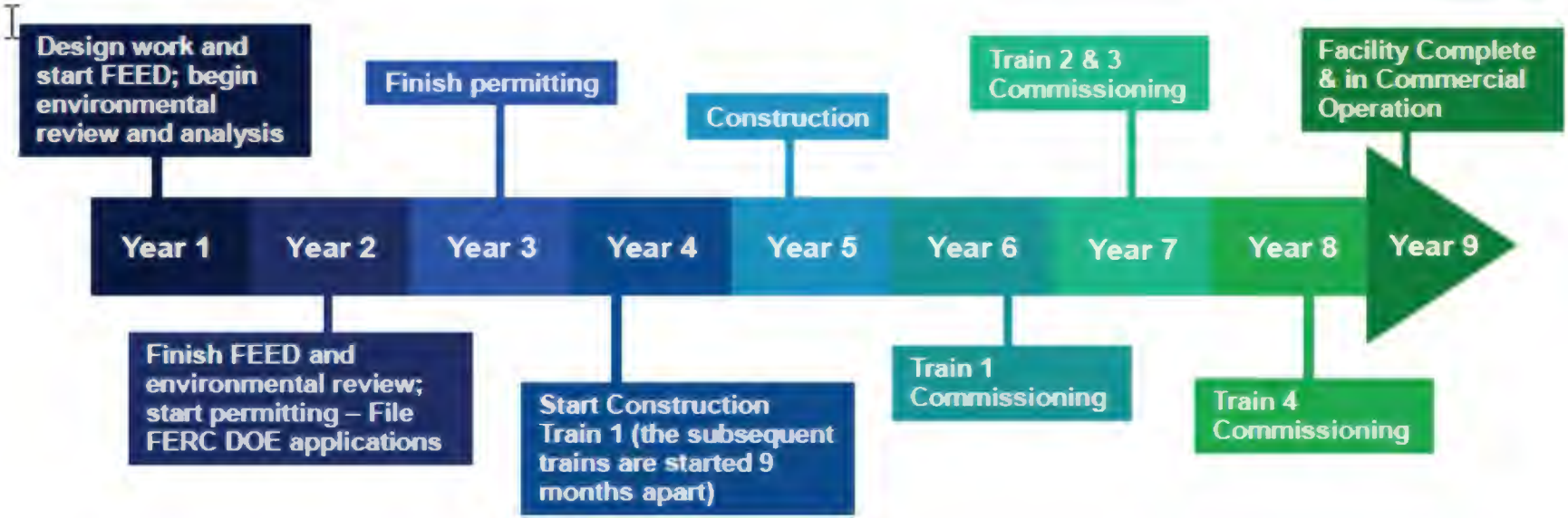
Plus other proposed LNG export projects that have not filed a FERC application.

* Application filing = ❖, FERC scheduling notice issued = ✓

Source: FERC, Cheniere,

FERC- the Real Regulator

Permitting and Construction Timelines For Approval



Sources: Poten Group, ICF, U.S. DOE, Facts, BG Group, Credit Suisse

Identifying Future Energy Conflicts: New Relationships and Evolving Priorities

Deliverable 2
Contract HQ0034-13-C-0131
Energy Policy Research Foundation, Inc. (EPRINC)
for the Office of Net Assessment
May 25, 2014 by EPRINC Staff

Outline

- Iraq Update
- Iran
  - New contracts, reserves, eagerness
  - Historically underperformed
  - Competition for Saudi Arabia
- Turkey a transit state for ME, Europe, Russia
- China

From This Contract's Proposal

"These types of events have serious consequences. The West lost ground with a potential ally, a revolutionary former-Soviet state, and Russia has moved to consolidate its role as a monopolistic energy supplier to Europe…The Kharkov Accords will not be the last the geopolitical event driven at least in part by burgeoning North American energy self-sufficiency."

Iraq Update

- Export record (2.8+ mm bd) reached in February
- Work progressing in southern fields
  - Behind schedule, but nevertheless, progress is being made in both the upstream and midstream
- Giant Majnoon, WQII and Gharraf fields launched
  - (Shell, Lukoil and Gazprom Neft, respectively)
  - Russian and Chinese presence in Iraq is growing as western companies move to KRG
- KRG upstream continues to develop
  - KRG has launched its own pipeline into Turkey

…but good news is limited

- Baghdad has lost control of Al Anbar province to ISIS
  - Pipeline destroyed and leaked crude into Tigris
  - ISIS moving east towards Baghdad
  - Direct link to Syria
- ISIS: Islamic State of Iraq and the Sham
  - A group of Sunni jihadists that has emerged during fighting in Syria
  - Has challenged al Qaeda and al-Zawahiri
  - Some consider it to be “more extreme”
- Violence in Sunni regions spreading beyond Anbar
  - including into Ninewah/Salahuddin and even the KRG
- Kirkuk - to Ceyhan line bombed on a weekly basis

…but good news is limited

- Gov't continues to fail to provide basic services
- Oil projects:
  - Waterflood missing
  - Companies remain unhappy with economics, Gov't remains difficult to operate with
  - Security issues increasing outside of Basra regions
  - Chinese service companies very active
- Election results favor Maliki, but he will have difficulty recruiting the Kurds to form a coalition as he did in 2012
  - Erbil – Baghdad oil and budget dispute continues on

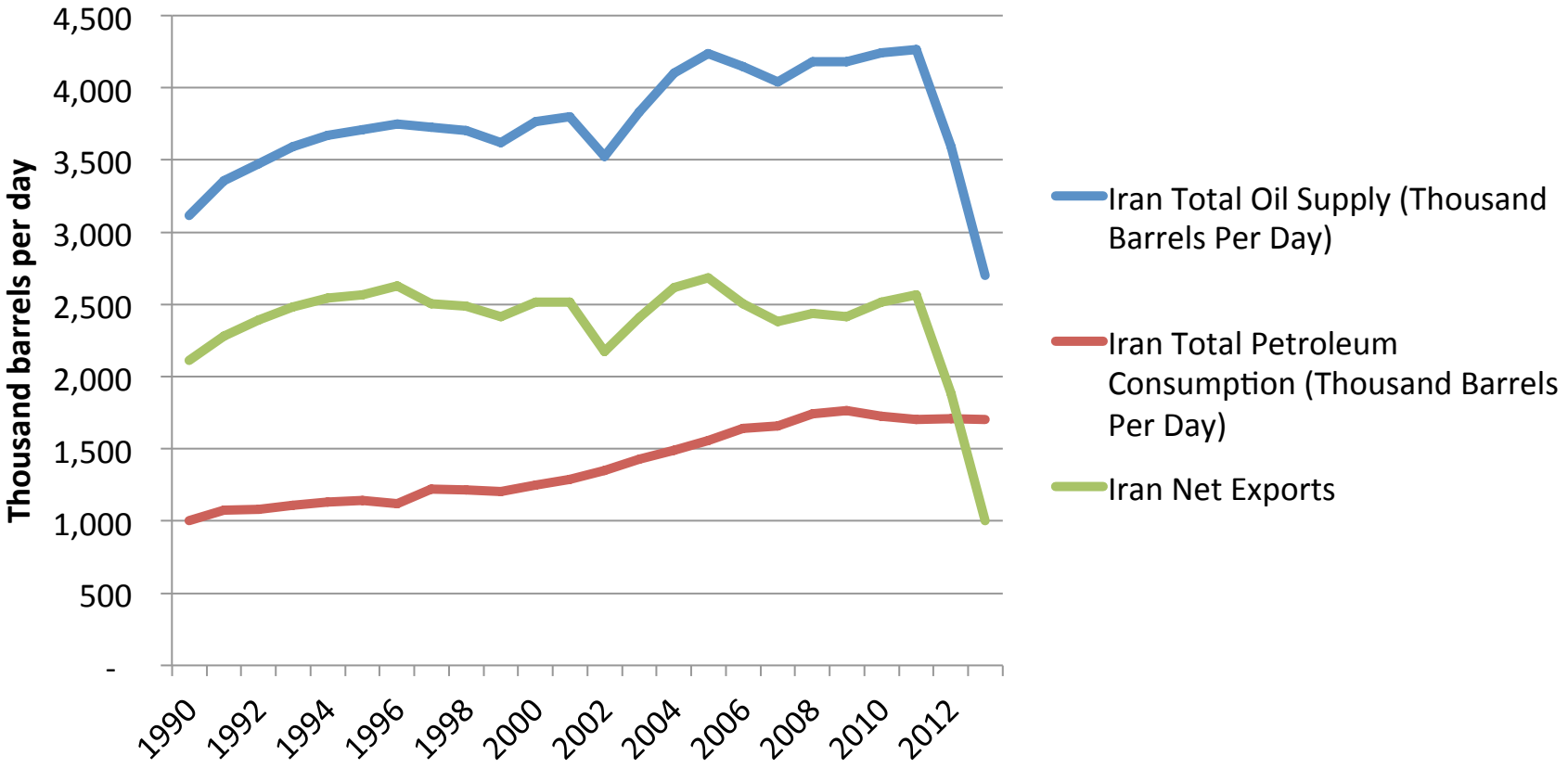
Pockets of stability

- Pockets of *relative* stability have emerged during a period of growing chaos
  - KRG and Basra region
- Situation beginning to resemble one of three scenarios in our previous Iraq contract
  - KRG is able to maintain borders and internal security (there are growing expectations that KRG will eventually declare independence)
  - Basra region able to maintain some security and stability, perhaps due to increased economic activity (and now Sunni militias entering from Syria)

Iran the next big middle east oil play?

- Expectation (and hope) among many foreigners is that U.S. sanctions on Iran will be eased further, eventually allowing for upstream investment.
- If sanctions are lifted/eased, Iran could attract large amounts of foreign investment and boost production rather quickly.
  - Over 100 bln bbls of reserves (and underexplored)
  - New contract terms

Iran Oil Production, Consumption and Net Exports



Source: EIA data, EPRINC Calculations

China has not reduced imports from Iran

Source: MEES

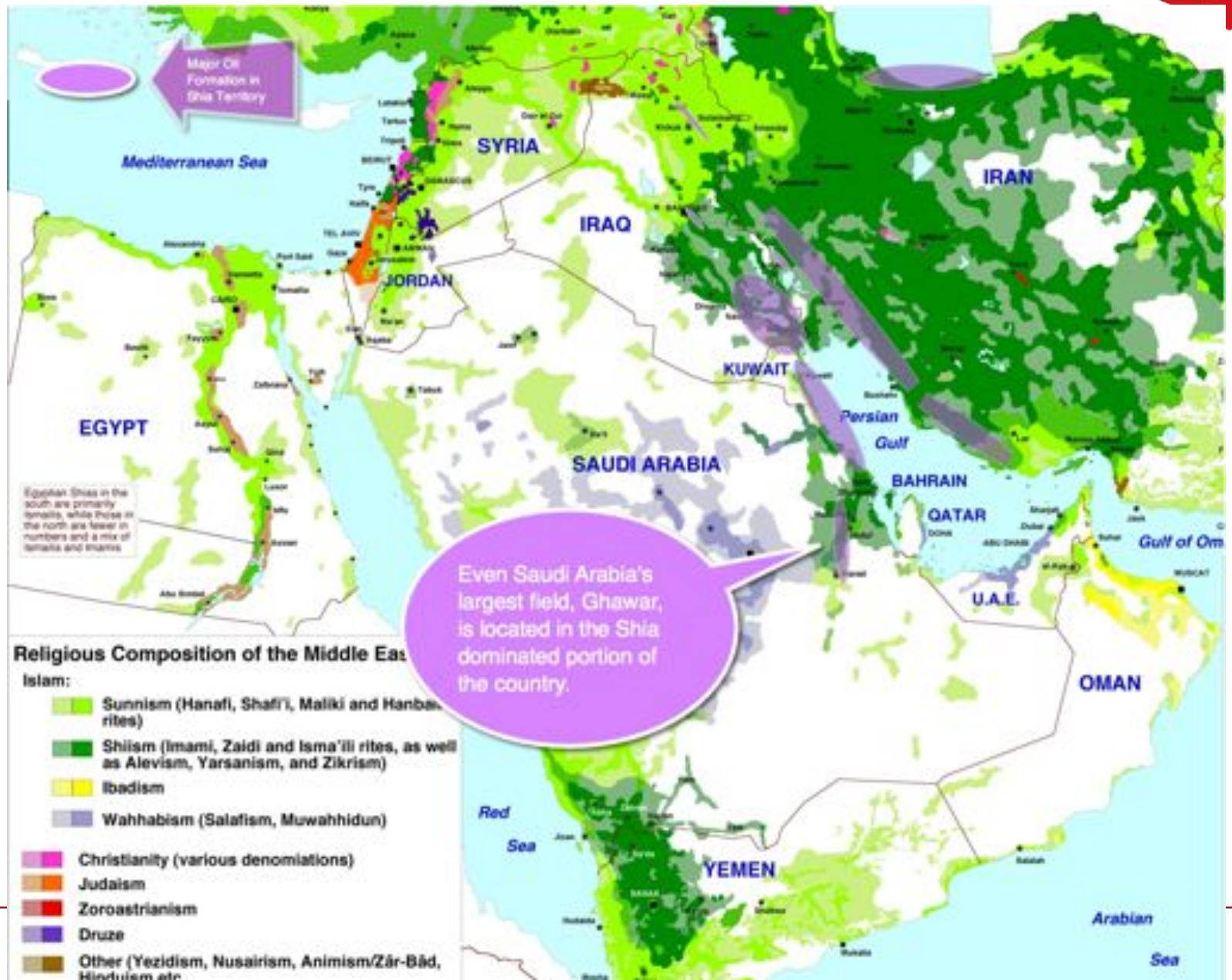
Iran has learned from Iraq's contracting experience: Iran Petroleum Contract (IPC)

- Has done away with the buyback model
- Is prepared to offer technical service contracts that are similar in nature to Iraq's, but far more lucrative and flexible
  - Exploration upside
  - IOCs provide capital and tech, but get reimbursed
  - Incentives for cost savings
    - Half of production allocated for cost recovery
  - Remuneration fee, in cash or kind, based on exploration risk and oil prices

In a sanction free environment…

- Iran will offer a more stable operating environment than Iraq
- With more lucrative contract terms
  - And upside exploration incentives - important given that Iran is not fully explored
- A large conventional oil reserve base
- Is likely to attract eager European and Asian IOCs.
  - Service co's ready to return as well
- A reversal of Iranian's energy fortunes should not be dismissed

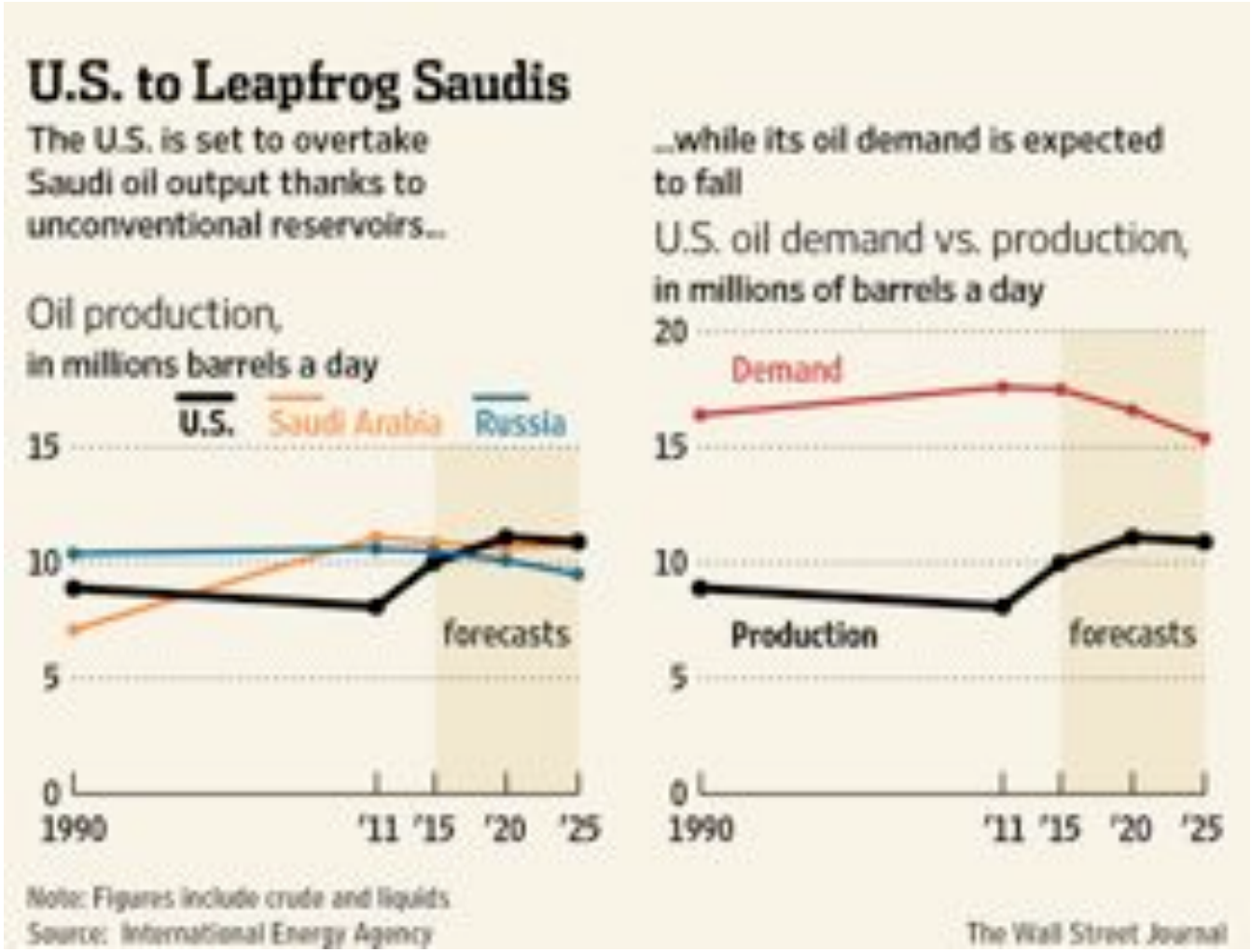
Distribution of reserves and production favors Shias



Iraq – Iran Oil Cooperation

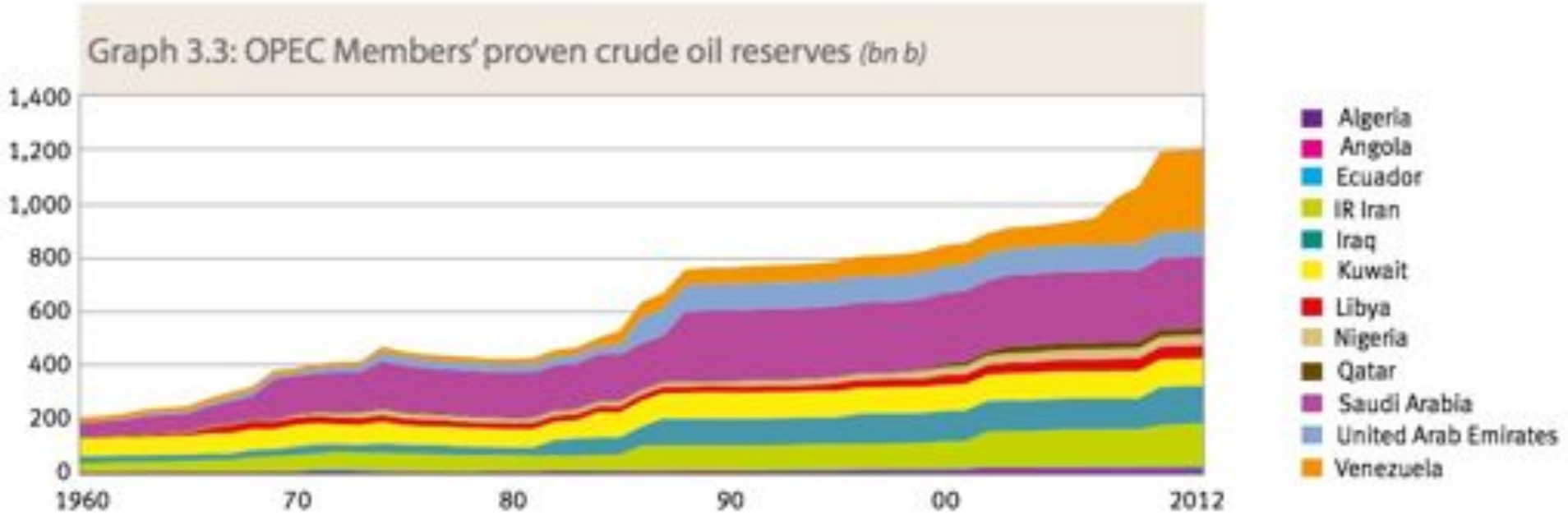
- Iraq and Iran have agreed to cooperate on several oil issues:
  - Iraq helped Iran design its new oil contracts
  - The two countries have formed a committee to devise a plan for the joint exploration and production of fields on their shared border (SE Iraq/SW Iran)
  - Iraq has supported in OPEC meetings Iran's right to increase production

Saudi Production to Remain Roughly Flat



Source: MEES

Iraq, Iran, Libya and Venezuela most underperforming OPEC members based on reserves



Source: OPEC

Iraq, Iran, Libya and Venezuela most underperforming OPEC members based on reserves

Estimated Sustainable Crude Production Capacity

(million barrels per day)

Country	2012	2013	2014	2015	2016	2017	2018	2012-18
Algeria	1.20	1.14	1.09	1.02	0.94	0.88	0.82	-0.38
Angola	1.84	1.86	1.94	2.03	2.05	2.11	2.16	0.32
Ecuador	0.51	0.51	0.51	0.51	0.51	0.49	0.47	-0.04
Iran	3.39	3.02	2.93	2.81	2.66	2.51	2.38	-1.01
Iraq	3.18	3.52	4.10	4.26	4.43	4.64	4.76	1.57
Kuwait	2.78	2.85	2.86	2.82	2.79	2.65	2.52	-0.26
Libya	1.50	1.57	1.64	1.56	1.50	1.51	1.48	-0.02
Nigeria	2.57	2.48	2.35	2.32	2.50	2.60	2.66	0.09
Qatar	0.76	0.74	0.73	0.77	0.82	0.83	0.82	0.06
Saudi Arabia	11.97	12.17	12.43	12.39	12.33	12.36	12.35	0.38
UAE	2.70	2.91	3.08	3.23	3.37	3.43	3.44	0.74
Venezuela	2.58	2.60	2.64	2.65	2.76	2.77	2.90	0.31
OPEC-11	31.81	31.84	32.29	32.12	32.23	32.15	31.99	0.18
Total OPEC	35.00	35.35	36.30	36.37	36.66	36.80	36.75	1.75

Iran has already lost 400 kbd of the 1,000 kbd projected 2012-2018 decline. This table assumes sanctions remain in place.

Source: IEA MTOMR 2013

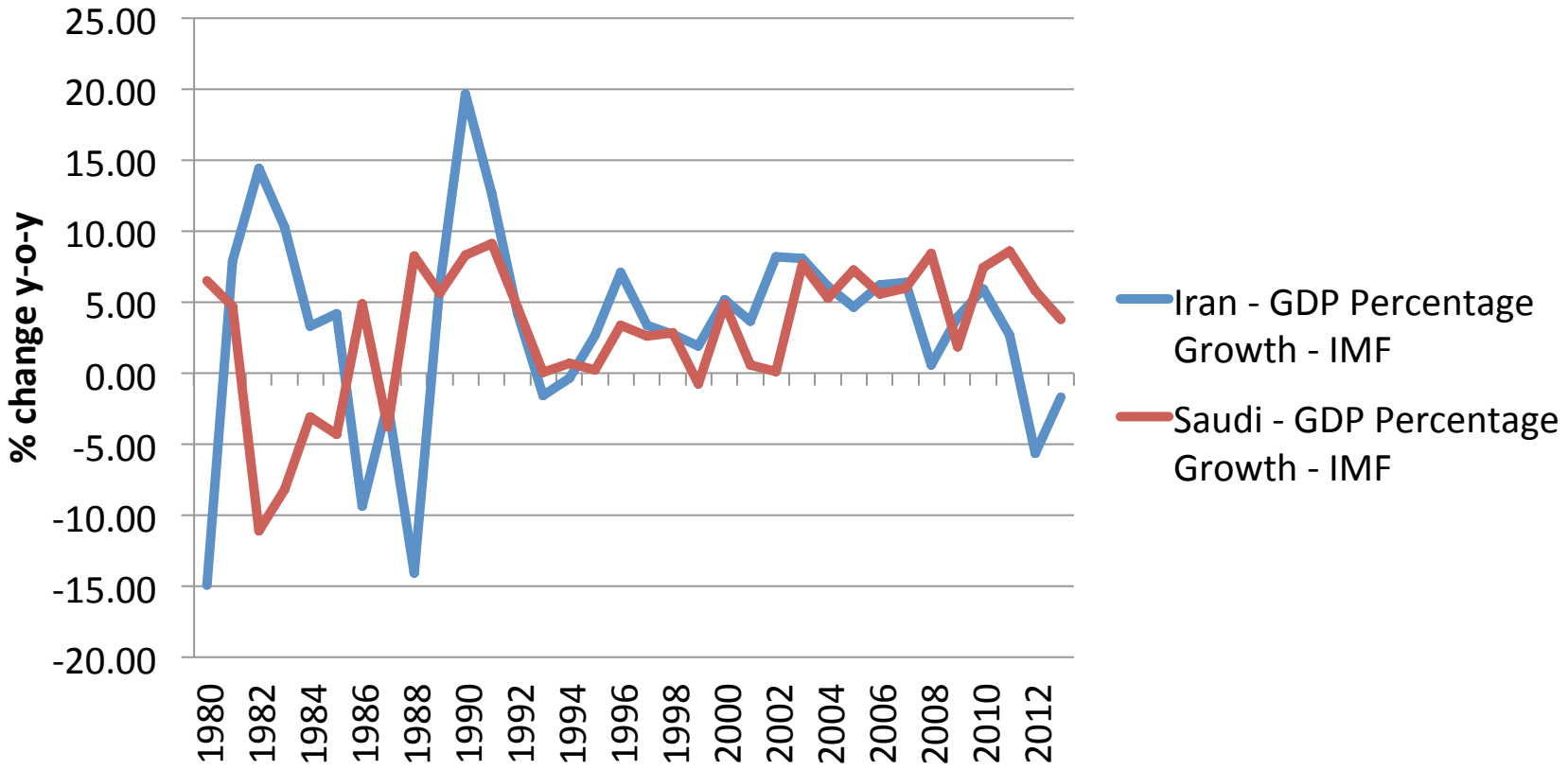
Price vs. Volume Relationship Changing

- Iran currently relies on price changes to increase revenues as it cannot grow production under current sanction regime
  - Therefore has an incentive to create havoc in oil market in order to increase prices
- Saudis rely on volume, less dependent on pricing to grow revenues, however…
  - Given only marginal capacity growth plans, Saudis will need higher prices in order to expand revenues and economy going forward

Iranian and Saudi Economies

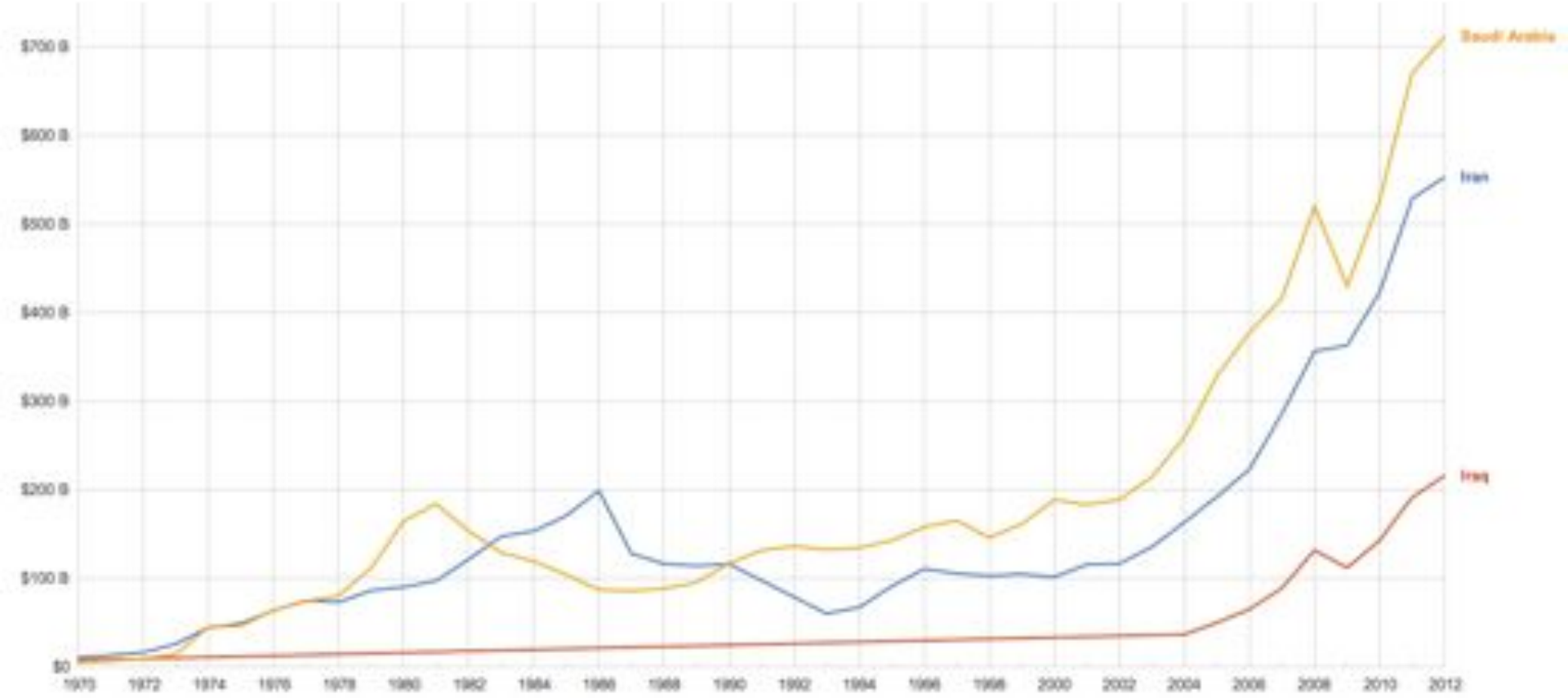
- Bear in mind that the Iranian economy is smaller per capita than the Saudi economy, but is a bit more diversified
  - Gov't too: Oil revenues account for approximately 60% of Iranian gov't revenues and 90% of Saudi revenues
- Consider also that the Iranian economy and regime has already survived 'lean' times, the Saudis have not experienced belt-tightening

Since the 1990's economic performance has been similar…until sanctions bit.



Source: IMF data

Nominal GDP Through 2012



Source: World Bank data via Google

Relative Strength

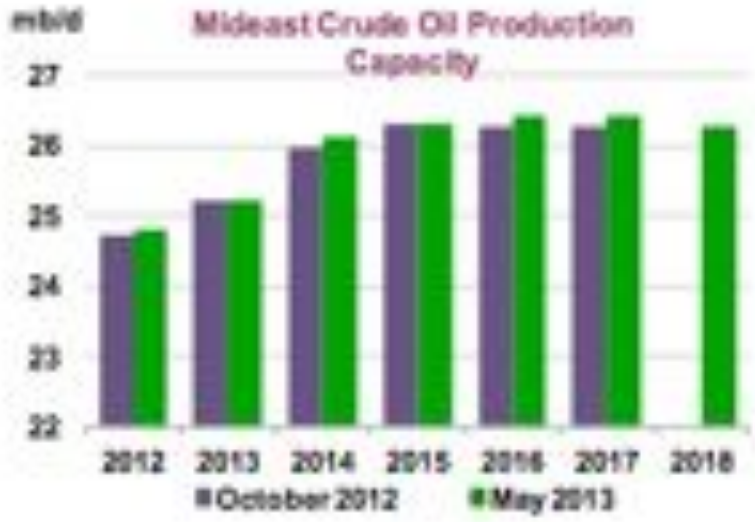
- Even if U.S. allies in the M.E. region remain stable (along with their energy production), relative economic strength and influence could diminish
  - Little upside in terms of production growth, demand to increase, ultimately reducing or curtailing revenues

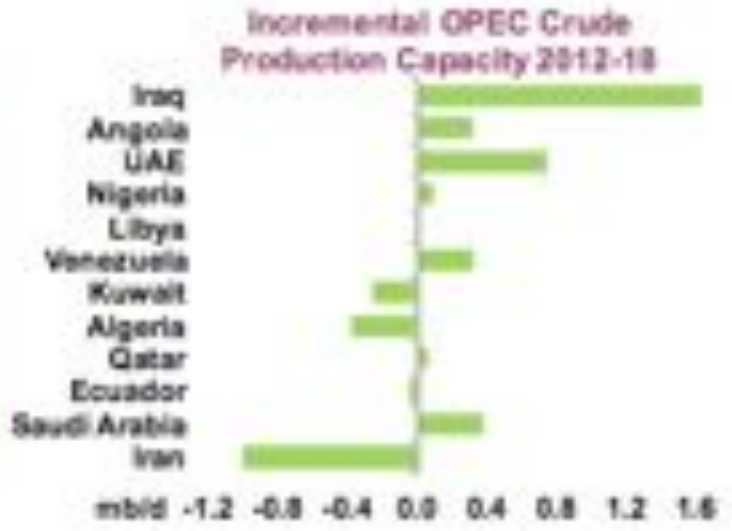
- The bulk of upside oil production potential rests in Iran and the Basra region of Iraq (Shia)
  - KRG and UAE (Abu Dhabi) follow in terms of potential
    - Approximately 1 mm bd potential for KRG

How do Saudis handle rising Iran/Iraq production?

- In an otherwise balanced market, the Saudis can deal with significant increases in Iraqi and Iranian oil production by:
  - Cutting their own production
    - Keeps prices balanced, but revenues drop due to volume loss
  - Maintain production volume, allow prices to drop
    - Also reduces revenues
  - Dissuade Iran/Iraq from producing, create instability in market, etc. to raise prices.
- Conventional wisdom has been that Iranians need price and Saudis need volume – a role reversal is possible

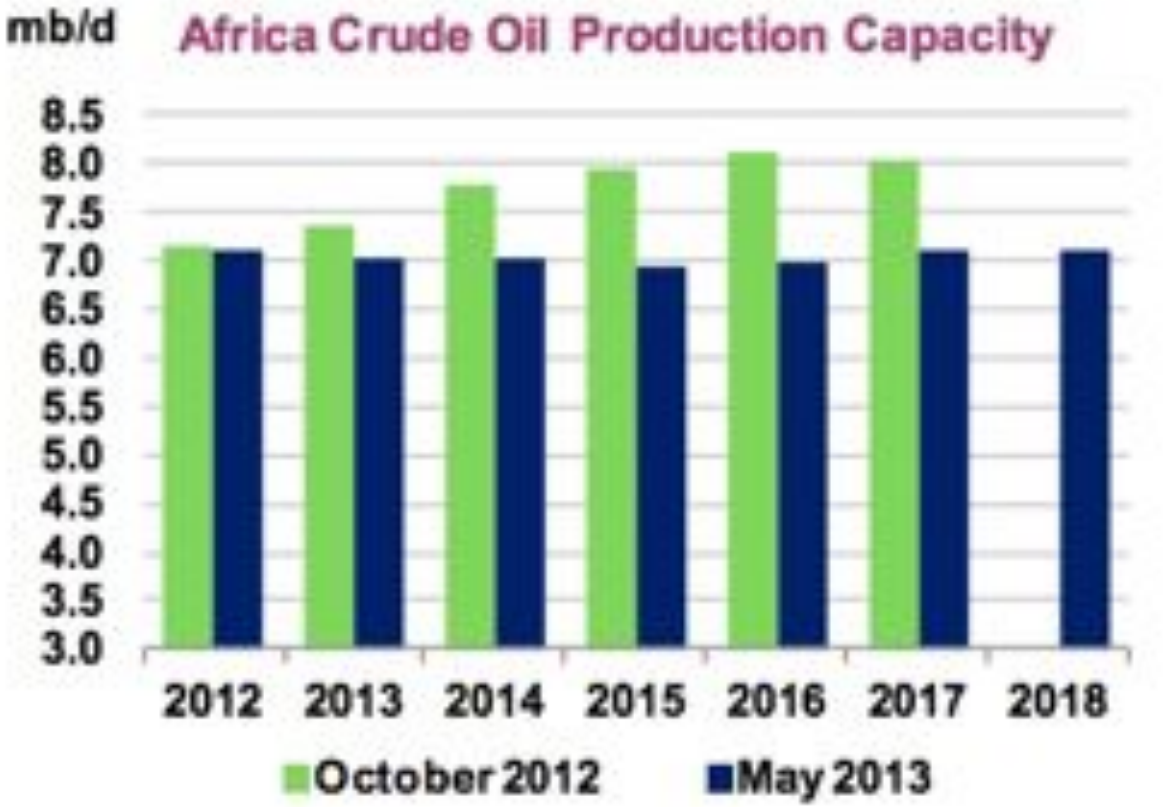
ME Capacity Growth Minimal





Source: IEA MTOMR 2013

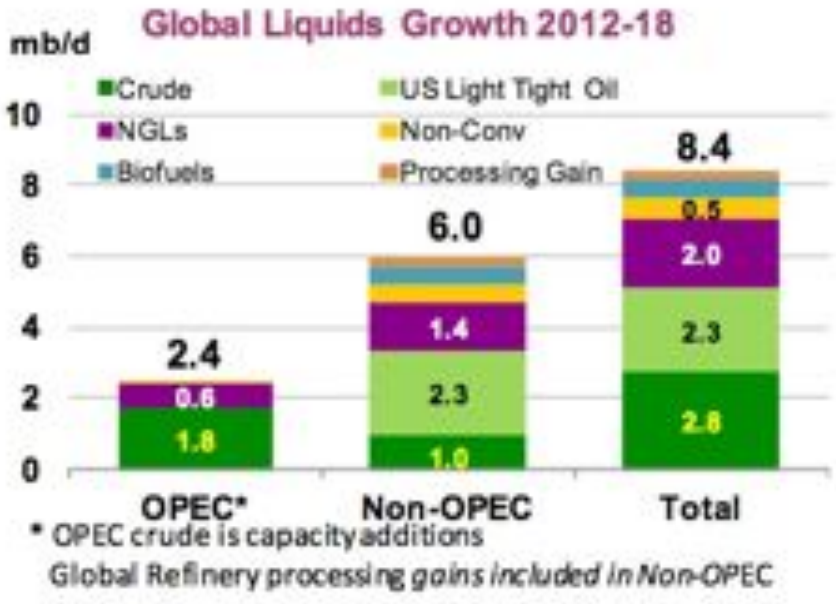
African Capacity Largely Flat

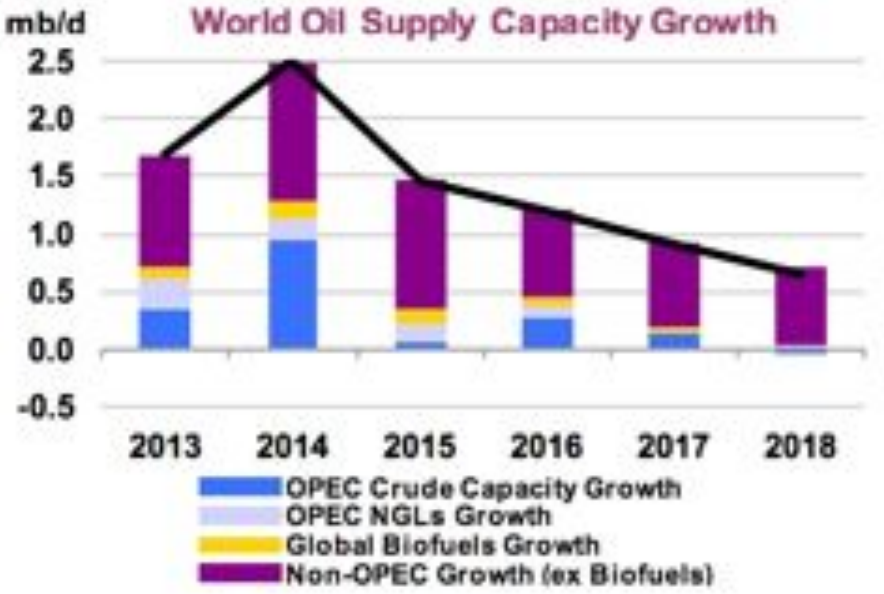


Does not account for lost Libyan production, only a gradual decline.

Source: IEA MTOMR 2013

IEA's 2013 MTOMR Outlook





Source: IEA MTOMR 2013

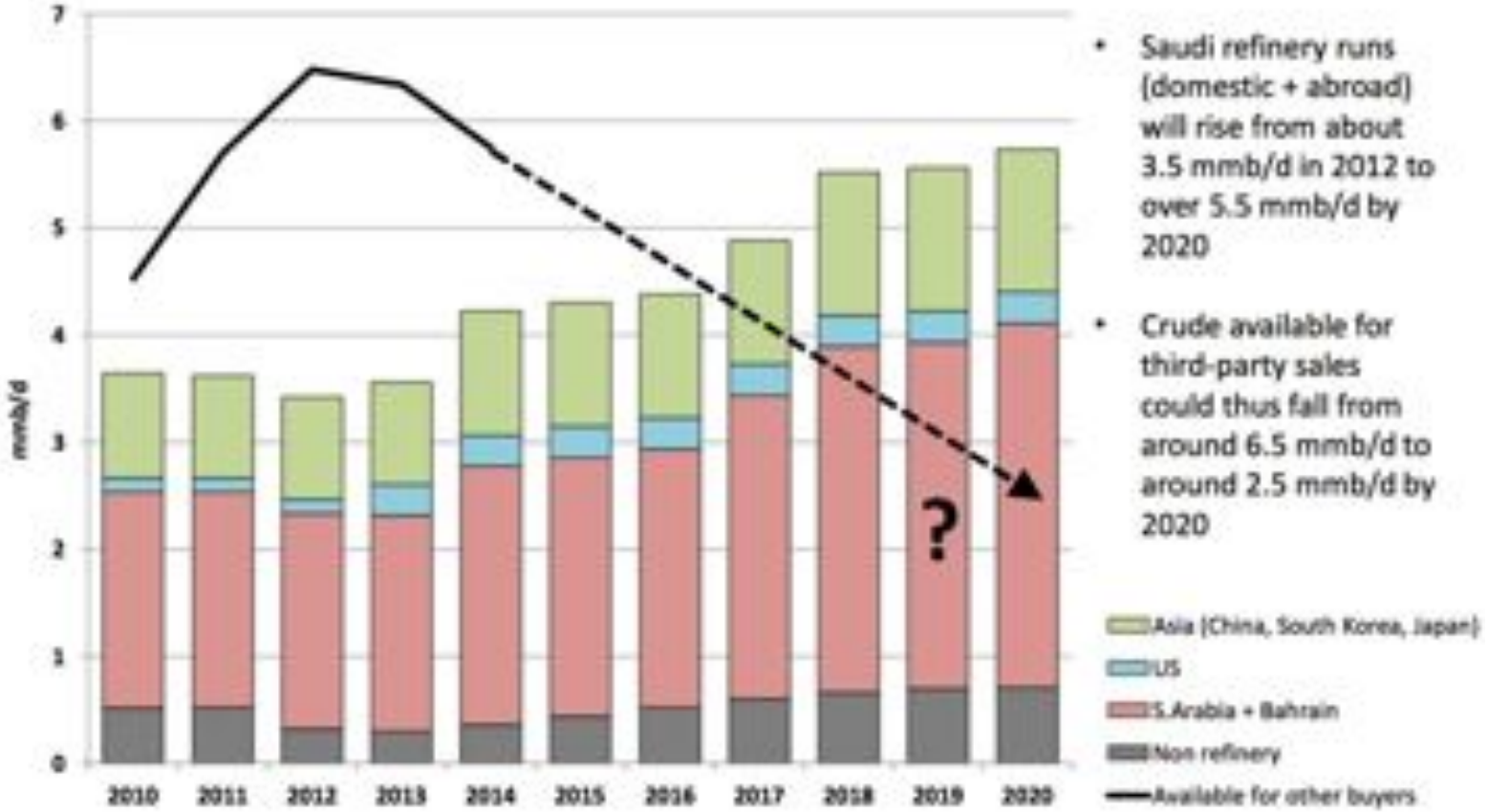
What is assumed in the forecast?

- The previous chart assumes crude production of +1 mm bd from Brazil, +3 USA, +1 Canada, a stable Mexico, + 1 from UAE and SA, Iraq at +1.5, Iran at -1, and Libya at ~1.5 mm b/d from 2012 to 2018.
  - All others cancel out
- Including biofuels, NGLs, and refinery gain, world should add 8.4 mm b/d of liquids.
  - Loss of Libya knocks 1.5 mm b/d off this forecast. Should the country not regain stability, bringing net liquids additions to 6.9 mm b/d.
- Aggregate 6.9 mm bd demand growth expected between 2012 – 2018; this leaves little room for error

Balancing the oil market

- Actual production is already falling short of IEA's forecast
  - Demand might be too
- The Americas represent the largest net additions in IEA's forecast and their upside, save for Argentina, is already baked in
- Saudi and UAE additions are limited, well-understood. Progress in Iraq is assumed.
- Iran, with shut-in capacity of 1+ mm bd, and a desire to attract investment, could be looked to to fill a supply gap should turmoil in the ME and Africa persist
- In sum, Iran is an obvious choice for European and Asian customers looking for conventional oil supply growth – their eagerness for sanctions to end backs this up
- In EPRINC's 1st deliverable for this project, South America was identified as a large swing region – with the potential to become a large exporter or a net importer in the coming years
- Iraq and Iran are the next largest sources of potential upside.

Availability of Saudi Crude to decline as more is refined internally

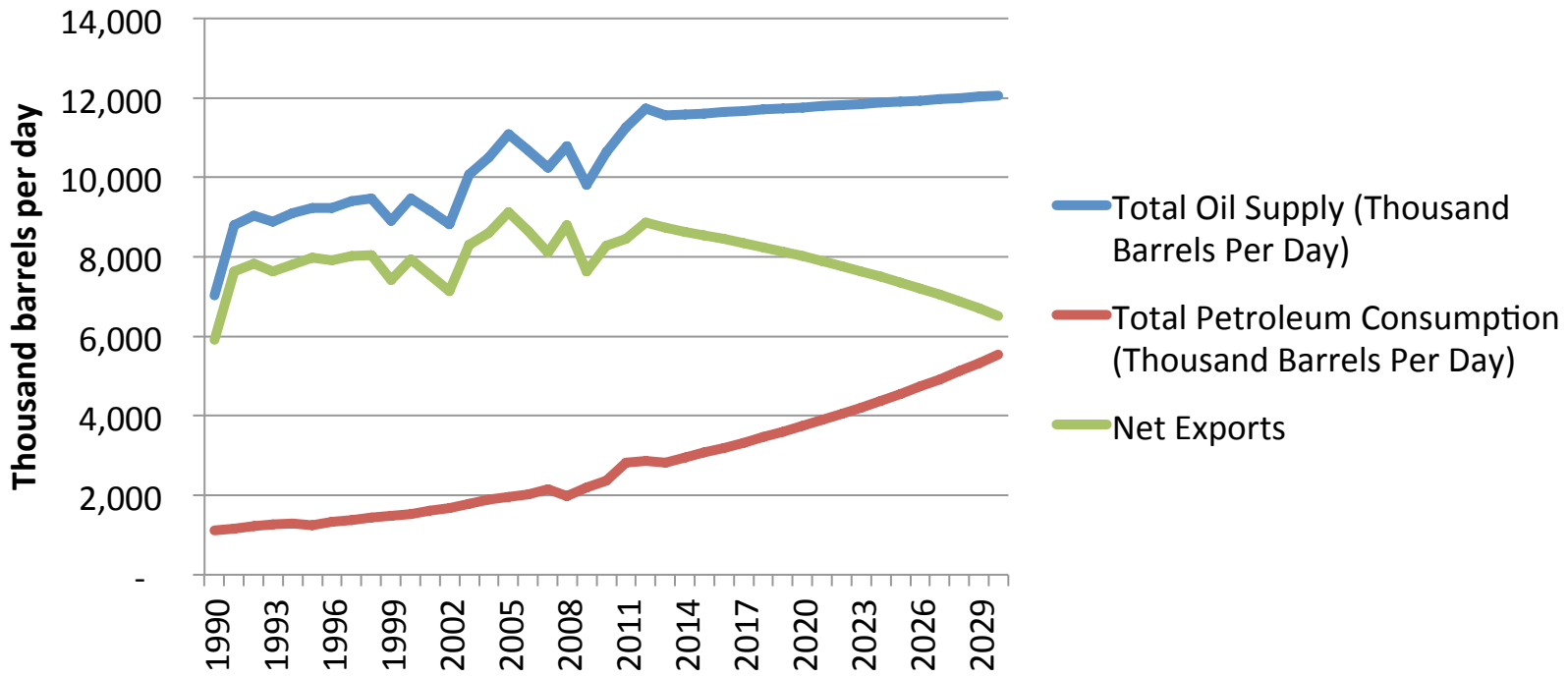


FGE

10

Source: Facts Global Energy

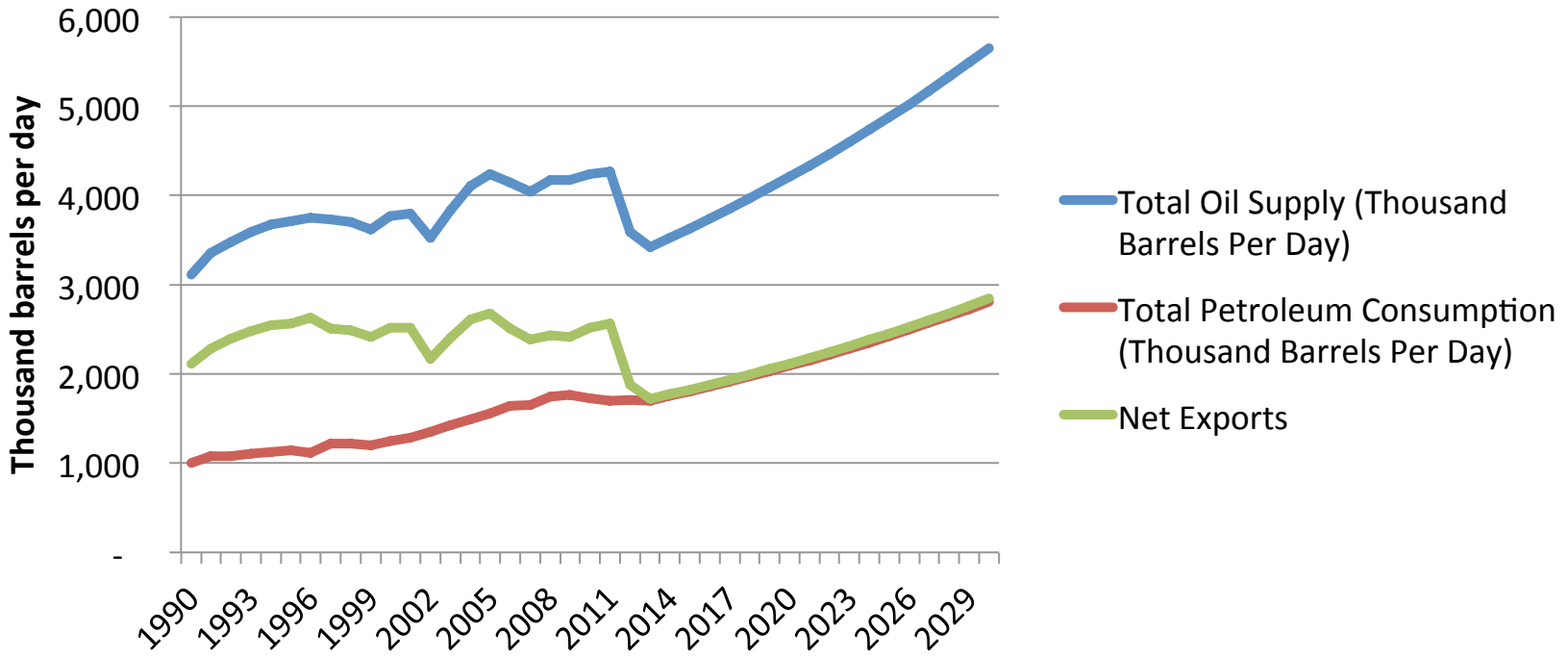
Some will be exported as product, but much will be consumed internally – net exports decline



Estimate from 2014 onwards. Assumes 0.25% annual production growth and 4% annual consumption growth (actual rate over past ten years is 5%). Does not account for the refinery gain which would accrue in the previous slide.

Source: EIA data, EPRINC calculations

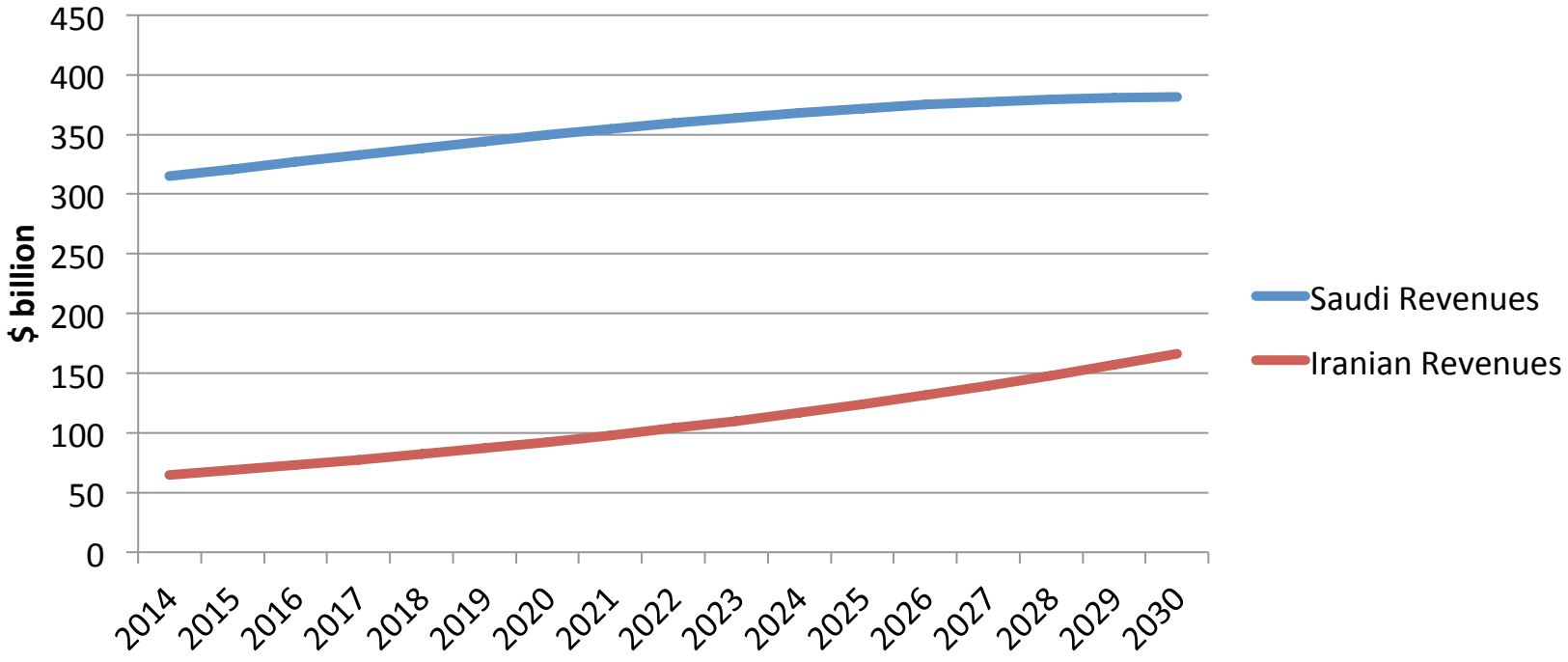
Even slow growth in Iran can turn things around



Estimate from 2014 onwards. Assumes 3% annual production growth, which means 2011 production level not reached until 2020/2021. This figure is likely conservative as shut-in production capacity could come online more quickly. Also assumes 3% annual consumption growth rate.

Source: EIA data, EPRINC calculations

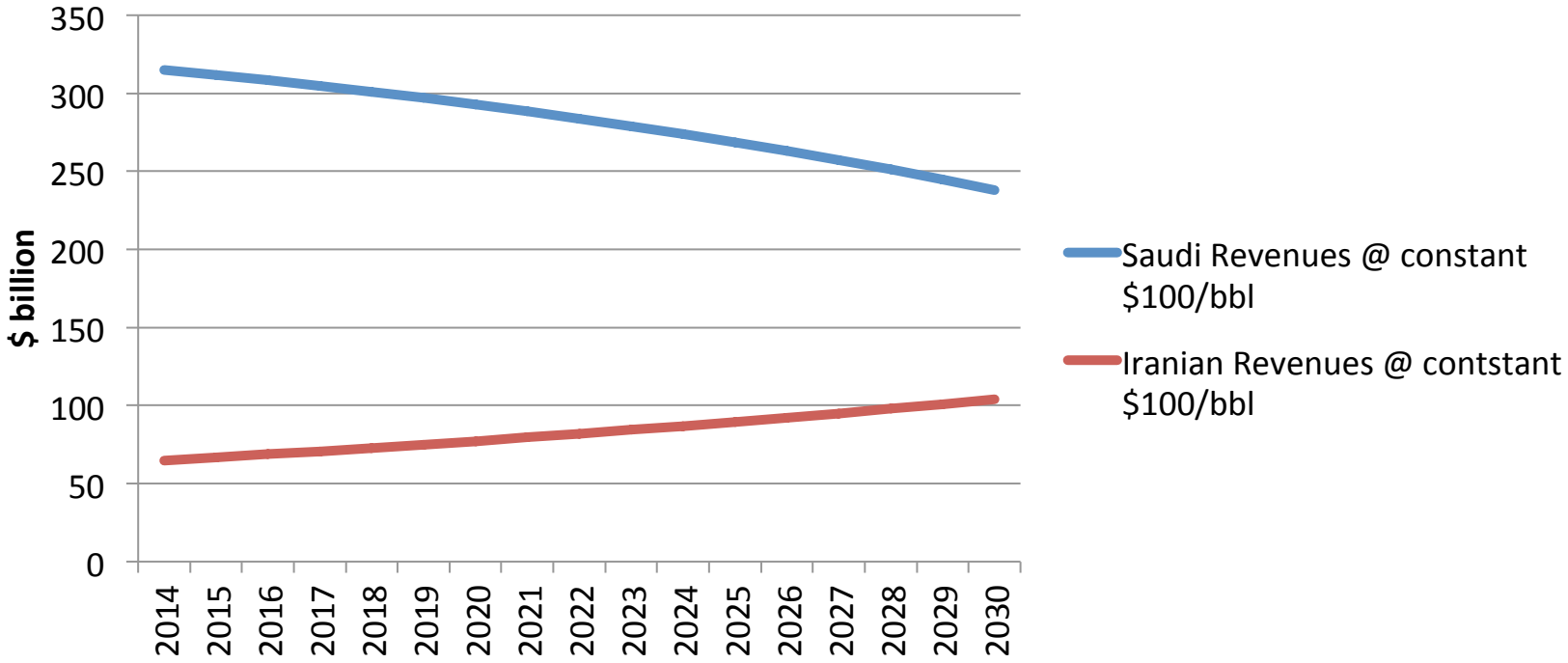
The revenue gap closes if oil prices increase…



Assumes oil price increase 3% per year beginning with $100/bbl in 2014. (In real 2014 $)

Source: EPRINC calculations

But even more so if prices stay flat over time…

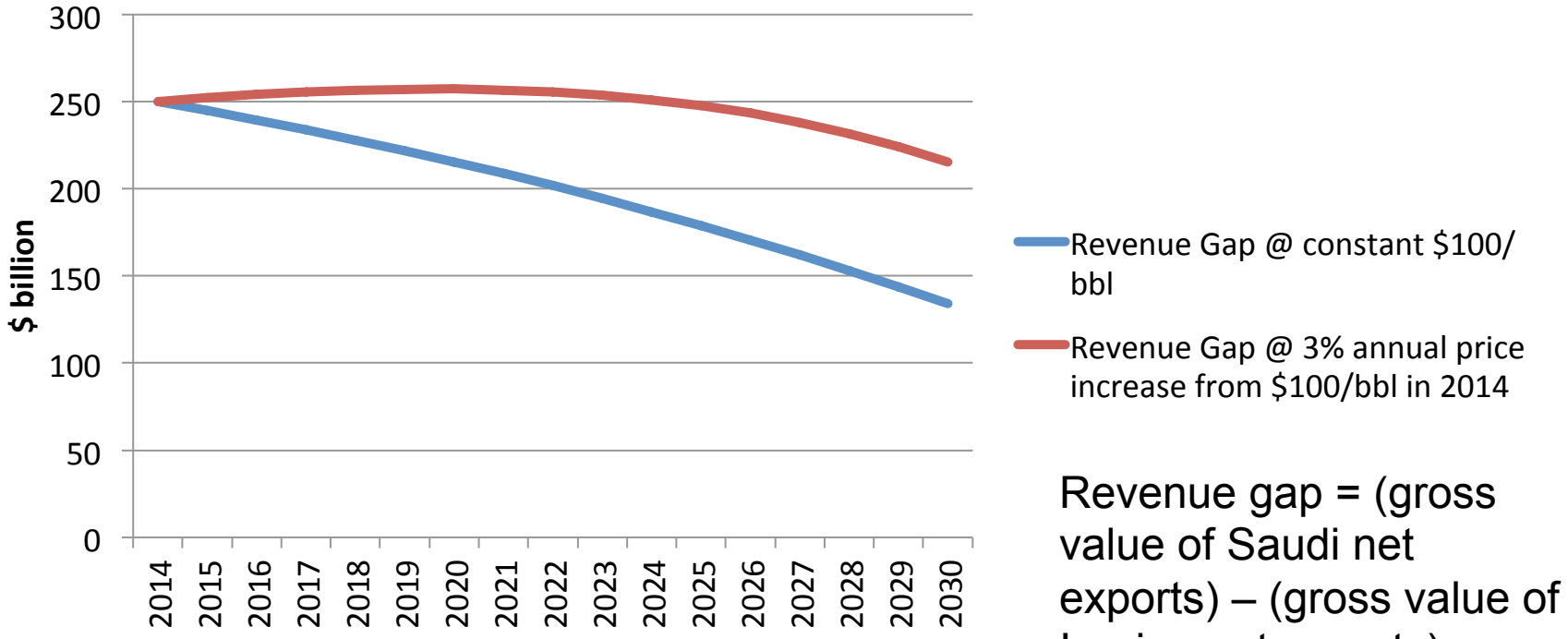


Assumes oil prices increase remain at $100 through 2030. (real 2014 $)

Source: EPRINC calculations

If one believe that Iranian exports will grow over time while Saudi's decline…

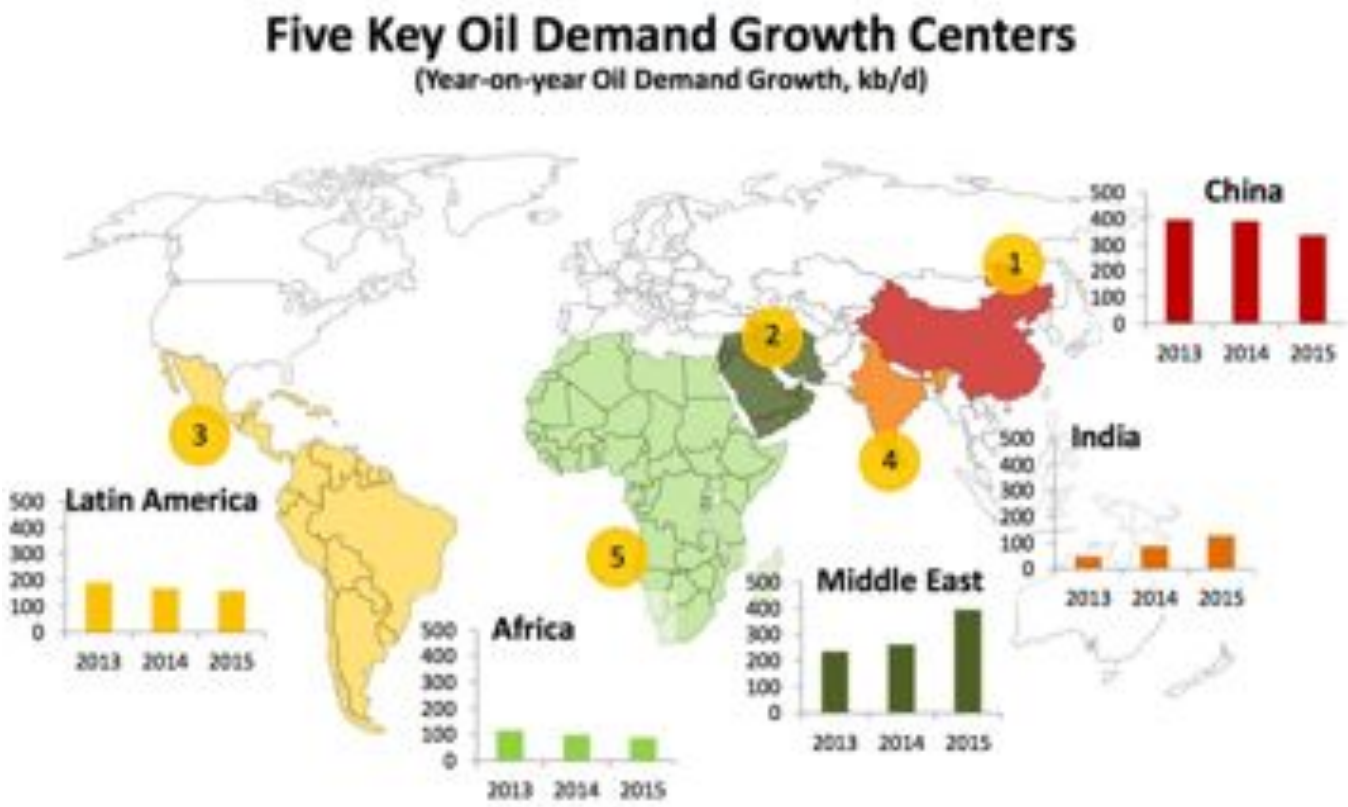
…then Iran has more to gain from low prices than Saudi Arabia because its volume is expanding. A large budget gap remains, but it closes more quickly in a low-price environment.



Revenue gap = (gross value of Saudi net exports) – (gross value of Iranian net exports)

Source: EPRINC calculations

ME is fastest growing demand center near-term



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Source: Facts Global Energy

Closer to Parity

- The Saudis retain a net revenue advantage, but they experience a decline in relative terms
  - Fuel subsidies are large in both countries. Ability to reign in subsidies and control demand should be considered.
- This analysis does include the value added from refined product exports or production costs
  - Both factors benefit Saudi Arabia
- However, this analysis excludes natural gas export potential – a scenario that greatly favors Iran

An economically resurgent Iran?

- This is not meant to be an indictment of nuclear negotiations with Iran
  - A strong argument can be made that rapprochement is the best option, assuming one believes that moderate forces within Iran will prevail
- Nuclear ambitions aside, the implications of an economically strengthened Iran should be considered
- Saudi oil production is not at risk, per say – but the country's plans involve little more than offsetting declines, not large amounts of capacity growth
  - Demand growth continues to increase as well, reducing net exports
- Like Russia, Saudi Arabia is entering a period in production is expected to remain largely flat, meaning it needs oil price growth to drive economic growth
  - (Note that Russia is entering a recession despite record oil production and oil prices constantly over $100 for the past few years)

The U.S. should watch for a reversal of Iran – Saudi fortunes

- It is possible that Iran has "hit bottom" economically while the Unites States' primary ally in the region has little economic upside
  - Even now, Iran exerts great influence in the region
  - Saudis have tenuous demographics and an aging monarch
- The trend is towards sanctions being relaxed, not tightened
- Iran has under-produced oil reserves and shut-in capacity
  - Although investment is critical to preserving capacity
- New contract terms have caught the attention of IOCs and foreign governments, particularly in Asia.
  - U.S. allies may be tiring of sacrificing economic benefit for unclear foreign policy goals (Germany – Russia, China – Vietnam, European and Asian allies pushing to enter Iran)
- Iran and Iraq seem to be entering a fledgling oil partnership. Given Iraq and Iran's Shia majorities and the amount of oil reserves in Shia dominated regions of Iraq and Iran (even SA), Iran stands to both benefit from production and affect production in nearby regions.
  - It was initially assumed that Iran would be hostile to Iraqi oil development. However, they may be deciding to join them, particularly as Iraq splinters and the opportunity to influence politics in the Basra region grows.

Turkey vulnerable to internal and external forces

- For many years Turkey has been a largely reliable U.S. and NATO ally
- But has very complex internal issues
  - Spillover from Syria
  - Increasing Islamization in parts of country – in part driven by unequal economic distribution
  - Gov't protests against what many consider to be Erdogan's creeping authoritarianism
  - The murky influence of the Muslim brotherhood
  - A history of coups
- Has been drawn closer to Russia as it replaces Ukraine as the main transit state for Russian (and Central Asian, and potentially Iranian and Israeli) energy to Europe.
  - Also relies heavily on Russian energy
- Complex KRG – Iraq relationship
  - Needs Kurdish energy, but does not want to anger Baghdad (too much)
- Struggling to balance ties with Iran and western sanction

Turkey is the Eastern energy bridge to Europe

- BTC (Baku – Tbilisi – Ceyhan) pipeline brings oil from Azerbaijan and the KRG to the Mediterranean
- Blue Stream brings 16 bcm of Russian gas into Turkey for domestic use and to be shipped on to Europe
- The proposed South Stream pipeline will bring 63 bcm of Russian gas per year through Turkish waters in the Black Sea to SW Europe
  - Effectively removes need to send any gas through Ukraine to Europe
  - Plans have progressed with Italy, Austria and Bulgaria despite Ukraine/Crimea issues
  - The Russians will have completely offset Ukrainian pipe shipments, with cooperation from individual EU states, before the EU gets a single project launched
- Successor to Nabucco, the Trans Adriatic Pipeline, would also traverse Turkey with Caspian and possibly Iraqi and Iranian gas
  - Another 'pipe-dream' perhaps, but shows Europe's desperation for reliable gas supplies

What does the U.S. offer Turkey?

- Turkey Receives over ½ of its ~40-50 bcm/year of gas imports from Russia
  - About 20% from Iran
- Fallout from the May coal mine disaster could lead to greater natural gas consumption (and imports)
- Iran and Iraq (KRG too) are its largest oil suppliers
- Despite considering the U.S. a strong ally, will Turkey, like much of Europe, become hesitant to support U.S. policy goals that place it at odds with its energy suppliers and ultimately risk economic growth?
- Consider also Turkey's complex internal politics, which many believe is shifting slowly towards authoritarianism and more conservative religious ideology, and the U.S.' recent failures in the region (Syria, Iraq) on issues important to Turkey
- If the U.S. values its relationship with Turkey, the U.S. must ask itself if we remain as valuable to them as in the past

Inconsistent policies make for unstable allies

- The U.S.' recent indecisiveness and failure to follow through on interventions has cost credibility with allies, particularly in the Mediterranean
- U.S. enabled regime change in Libya but did not stay behind to support stability
  - Oil supply is in flux, almost non-existent
  - Has faced an influx of foreign Islamist fighters. Algeria (Europe's 3rd largest energy supplier) and Egypt are cooperating to stem the tide of fighters entering their countries from Libya. Conflict with Muslim Brotherhood
- Pulled out of Iraq just as Syria was disintegrating
  - Some believe we never tried to negotiate in good faith with the Iraqi gov't to extend withdrawal timeline
  - Then tried to intervene in Syria and backed down
  - With a presence in Iraq, much of the spillover and influx of foreign fighters could have been contained. Stability in Iraq would have been better too
- No consistent policy with Egypt
  - Egypt has become a net importer of energy – was recently a gas exporter

Inconsistent policies make for unstable allies

- From Turkey through the Eastern Med. Sea and west to Algeria, instability prevails, with little expectation that the U.S. can or will provide stability
- Must not take a stable Mediterranean region for granted – yet the U.S. has already begun its Asian pivot and initiated a shift in fleets to Asia
  - There is a clear need for the U.S. in the Med. Sea and it has shown a willingness to intervene there, with mixed results. But to what extent is it willing to intervene against China with the assets being moved there?
- Russia is Europe's and Turkey's largest energy supplier. Iran is Turkey's second largest and is poised to play a greater role in European and Chinese energy supplies.
  - Europe has become a complacent ally and has shown its true colors during the Ukraine affair – and they cannot necessarily be blamed – the choice is propping up a corrupt former Soviet state or maintaining ties with their largest energy supplier
  - Saudis likely to have diminished influence
  - China is making large investments everywhere

Economic fatigue overtaking strategic priorities

- But most importantly, what will be the state of our allies in 5-10 years?
  - Saudis role will diminish as energy production stabilizes and exports decline
    - Change of leadership imminent too
  - North African nations in various states of disarray
    - Energy production likely to decline anyways
    - Even countries like Libya, who could not be considered an ally in the past, were somewhat manageable and predictable/stable
  - Europe and Turkey increasingly dependent on Russian energy – putting economies before strategic goals - also supportive of Iranian energy exports
- There is a large opportunity for Shia energy production combined with their relative unity, backed by Russia and China, to alter the power dynamics of the region
  - Shias, while a minority in the region, have not splintered the way Sunnis and their countries have
    - Secular forces vs. Muslim Brotherhood (Libya, Egypt, Turkey???), various Sunni extremist splinter groups (al-Qaeda, ISIS), vast amounts of foreigners crossing borders to fight in various Arab Spring related conflicts – almost all Sunnis.

Turkey Vulnerable

- Current instability in Med. Sea, the ME region and Ukraine is both a failure of U.S. (and EU) diplomacy, but is also indicative of economic and demographic weakness in U.S. allies
  - The strength of the U.S. is not necessarily the issue
  - Also, sanctions fatigue
- The question of whether or not the U.S. should choose to remain active in the ME region is often debated, particularly as the U.S. imports much less oil than just a few years ago. It may be worth asking if the decision is the Unites States' to make? The U.S. may find its role changed without consciously deciding to do so – our allies rise and fall may affect this.
- Europe and Turkey may not have much choice but to defer, in some cases, to energy suppliers – unless the U.S. can find another value proposition
  - U.S. energy exports important, but not enough to shift thinking or markets
- Turkey is one of the most important ME country to both Europe and Russia and is a NATO member – it will be tested by both internal and external conflicts and relationships

A Russian diplomat recently told EPRINC:

“We love China because they do not attach political considerations to their investments.”

Of course, this is a two-way street.

China's Peaceful Rise?: Economic Growth, Energy, Chokepoints, and Geopolitics

Presentation Overview

- Economically, China may be in for tougher times than expected. This could deeply impact oil prices, geopolitical climate.
  - Housing market, a huge source of Chinese economic growth and employment, under pressure
  - Oil demand dragging
- China is expanding its geographic footprint in East Asia via the South China Sea using aggressive, controversial methods
  - Nearly all expansionary claims are related to energy assets, real and potential
- Further abroad, China is expanding upon the Japanese passive investment model to gain access to resources
  - Often overpays for assets to establish a foothold
  - Investing in nearly every continent and in almost every major oil play
  - Clearly fears lack of access
- Acting out of fear rather than strength – timing of recent South China Sea aggressive actions coincides with significant and sudden decline in economic fortunes
  - China may want to reconsider its actions in the South China Sea given its incredible dependence on the Strait of Malacca and the responses of Vietnam and Japan

Economic Events

- Several major Chinese economic indicators have taken a turn for the worse in the spring of 2014
  - Housing starts have slowed dramatically
  - Real Estate accounts for 12.5-20% of Chinese GDP, according to several estimates, and 14% of total urban employment, or 90 million people (IMF data)

- The events in Ukraine have distracted the West and provided China with geopolitical opportunity
  - This gave China the ability to flex its muscles and distract from internal issues

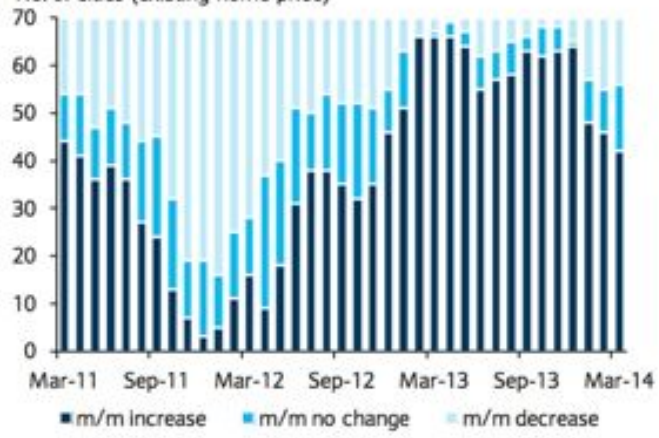
- China's recent economic stats, investment patterns, and territorial aggression indicate a deepening struggle within China to grow the economy internally and in a balanced fashion.

Housing's Recent Decline

Property starts and property investment growth

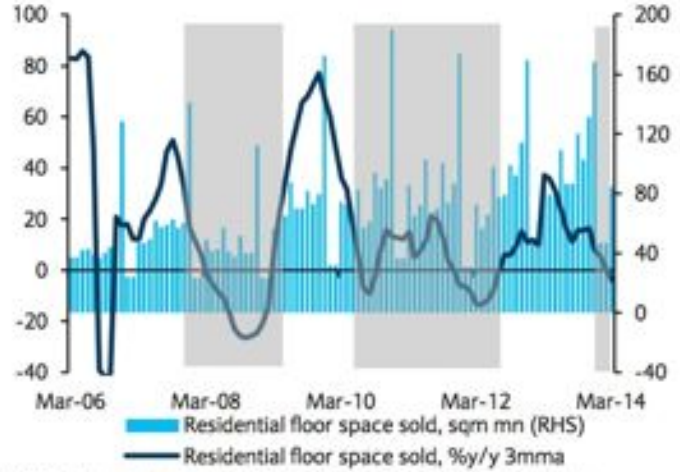
Source: CEIC, Barclays Research

No. of cities (existing home price)



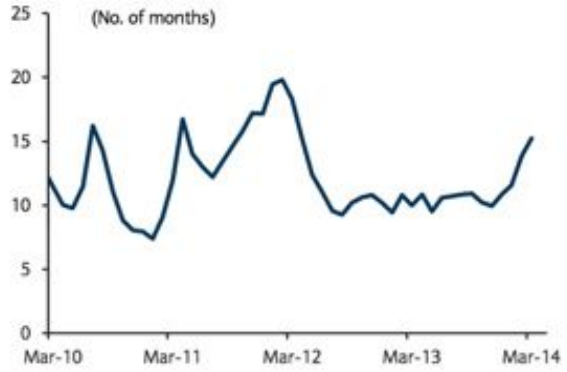
Source: CEIC, Barclays Research

Marked slowdown in home sales in Q1…



Note: Shades mark property downturn. Source: CEIC, Barclays Research

Housing inventory-to-sales ratio has risen sharply…



Source: CREIS, Barclays Equity Research

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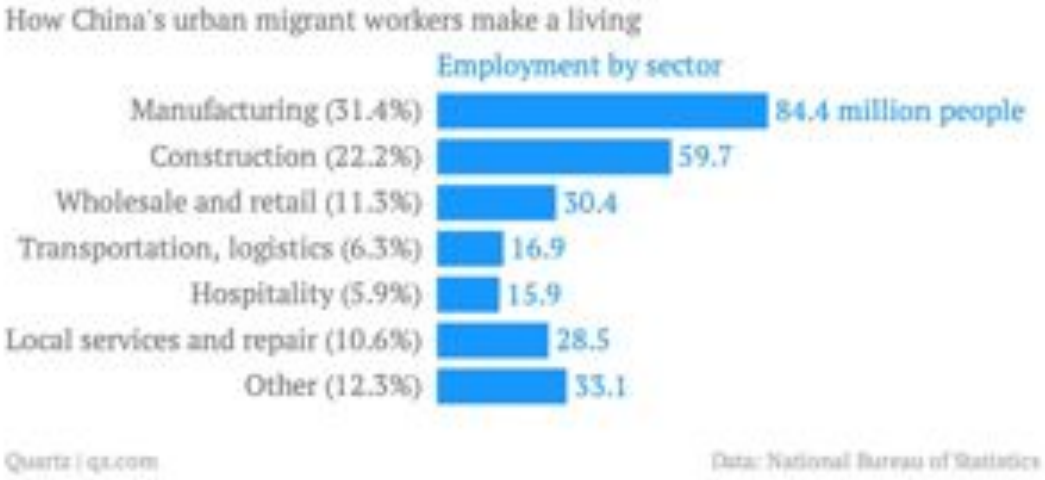
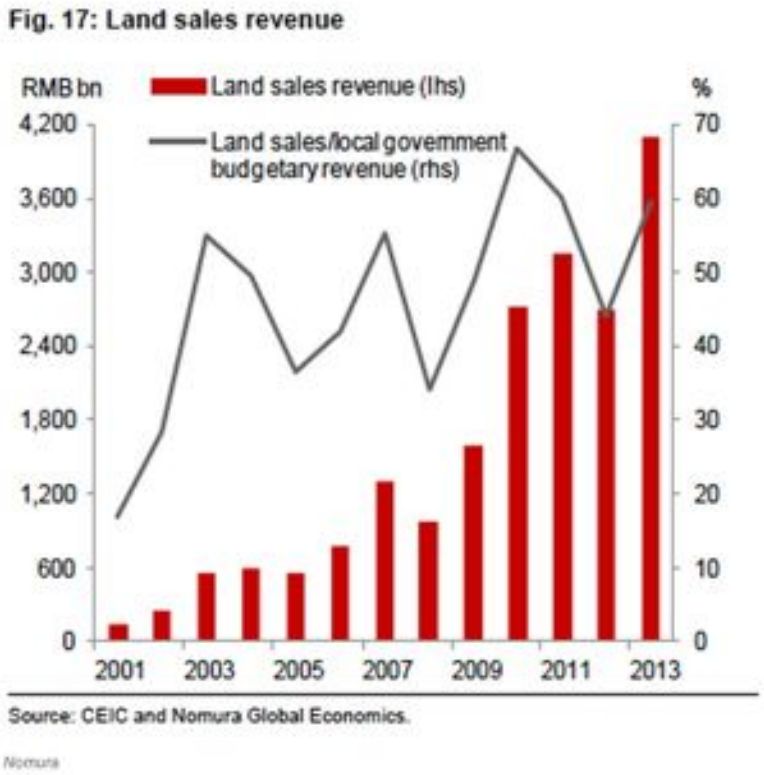
Source: QZ.com

Real Estate Construction and Employment





Source: QZ.com

Oil Demand Growth Is Slowing

China's Apr 2014 apparent oil demand

	Apr-14	Apr-13	% Change	Mar-14	% Change
Oil product import (million mt)	2.54	3.89	-34.7	2.37	7.2
Oil product exports	2.2	2.67	-17.6	2.74	-19.7
Net product imports	0.34	1.22	-72.1	-0.37	N.A
Crude throughput	39.58	38.13	3.8	41.92	-5.6
Apparent demand	39.92	39.35	1.4	41.55	-3.9
Apparent demand ('000 b/d)	9,754	9,615	1.4	9,825	-0.7

Sources: China's National Bureau of Statistics, General Administration of Customs, Platts

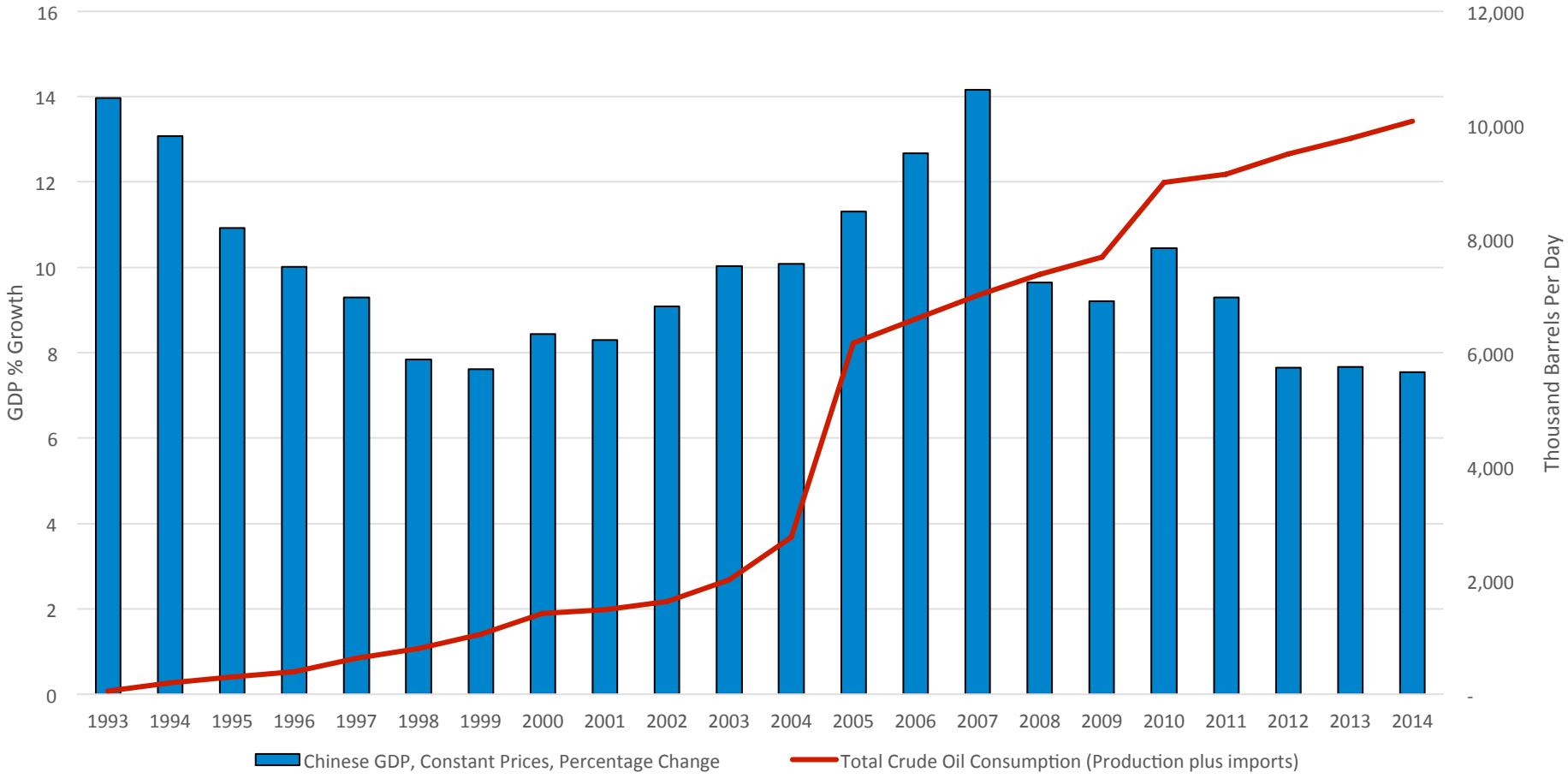
China's apparent oil demand

Source: Platts

Source: Platts, May 15 2014

GDP Growth and Oil Consumption

Chinese GDP Growth and Oil Consumption



GDP Growth and Crude Oil Consumption

- Three forecasts are provided to illustrate potential Chinese oil consumption based upon GDP growth. Looking at GDP growth and crude oil consumption since 2005, there is a 1% increase in oil consumption for every 2.4% rise in GDP. This ratio is factored into all three cases provided.

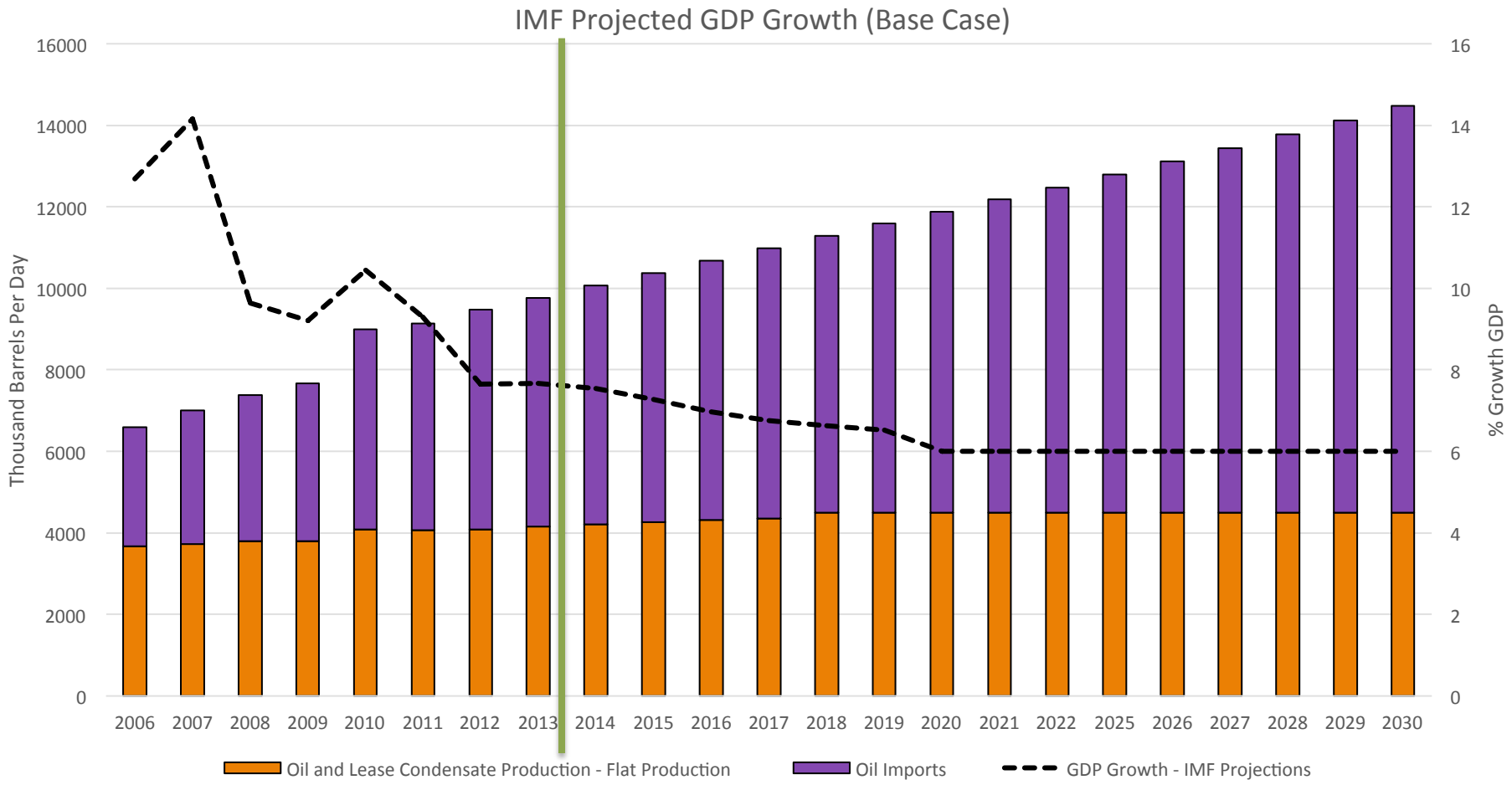
- These projections hold production relatively flat at 4.5 mbd, which assume difficulty increasing production through shale oil development and advances in offshore drilling while fighting declines in traditional onshore fields.

- Even with three different scenarios for GDP growth, crude oil consumption only varies by 2 mbd in 2030.
  - In the "Base Case" or "IMF projection case", GDP growth is 6% in 2030 and oil consumption is at 14.5 mbd.
    - This is a 4.7 mbd increase in consumption from 8.8 mbd in 2013.
    - Assuming flat production growth at 4.5 mbd means imports in 2030 would rise to 10 mbd. This is a 4.4 mbd rise from 5.6 mbd in 2013.
  - In the "High Case" or "Unexpected Turnaround" case with 7% GDP growth in 2030, oil consumption is at 15.2 mbd.
    - This is a 5.4 mbd increase in consumption from 9.8 mbd in 2013.
    - Assuming flat production growth at 4.5 mbd means imports in 2030 would rise to 10.7 mbd. This is a 5 mbd rise from 5.6 mbd in 2013.
  - In the "Low Case" or "Hard Landing" scenario with GDP growth at just 4% in 2030, oil consumption is 13 mbd.
    - This is a 3.2 mbd increase in consumption from 9.8 mbd in 2013.
    - Assuming flat production growth at 4.5 mbd means imports in 2030 would be 8.4 mbd. This is a rise of 2.8 mbd from 5.6 mbd in 2013.

- The base case is based on the IMF's projection for Chinese GDP to 2019 then assumes 6% GDP growth through 2030.

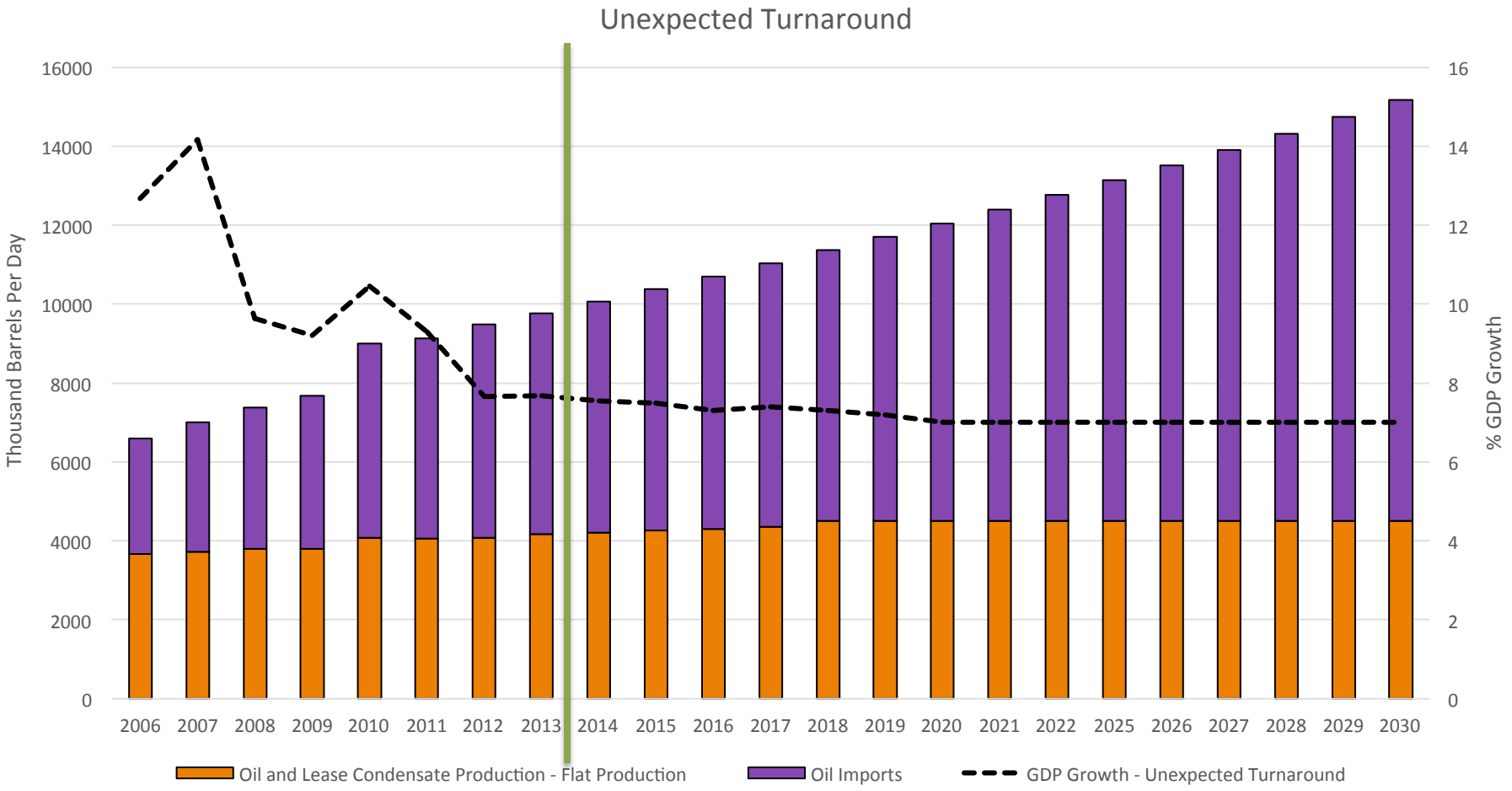
- Should there be an increase in production of crude oil, imports would decline correspondingly. If production increased by 2 mbd between now and 2030, imports in the base case would decline to 8 mbd and 8.7 mbd and 6.4 mbd for the high case and low case respectively.

Base Case – IMF GDP Projections



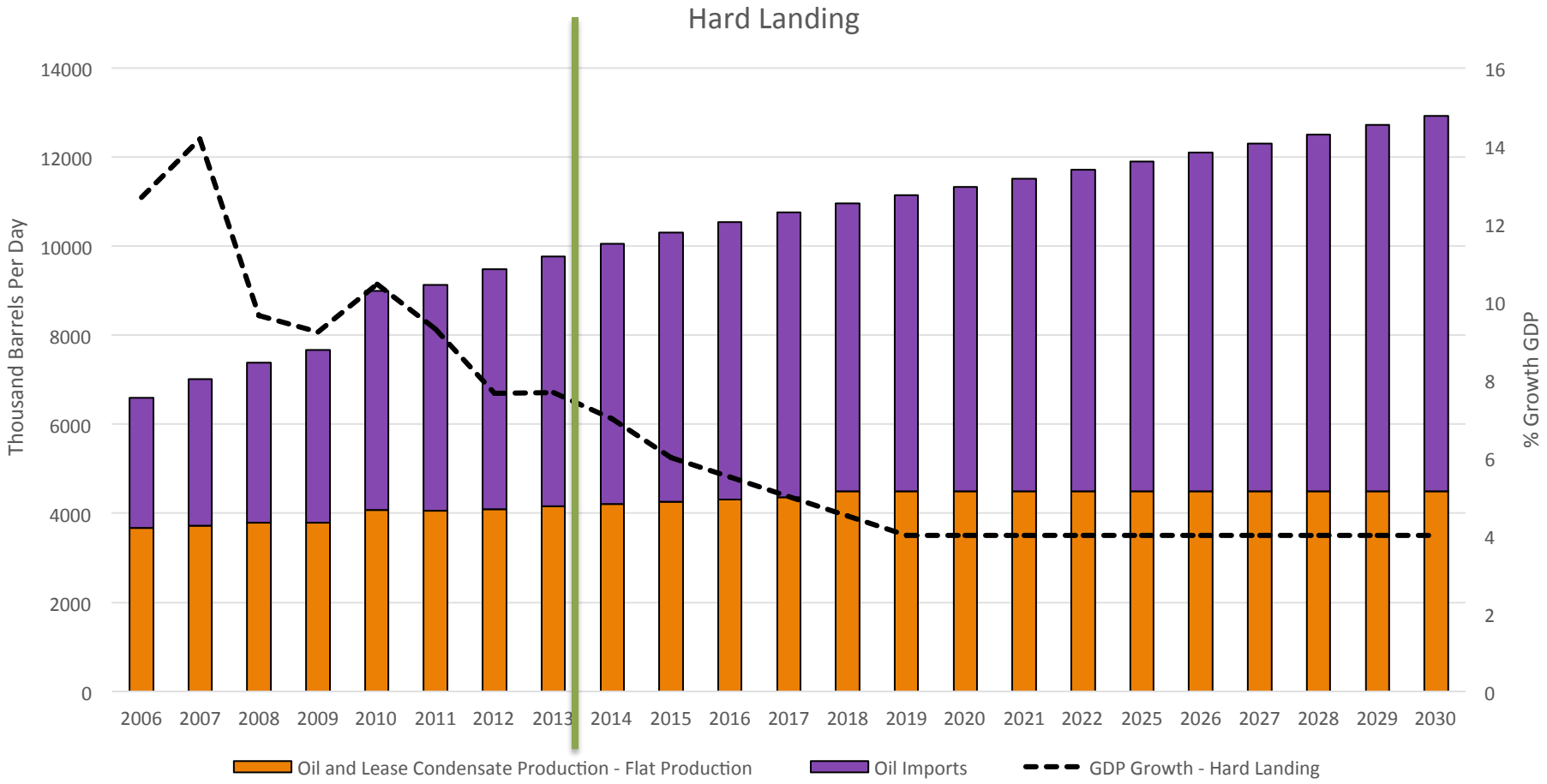
Source: EPRINC, IMF GDP forecast with 6% assumption post 2019. Assumption of oil consumption by GDP growth based upon recent GDP and oil consumption data from EIA and FACTs.

High Case – Unexpected Turnaround



Source: EPRINC, Assumption of oil consumption by GDP growth based upon recent GDP and oil consumption data from EIA and FACTs.

Low Case – Hard Landing

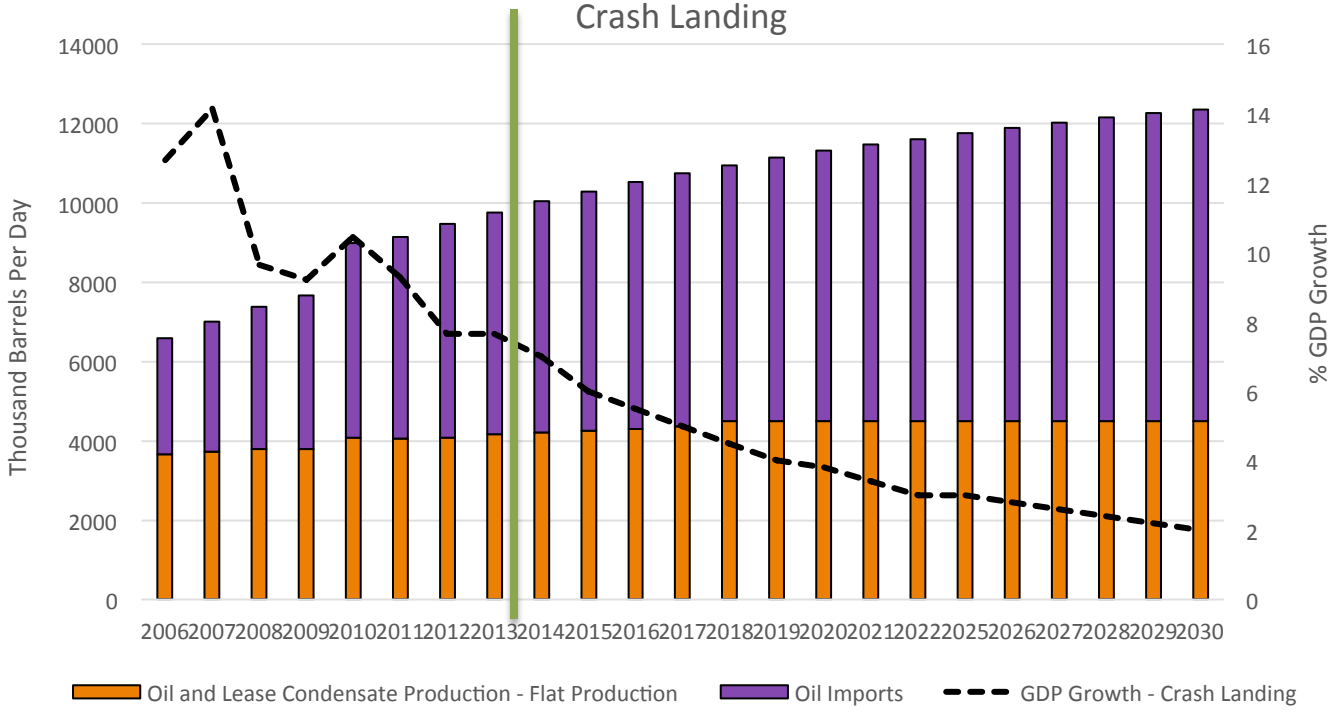


Source: EPRINC, Assumption of oil consumption by GDP growth based upon recent GDP and oil consumption data from EIA and FACTs.

Crash Landing…?

But what about a crash landing with dramatically deteriorating GDP growth?

Oil consumption growth remains steady and rises to just under 12.4 mbd. Assuming flat production of 4.5 mbd this would put imports at 7.9 mbd in 2030.



Source: EPRINC, Assumption of oil consumption by GDP growth based upon recent GDP and oil consumption data from EIA and FACTs.

Impact of a Crash Landing

- Projecting growth in any country is a difficult task, but exceptionally so in a developing country with data that lacks full transparency.

- Should the bears be correct in that China's market is on the cusp of a major housing and financial crash, 2 mbd is easily up for grabs. In other words, 2 mbd will be left on the world table to consume. This assumes that China has a crash landing vs. the IMF projected base case and by 2020.

- Economies and oil demand of many neighboring countries would be severely damage given their economies' growing dependence on Chinese growth. A crash in China would mean a substantial ripple effect throughout Asia and would likely impact many smaller countries.

- An extra 2 mm bd+ of oil could remain on the market and could affect upstream investment decisions. U.S. production could be impacted rather deeply by a price decline.

Chinese Oil Supply and Demand Overview

- Chinese production and consumption
  - Chinese oil production is about 4.3 mbd and is expected to remain stagnant as Chinese companies suffer from lack of offshore drilling experience and declining onshore fields
  - While reserve estimates vary widely for unconventional oil, gas, and CBM, there is currently limited knowledge, high cost, and great uncertainty regarding the geology
  - The true potential of China's geology will not be known for many years to come.

- Chinese oil demand, heavily underpinned by economic growth, has risen steadily to around 10 mbd, but has slowed year over year from 7% in 2012 to 3.5% in 2013 due to slower economic growth.
  - Economic growth is expected to continue, but at a continually slower pace….single digit growth around 7% and not the historical 10%.
  - Many Asian countries so tied to China that should China's economy continue to slow, other countries in Asia would also. This would mean significant declines in energy consumption and in turn likely lower oil pricesw

- China imported an average of 5.6 mbd of crude oil in 2013.
  - The lion's share of these imports were from the MENA region and are increasingly from nation's with troubled governments and history
  - As imports rise from volatile regions, volatility in the oil market will also increase
  - Not only is China reaching into far more volatile regions, China must increase ties with nations such as Russia and Pakistan to secure land based routes for crude oil imports in case there is a disruption in the South or East China Seas

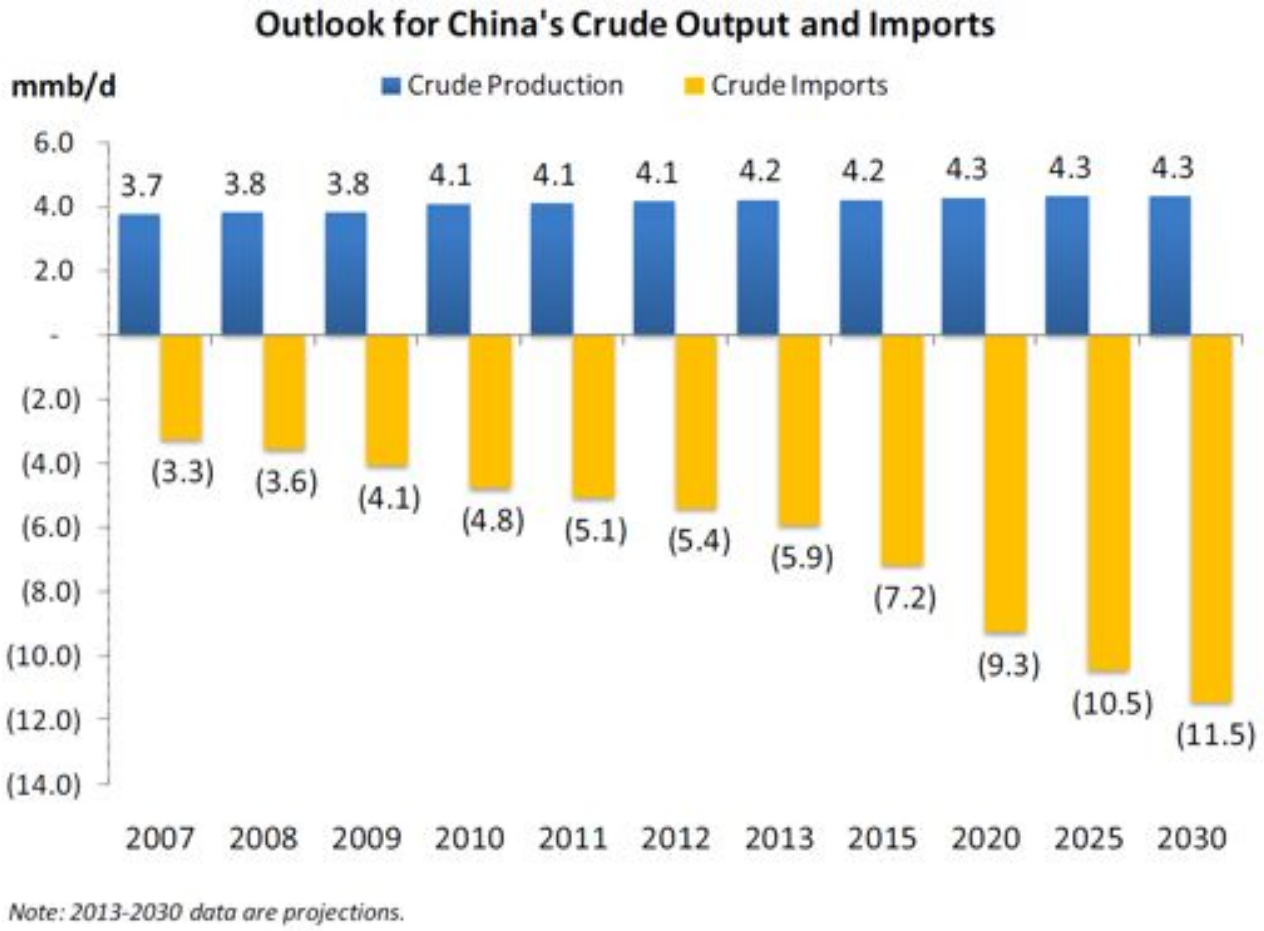
China's Gas Appetite is Growing

- Chinese gas demand is also rising. China will continue to pursue unconventional gas, but it has and will continue to be heavily reliant on LNG that must flow through clogged choke points along with oil.

- Over 80% of China's oil imports flow through the Strait of Malacca, a narrow and increasingly active chokepoint which sees over 15 mbd of oil flow each day

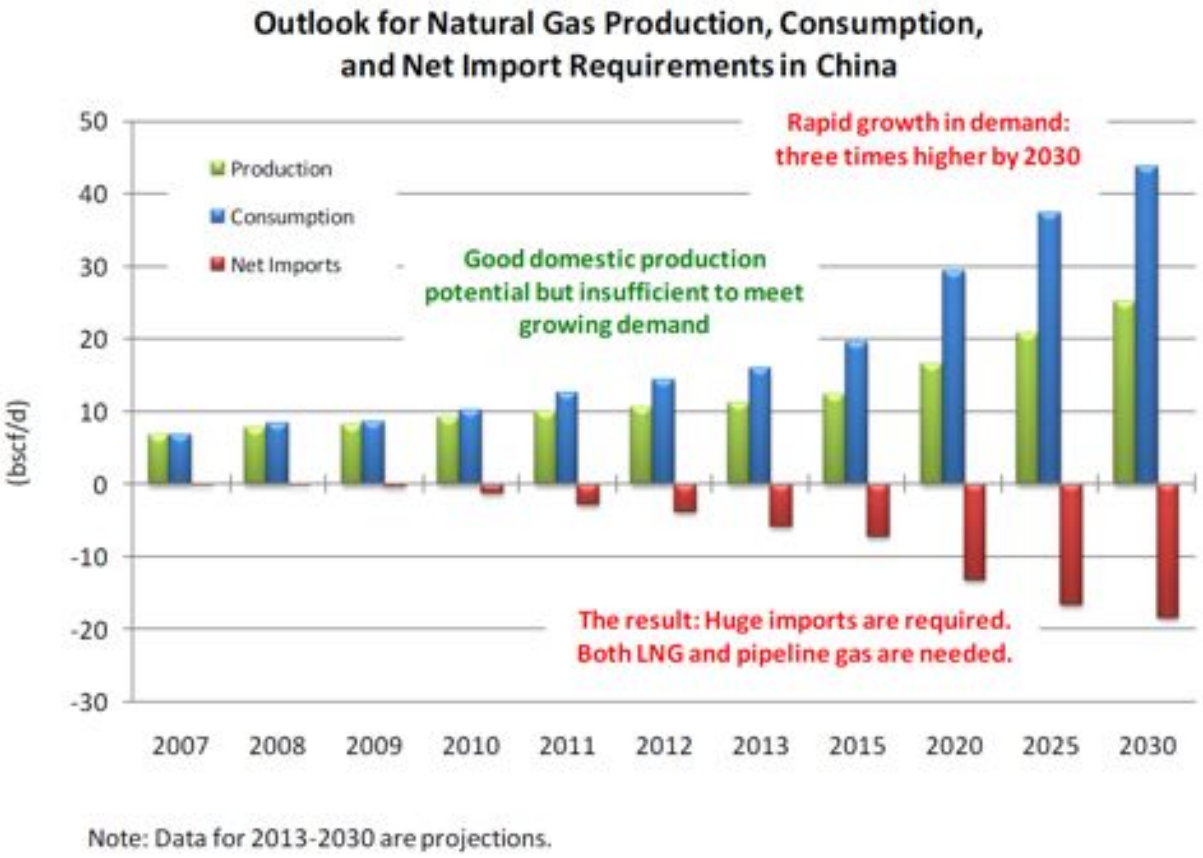
- China is also vulnerable to the Mandeb and Strait of Hormuz chokepoints

Assumed Crude Production and Import Outlook



Source: FGE-FACTS Global Energy, Dr. Kang Wu, June 2013 presentation

Nat Gas Outlook



Note: Data for 2013-2030 are projections.

This growth in nat gas production, shown in green, may not be realistic given China's uncertain geology and cumbersome CBM (coal bed methane) reserves along with a lack of experience.

Source: FGE-FACTS Global Energy, Dr. Kang Wu, June 2013 presentation

Barriers High for Unconventional in China

Figure 1.2 Summary of Development Outlook for Major Shale Resource Countries

Country	EIA Resource Estimate (Tcf)	Services Industry	Pipeline Network	Water Access	Geological Complexity	Gas Reserves/ Capita (Mcf)	Shale % of natural gas production	Outlook
Argentina	774	🟡	🟡	🟢	🟢	318	<5%	• Success during the Nascent stage is driving investments needed as an Incubator • Maintaining a favorable investment climate is needed to become a Decoupler
China	1,275 (886)*	🔴	🟡	🟡	🔴	80	<3%	• International partnerships needed to overcome geological complexity • Services sector needs shale experience and water is a concern • Unlikely to be a Globalizer
Poland	187 (12 – 27)†	🔴	🔴	🟢	🟡	88	N/A	• Stable investment climate needed to reinvigorate investments • Must demonstrate commercial viability of its shale • Unlikely to be a Globalizer
United States	482	🟢	🟢	🟢	🟢	966	23%	• Poised to be a Globalizer with LNG exports • Government export approvals are determining factor

* Ministry of Land and Resources (China) estimate.
† Polish Geological Institute (Poland) estimate.
Tcf = Trillion cubic feet
Mcf = Thousand cubic feet

🟢 = low barrier 🟡 = moderate barrier 🔴 = high barrier

Source: Deloitte, Oil and Gas Reality Check 2013

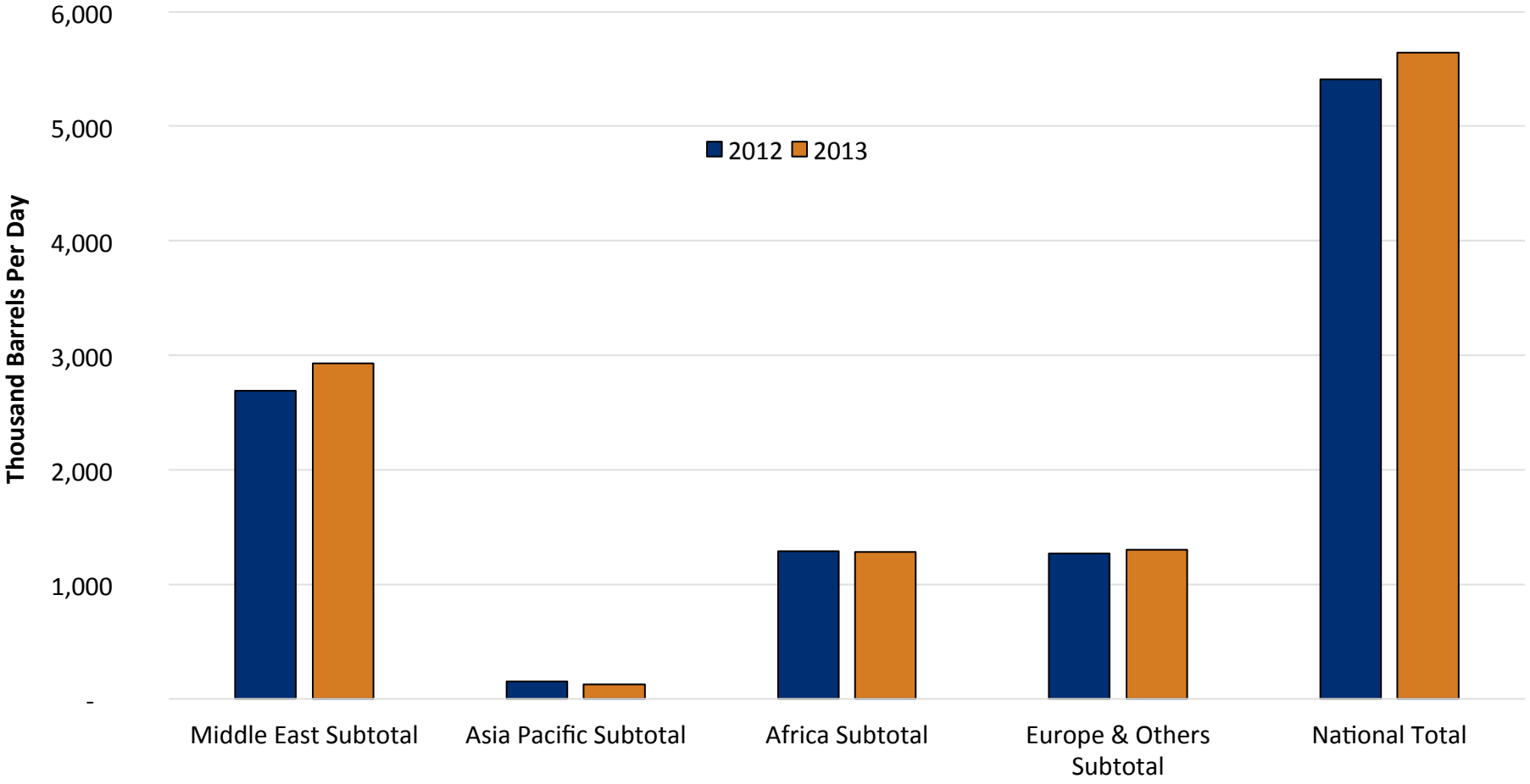
China's Crude Oil Imports

Diversifying Oil Imports

- China is diversifying crude oil suppliers
  - There is not necessarily a discernable pattern to this diversification
  - Matches investment patterns – diversification as protection seems to be key whether it provides tangible benefits or not

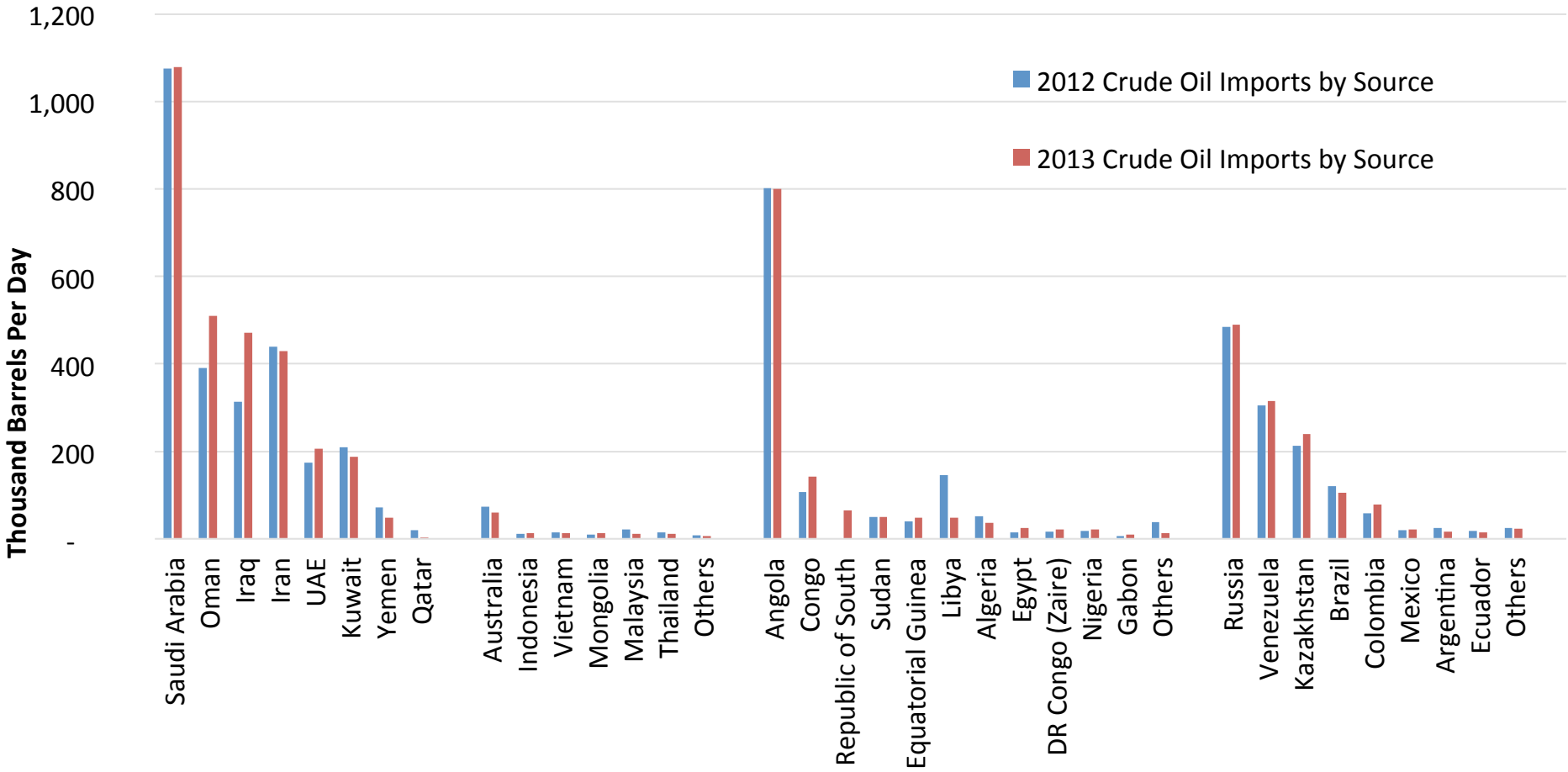
- In some cases, China is importing growing volumes of crude oil from suppliers who have seen exports to the U.S. decline
  - Imports almost as much crude oil from Saudi Arabia as the U.S. does
  - And now imports more from OPEC than the U.S.

Chinese Crude Oil Imports 2012 vs. 2013 by Region



Source: FACTS

2012 vs. 2013 Crude Oil Imports by Country



Source: FACTS

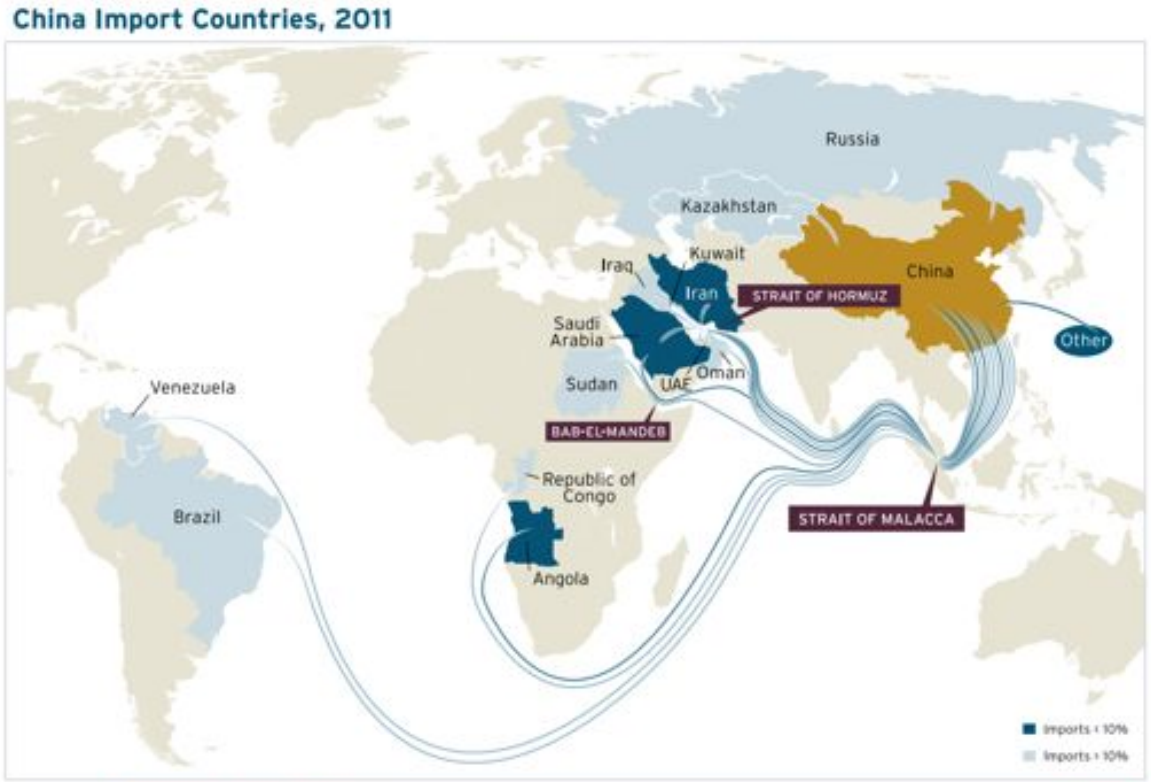
Chinese Oil Imports by Country

	Saudi Arabia	Angola	Russia	Iran	Oman	Iraq	Venezuela	Kazakhstan	UAE	Kuwait	Congo	Brazil	Sudan	Libya	Other Middle East	Other Africa	Others	Total
1995	7	20		19	73				7					4	50	10	150	340
2000	115	173	30	141	315			15	9	9			67	3	169	98	270	1414
2005	445	351	257	287	218		39	26	52	33		27	133	45	171	244	227	2555
2006	479	471	321	337	265		84	54	61	56		45	97	68	119	283	175	2915
2007	529	502	292	412	275		83	120	73	73		47	207	58	99	298	209	3277
2008	730	600	234	428	293		130	114	92	118		61	211	64	138	208	171	3592
2009	639	644	306	463	233	143	105	120		142			244	127			711	3877
2010	893	788	284	426	317	225	130	184		197		151	252	148			922	4917
2011	1005	623	395	555	363	276	230	224	135	191	113	134	260				572	5076
2012	1026	756	486	432	486	432	324	216	216	162	108	108	50	146			459	5407
2013	1078	800	489	429	510	470	315	240	206	187	142	105	49	48			575	5643

IEEJ June 2012 report data source: compiled from OGP etc. 1995-2008

FACTs Global Energy/EIA, 2009-2013

Nearly all imports via Malacca

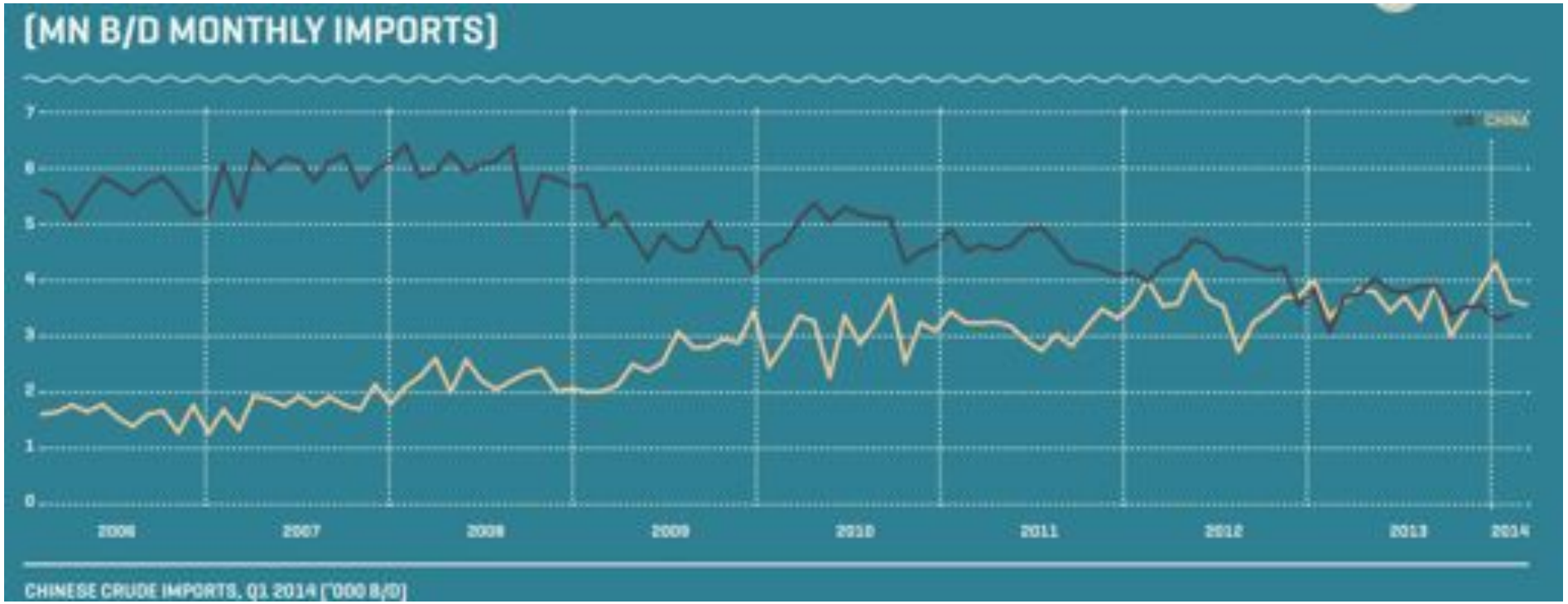


Country	Saudi Arabia	Angola	Iran	Russia	Oman	Iraq	Sudan	Venezuela	Kazakhstan	Kuwait	UAE	Brazil	Republic of Congo	Other
Percentage of Imports	19.8	12.3	10.9	7.8	7.2	5.4	5.1	4.5	4.4	3.8	2.7	2.6	2.2	11.3
Thousand Barrels	366,825	227,395	202,575	144,175	132,495	100,740	94,900	83,950	81,760	69,715	49,275	48,910	41,245	208,780

Created by Marcia Underwood of the Brookings Institution with data compiled from the U.S. Energy Information Agency's China Country Report 2012. http://www.eia.gov/countries/cab.cfm?fips=CH

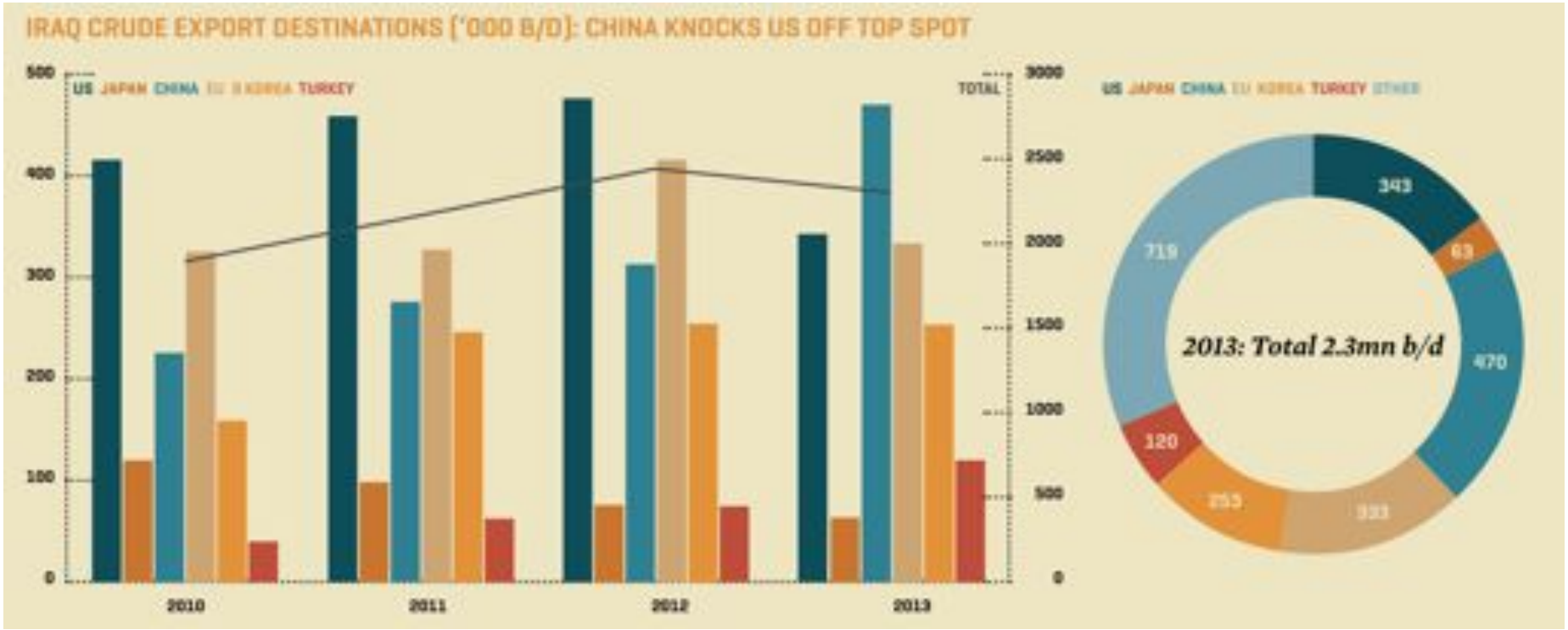
Source: Fueling a new Disorder? the new Geopolitical and security consequences of energy Project on international order and strategy at BrooKinGs, March 2014

China Overtakes U.S. for OPEC Imports



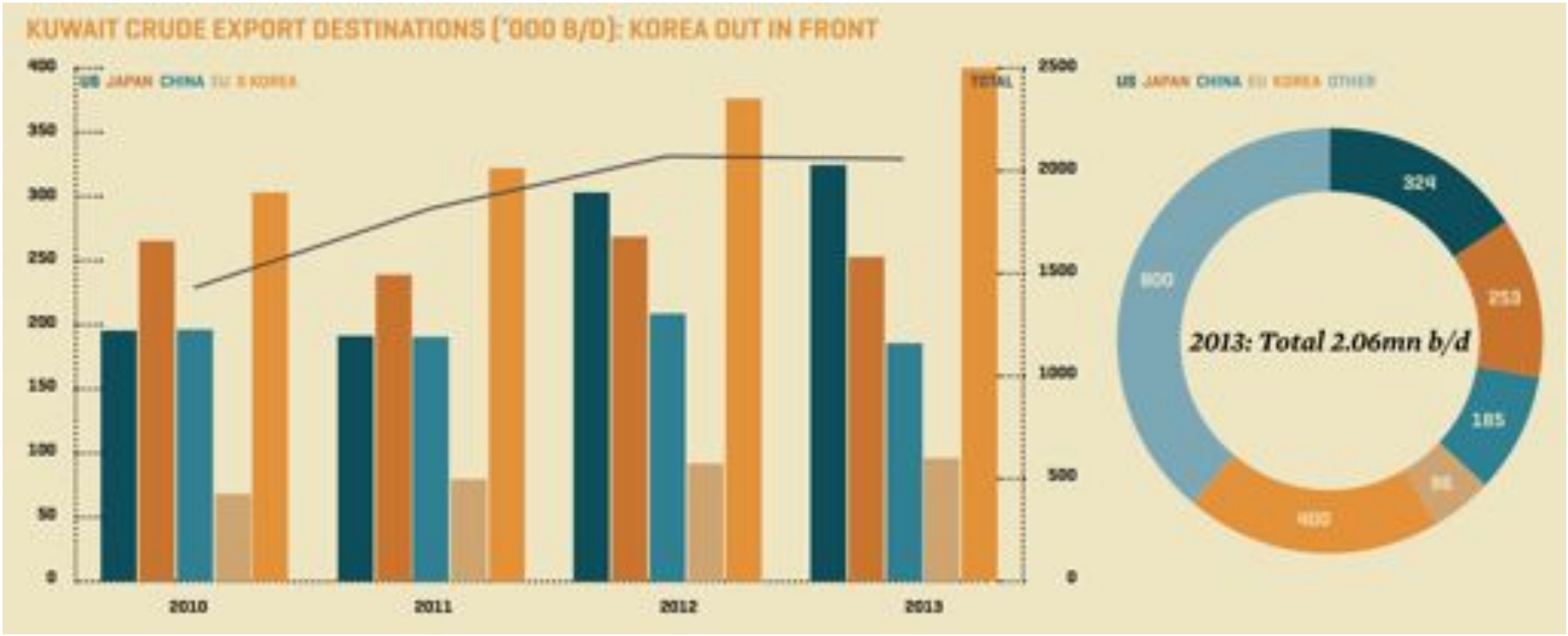
Source: Mees, May 2 2014

Iraq to China in 2013: 470,000 b/d



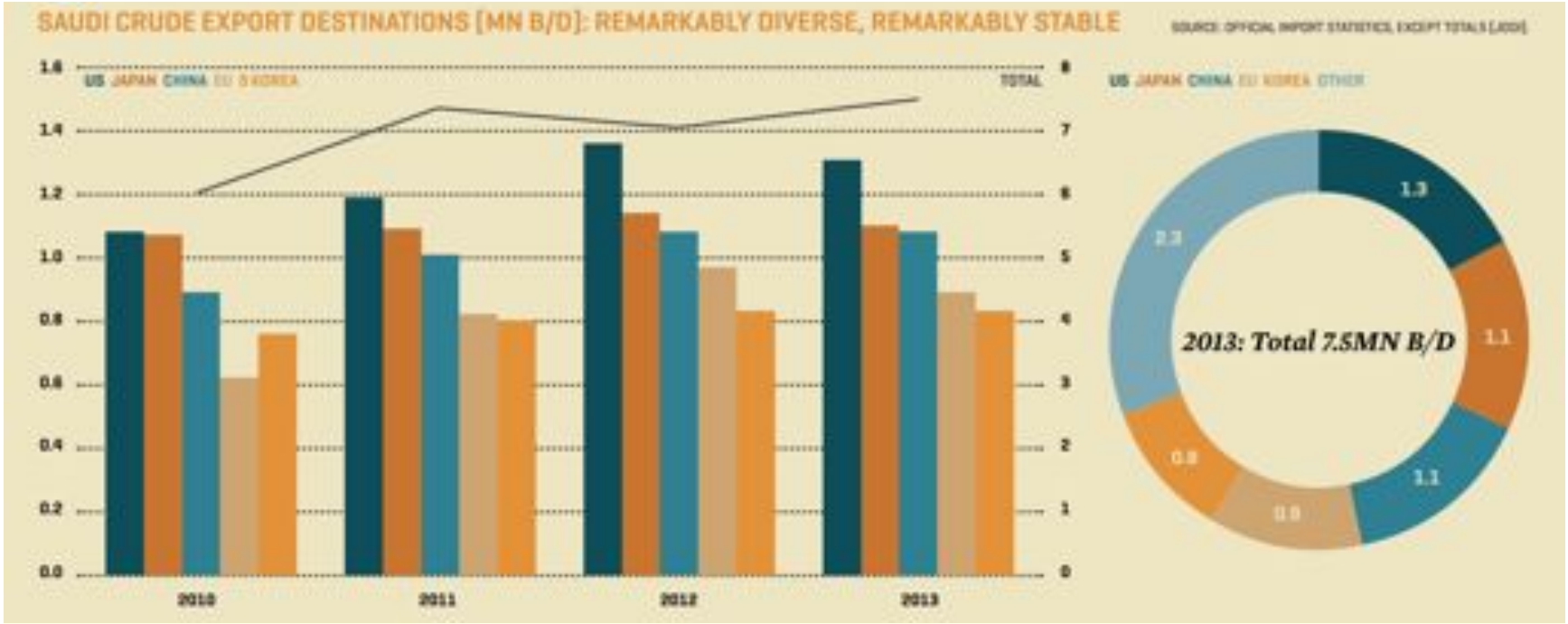
Source: Mees, April 18 2014

Kuwait to China in 2013: 185,000 b/d



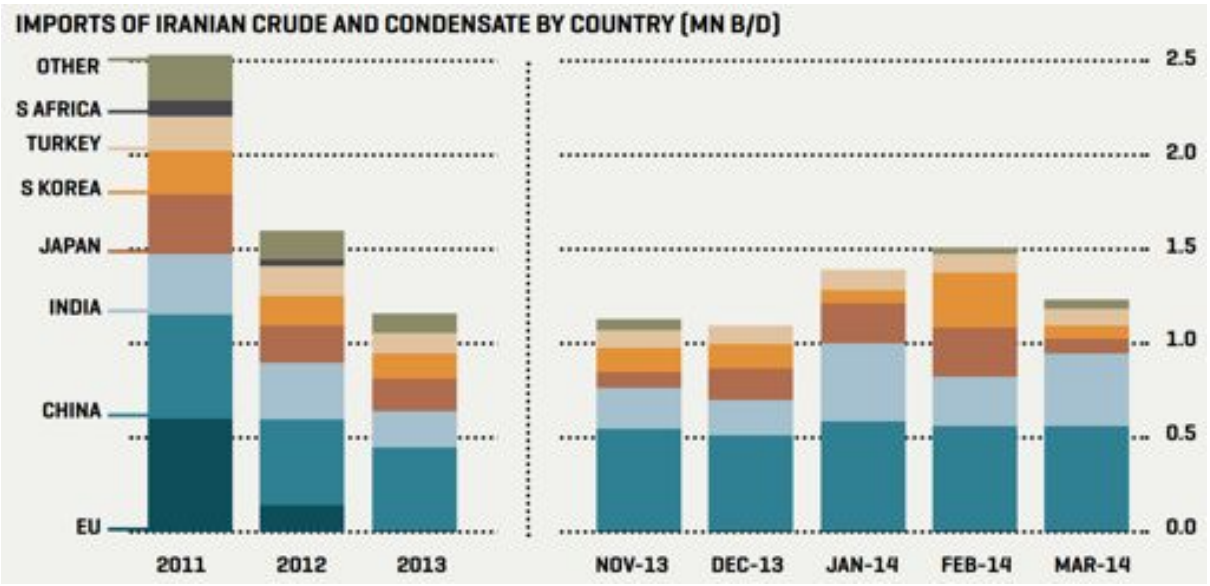
Source: Mees, April 18 2014

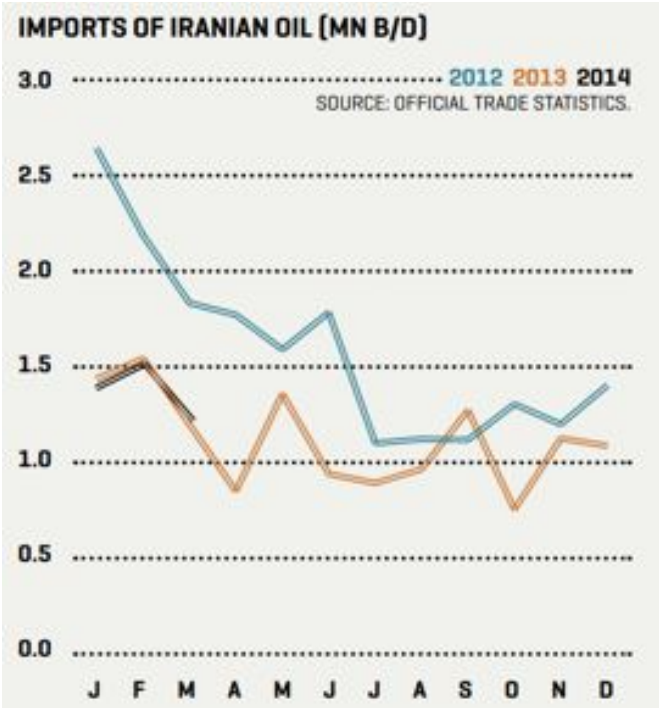
Saudi Arabia to China in 2013: 1.3 mbd



Source: Mees, April 18 2014

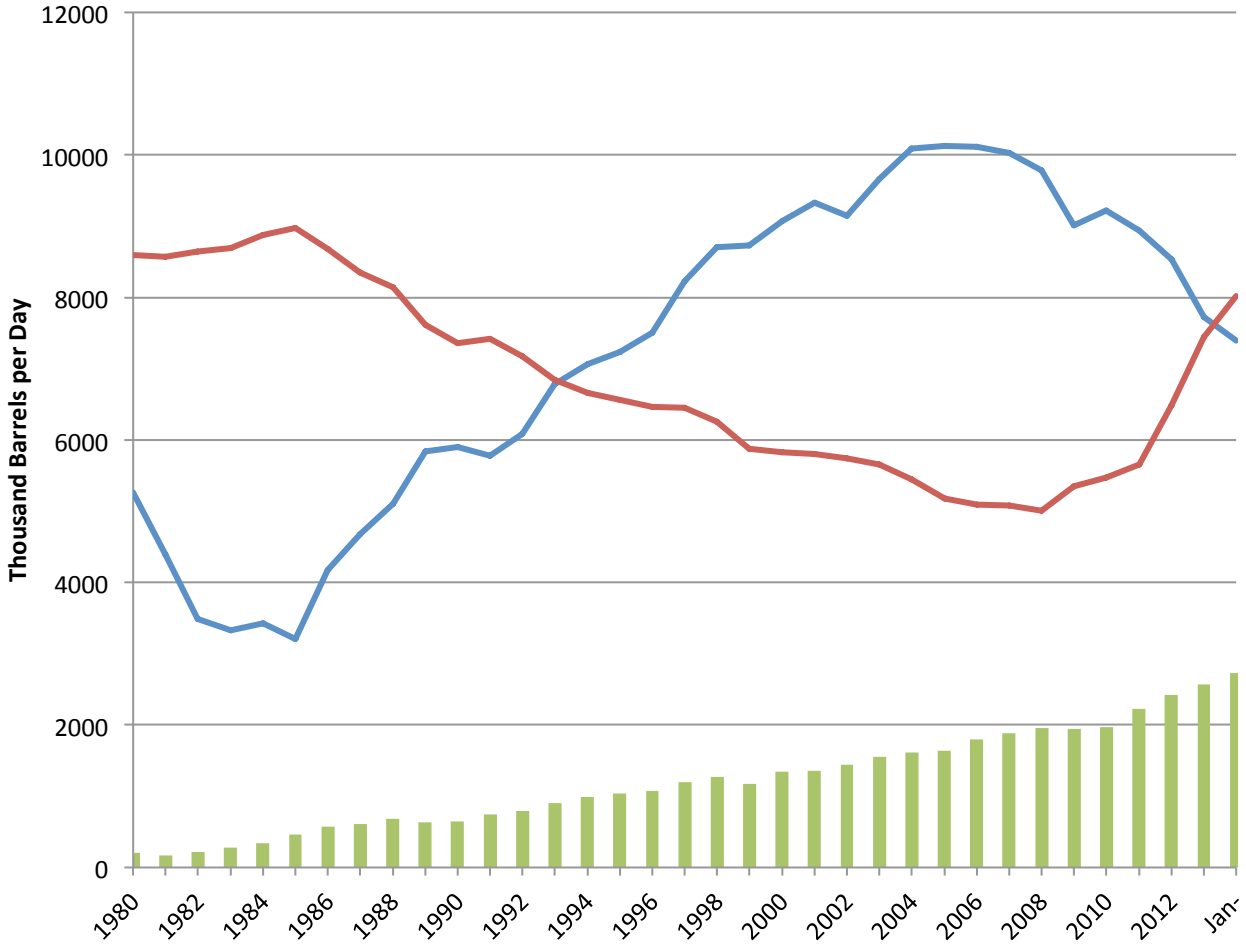
China's Imports from Iran Stay Steady





Source: Mees, April 25 2014

More Available on the World Market for China

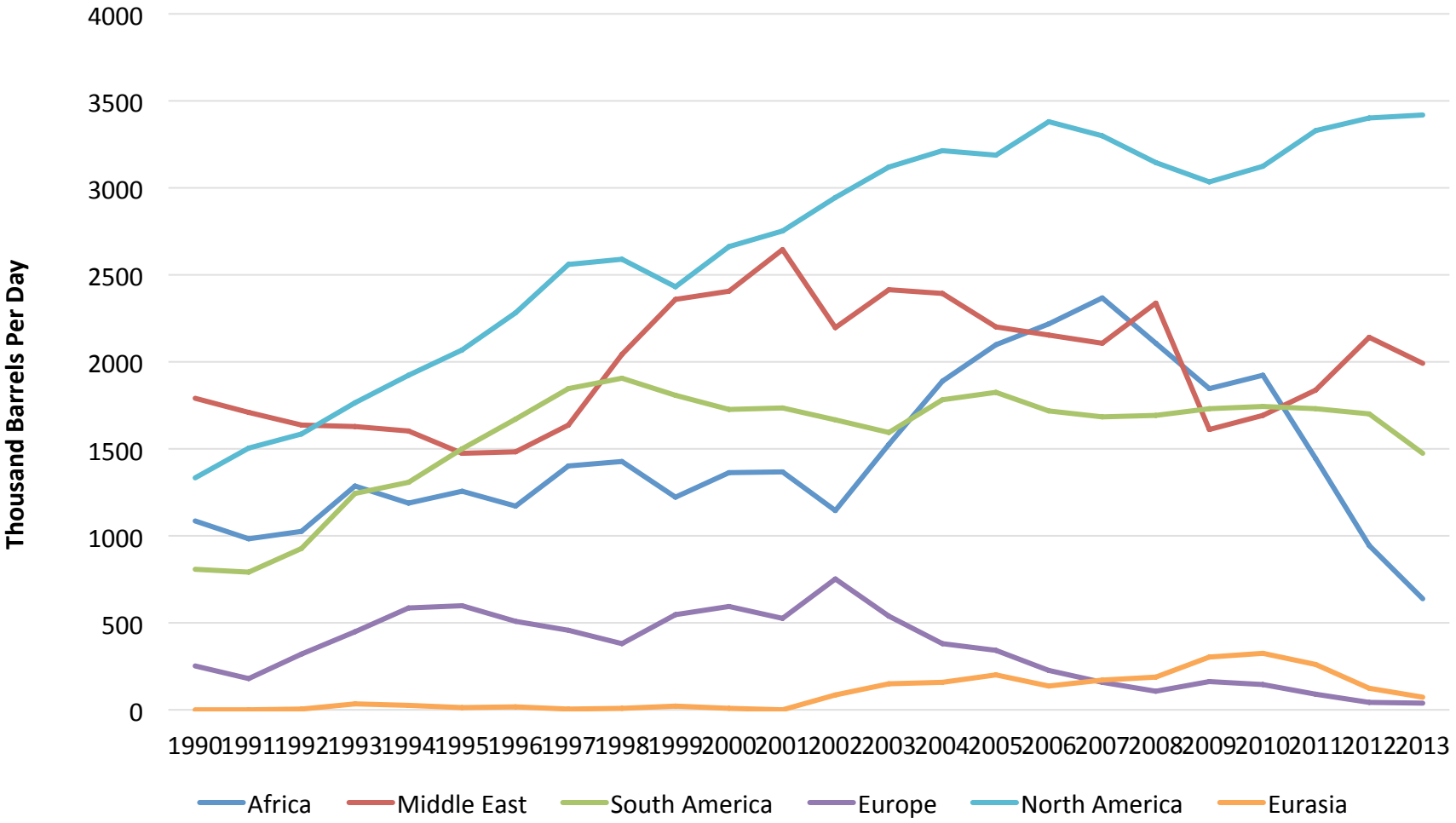


- U.S. imports dive as production climes

Canadian Imports 2.8 mbd or 36%

Source: EIA

U.S. Imports from Abroad Steadily Decline



Investments and Strategic Relationships

The Housing Hangover is Coming

Reuters, WSJ, May 5th 2014

Winson New Materials, WSJ, April 15, 2014

"A combination of a huge oversupply of housing and a shortage of developer financing is producing a housing market downturn that could drive China's GDP to less than 6% this year…Nomura bases a lot of its argument on the observation that that property investment turned negative in four of China's 26 provinces in the first quarter of 2014, and in two of them, Heilongjiang and Jilin, the fall was greater than 25%. To Nomura, that's a warning sign of similar problems to come in other Chinese provinces. Falling investment leads to falling levels of construction and sales. And given the property market's huge role in the Chinese economy, declining growth in the property sector means declining growth in GDPIn one regard, Nomura may be conservative. It estimates that real estate and related industries, such as steel and cement, account for 16% of China's GDP. Other economists put the figure at around 25%."

WSJ, May 5, 2014 "China's Property Bubble Has Popped, Report Says"

What does slower economic growth mean for Chinese behavior?

- Should the economy continue to slacken China will require less oil, but marginally less (2 mbd difference by 2030). This means that China will continue to need oil to oil to fuel even a marginally growing economy.

- China's view of energy security is characterized by its "go out" strategy (when in the early 1990s when it started importing oil) and its distrust of the market (the reason China tries to pursue equity oil ventures and security of supply). In a environment of slower economic growth and a population demanding jobs and higher living standards, China will be further pressured to secure energy supplies. China may seek to push its territorial claims in the sea to advance this energy security cause as well as demonstrate strength to its populous.

Slow Growth Behavior…continued

- China's push into the South China Sea has been relatively gradual over the past several years. However, their strategy shifted abruptly on May 3rd 2014 with the deployment of a CNOOC rig in the South China Sea near Vietnam and the contested Parcel Islands. The rig was accompanied by 80 military ships and vessels for its deployment and is within Vietnam's 200 nautical mile "exclusive economic zone." Vietnam has reacted by sending coast guard and military ships to the site and demands that China remove the rig.

- This action by China, just weeks after Obama's visit to Asia, shows determination and offers definition to what China means by seeking territorial claims and providing energy security. Furthermore, it undercuts major Chinese oil company scholars such as Erica Downs and Trevor Houser who have argued for years that Chinese National Oil Companies (NOCs), such as CNOOC, act in their own right with their own motives rather than the motives of the Communist government of China.

Intense and Almost Erratic Investment Abroad

- Investments and actions suggest a paranoia regarding energy security.

- China has tended to overbid and overpay for assets abroad. This reflects China's desire to secure energy supplies at any cost and illustrates China's inherent distrust in market mechanisms to supply energy (even if this method does not work in practice).

- However, Chinese NOCs have vertically integrated with their own service companies, creating a lucrative business model for investments in which they serve as an operator.

Continued…Intense and Almost Erratic Investment Abroad

- Firstly, Chinese State Owned Enterprises (SOEs) and National Oil Companies (NOCs) have moved abroad partly because of China's "go out" strategy which encompassed economic reforms and an attempt to secure resources and useful assets abroad. Economic reforms over the past decades have resulted in Chinese companies becoming more independent than in the past.

- Chinese NOCs though have moved abroad for multiple reasons. Because NOCs must sell a certain amount of oil to China at a discount (subsidized oil to China), going abroad allowed them to produce additional oil which could be sold on the world market. (This inherently provided energy security to China by adding additional supplies on the world market, helping to keep prices steady. But Chinese companies also produce oil in extremely volatile regions which some scholars argue actually reduces oil price stability).

Defining Chinese Investment and Activity Abroad

Africa

- More imperialist in nature than other investments and relationships. As Western powers moved out of Africa in the past two decades due to political/rights issues and continued volatility, China saw a vacuum and an opportunity.

- Investments in oil and gas, minerals and other sectors seek to establish equity oil and equity assets (securing supply), but also seek to establish a foothold in Africa for future opportunities. Oil imports from Africa are somewhat low given the investment that takes place there, but Africa is a long-term play for China
  - there are other advantages to Africa, such as the ability to employ Chinese workers (controversial).

Defining Chinese Investment and Activity Abroad

North America –

- Chinese investment in North America has risen significantly in the past few years. These investments have been in the energy and mineral sectors, as well as other businesses. Similar to Africa, investments in North America have been extremely expensive and marked by overbidding.

- Oil related investments in Canada and the U.S. are largely underpinned by two factors: acquiring knowledge and partnerships (at least a hope to do so) and securing oil supplies.
  - Even if supplies are not shipped directly to China.

Defining Chinese Investment and Activity Abroad

- **Canada:** China has acquired a substantial foothold in the oil sands. China also has stakes in the Northern Gateway pipeline that could potentially enable oil sands shipments to Asia. But for China this was an opportunity to secure a resource that could potentially be accessed in the future, foster a relationship with Canada, and use that relationship to help export that crude oil to China. Canada in turn welcomed Chinese and other Asian investment because the oil sands are costly to produce and require substantial capital investments.

- **U.S.:** Large and medium sized independent oil companies have utilized Chinese investment dollars to finance expensive shale oil and gas exploration in the U.S. over the past five years. The companies saw this as an easy opportunity to secure funding for drilling and de-risking acreage and China saw this as an opportunity to acquire knowledge and partnerships to develop shale resources in China. Unfortunately for China, the relationship has largely been one sided to date with U.S. independents receiving the vast majority of the benefits (little ROI for China in terms of knowledge or cash).

Defining Chinese Investment and Activity Abroad

Middle East –

- Chinese investments in the Middle East are strategic in nature. China often attempts to operate non-politically in the ME region so that it may work with a large swath of countries.

- China imported nearly 3 mbd from the Middle East last year with the lions' share coming from Saudi Arabia, Oman, Iraq, and Iran. Despite sanctions, China's Iranian crude imports stayed steady at just over 400,000 b/d per year.

- China has significant investments in Iran and Iraq, both of which come with their own dilemmas. As of late, China has been kicked out of projects in Iran because they have not been aggressive enough in increasing field production. But Iran holds immense potential for China and other major producers should sanctions be altered.

Defining Chinese Investment and Activity Abroad

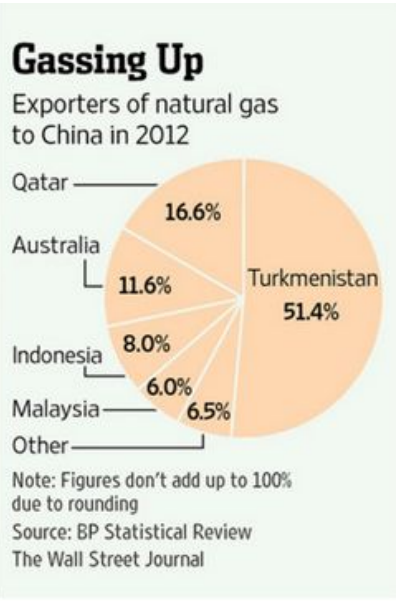
Russia/Eurasia –

- China's investments in Russia and former Soviet countries are largely about security of oil supply. Russia also provides a counter to American and Western influence in the Middle East and Asia.
- Both Kazakhstan and Russia provide secure land based routes to transport oil imports. Over 80 percent of China's oil imports come through the Strait of Malacca and the South China Seas, a vulnerable maritime supply route. Without securing further supplies from land based routes, China cannot risk volatility in the South and East China Seas. (thereby limiting their capacity to persue territorial maritime claims that hold immense oil and gas production promise.) Both of these countries are strategically important to China in terms of oil supply.
- Russia currently provides China with 500,000 b/d of oil imports and secure pipeline routes with the potential to increase imports. China has a large stake in oilfields of Kazakhstan, imports 240,000 b/d via pipeline, and has a strong steak with the Kazak government.

Ukraine Crisis Opens Further Opportunity for China

Russia's President Vladimir Putin

Agence France-Presse/Getty Images



Source: "China gets upper hand in Russia gas deal", May 14 2014, Abheek Bhattacharya

- Details of Russian gas deal are murky:
- Approximately $400 bn deal
- 38 bcm/year from 2018 to 2038
- Timing suggests an act of desperation on Russia's part – this deal has been in the making for over 10 years
- Russia needed capital to develop greenfields in East
- Has the potential to end badly for both parties – divergent economic trends, yet both countries are extremely territorial, eager to work with each other because neither party prioritizes diplomatic values in their business dealings (often, but not always the case)

Russia – China Gas Deal

1. Deal is not as large as people may think, about 2 bcf/day.
2. Pricing benefits for the Russians was not that great, costs will be high.
3. Chinese will be providing some investment funding on the Russian side but amount remains unclear.
4. Project appears to be a done deal, but it is large and expensive.
5. However, Chinese can access these supplies overland which is of some strategic value. The prospective Chinese consumption probably comes out of Chinese coal and not out of world LNG demand. Here the thinking is that without this deal the Chinese would probably just used more coal.

This, however, is somewhat speculative given the growing domestic pressure to improve air quality in China.

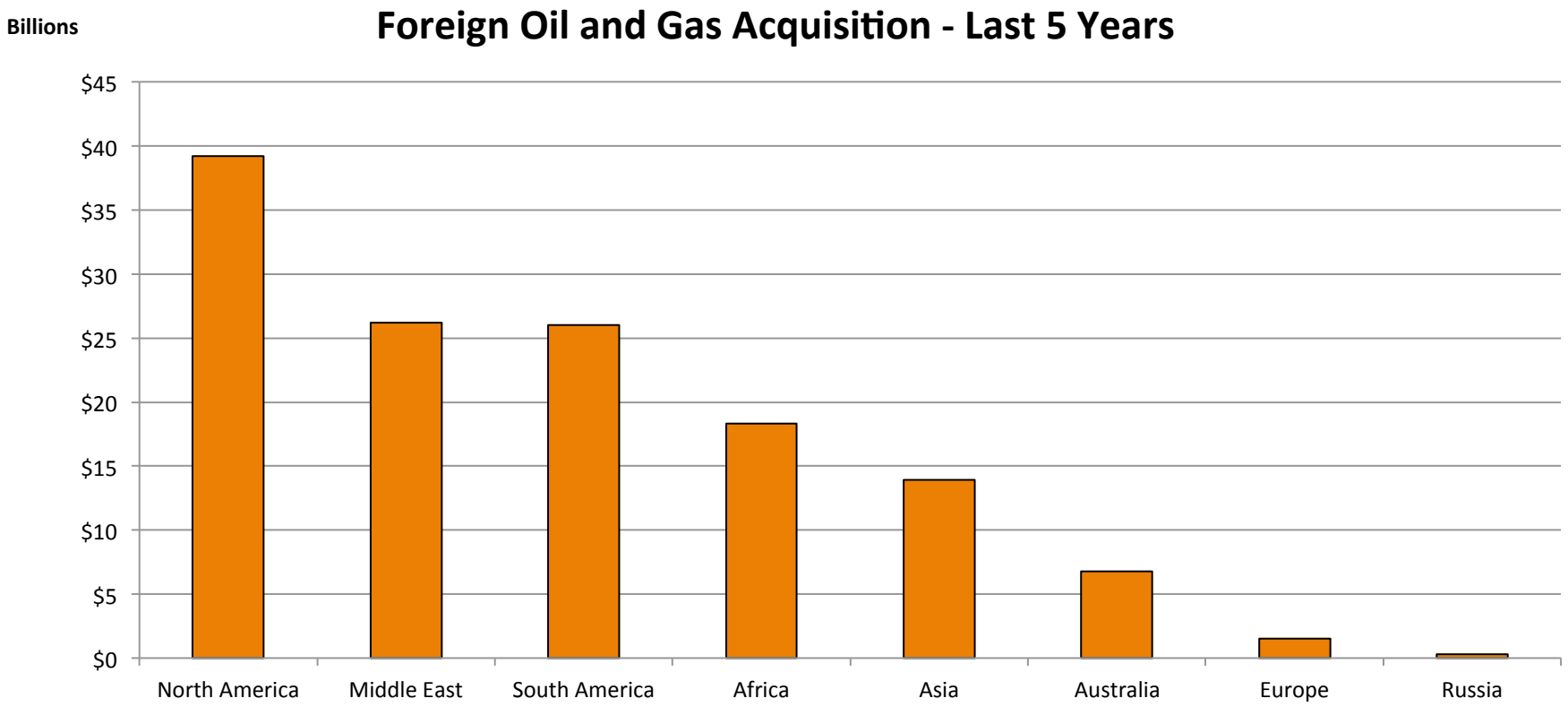
Chinese Investments in Russia

Date	Company	Deal	Share	Deal Size (USD billions)
Jan-14	Novatek- CNPC	Novatek sells 20% stake in the Yamal LNG Project to CNPC	20%	
Oct-13	Rosneft-Sinopec	Rosneft agrees to supply Sinopec with 200,000 bpd. CNPC signs a refinery deal. Novatek to sell LNG to CNPC		$85.00
Oct-13	Rosneft-CNPC	Rosneft and CNPC signed a memorandum for a joint venture on an upstream project in East Siberia	Rosneft: 51%	
Jun-13	Rosneft-CNPC	25 year supply deal worth $270 billion		$270 over 25 years

Source: EPRINC compilation, may not include ALL acquisitions

Foreign Oil and Gas Acquisitions by China

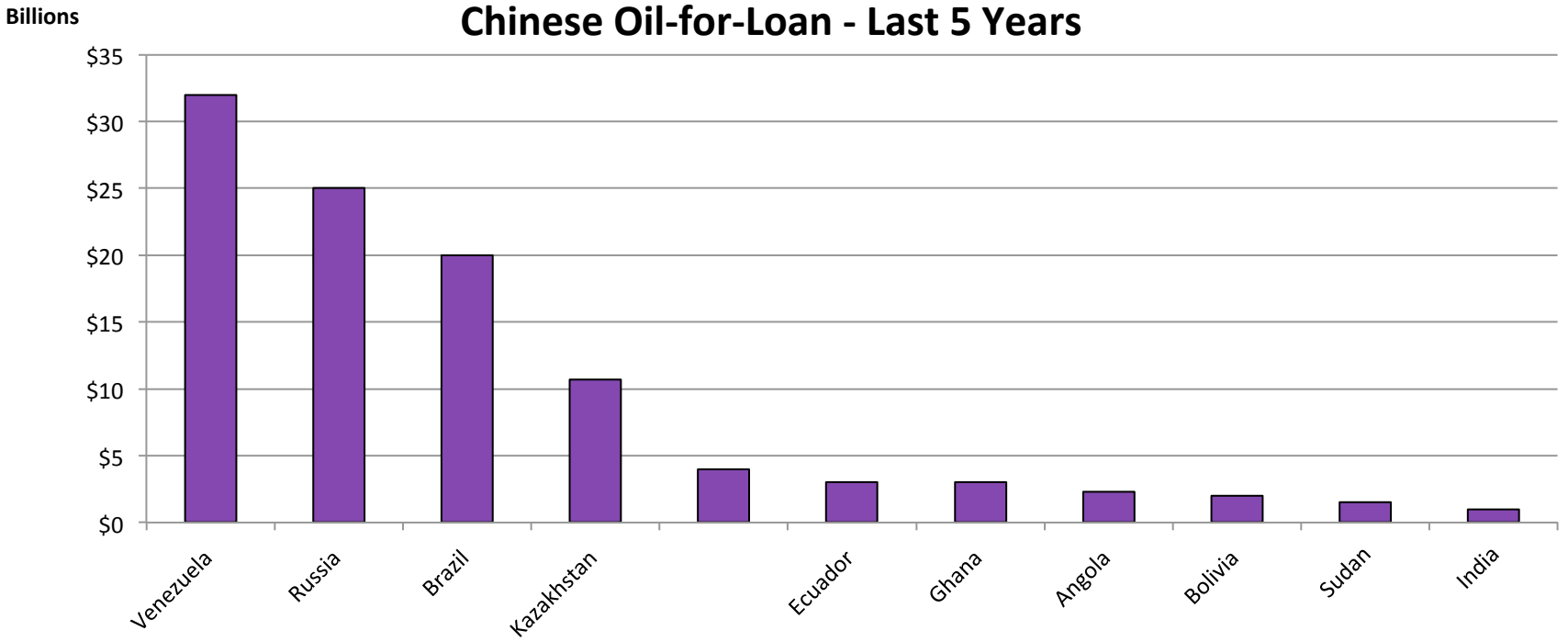
- China's aggressive push abroad has span the globe and is different in each region.



Source: EPRINC compilation, may not include ALL acquisitions

Chinese Oil for Loan Deals

- To sweeten the deal or often allow it to take place, China offers financing in combination with large project deals which often include oil and related infrastructure projects



Source: EPRINC compilation, may not include ALL oil for loan deals

Recent Developments in South China Sea

Recent Activity in the South China Sea

"According to a Vietnamese person with knowledge of the situation, a Chinese armada of Navy warships and Coast Guard vessels is protecting the oil rig, patrolling inside a 10-mile perimeter. A smaller flotilla of Vietnamese warships and Coast Guard ships continues to try to push past the Chinese boats. Chinese ships try to stop them, resulting in many instances of vessels from the two sides ramming each other, said the person who refused to be identified for fear of antagonizing the authoritarian government. ***The Vietnamese believe that the Chinese are widening the perimeter.*** *When the Vietnamese try to penetrate the Chinese line, the person said, the Chinese come farther and farther out of the perimeter to stop them, and come closer to the Vietnamese coast. Four to five Chinese frigates have been dispatched beyond the perimeter, according to a senior American government official who follows the situation from outside Vietnam. About 40 Chinese Coast Guard vessels are in the immediate vicinity of the rig, and Chinese helicopters fly overhead, the official said, adding that an assortment of 40 other Chinese boats, including fishing vessels, were also in the area. Vietnam has three to four warships on the way to the area, but so far they are not near the rig or its perimeter, the official said. About 20 Vietnamese Coast Guard ships are kept about 12 miles away from the rig by the Chinese, he said."*

NYT, May 17, 2014 "Vietnamese Officials Intolerant of Violence as Standoff With China Continues"

CNOOC rig dispute has invoked nationalist responses

- The recent deployment of China's CNOOC rig in the South China Sea in disputed waters claimed by the Vietnamese has highlighted tensions and major concerns held by Chinese scholars, analysts, and the military.
- China, Vietnam, and Japan are all in a state of rising nationalism with heightened tension teetering on aggression.
- **Vietnam** has erupted in protests. Protests have turned violent and have included mass looting and arson at manufacturing warehouses against both Chinese and other foreign entities. It is uncertain if these protests are turning against all foreign investment or if the protestors mistook some of these manufacturing centers for being Chinese.
- **Japan's** Shinzo Abe has responded by utilizing the recent dispute to embolden his nation's military powers. While the U.S. supports this some are more concerned.
- "The most dangerous figure in Asia is not in China; it's in Japan. Abe, with our backing, is an ultranationalist," said Mr. Chanos, founder of Kynikos Associates. "He [will begin] to destabilize the area from a political and military point of view more than any Chinese leader." WSJ, "Chanos: Japan's Shinzo Abe Is 'Most Dangerous Figure In Asia'" May 16 2014

Japan's Reaction

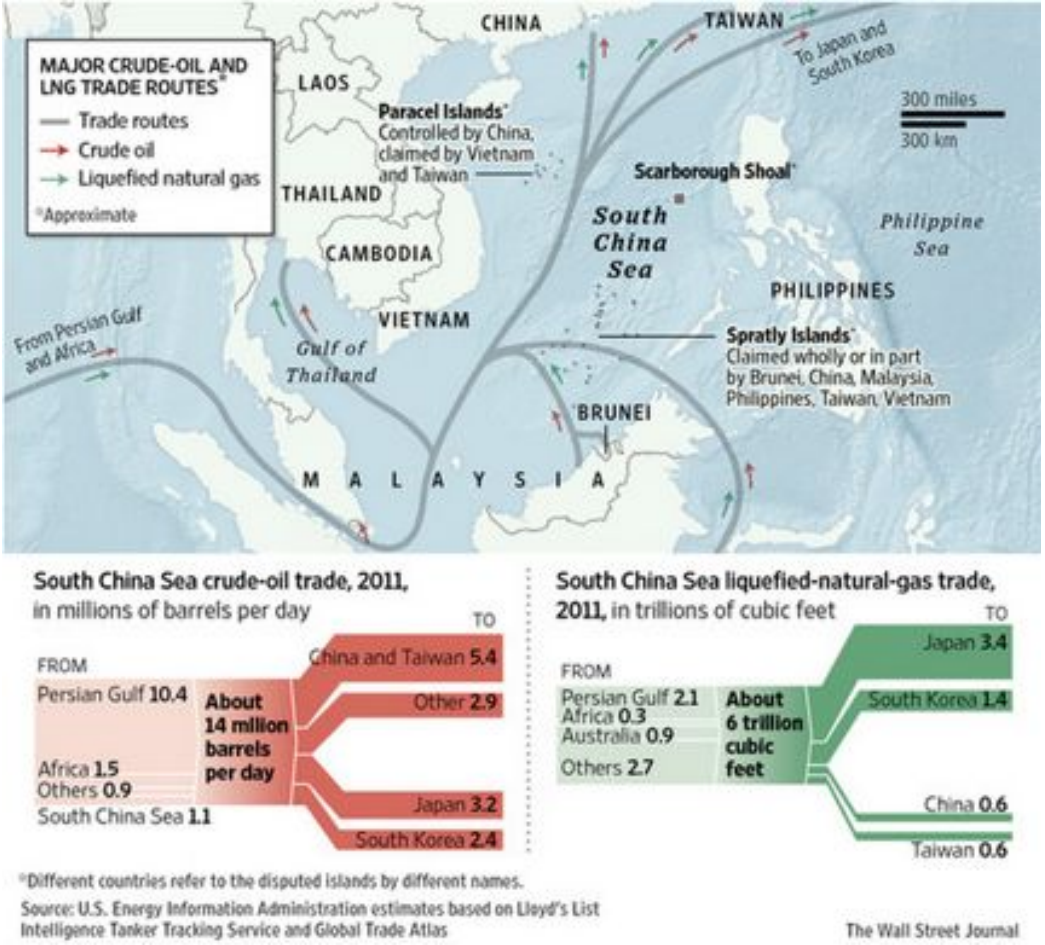
- The East and South China Seas are both fraught with tension. CNOOC's rig deployment is acting as a catalyst to advance the military agenda of some in Japan. Japan sees the South China Sea dispute similar to issues Japan has with China over the disputed islands in the East China Sea. And Japan feels threatened in general from China and North Korea.
- The goal is to adjust the interpretation of the constitution to allow for a 'collective self-defense' which would allow Japan to come to the aid of allies even if Japan were not being attacked directly.
- Restraints on the Japanese military date back over 60 years when the constitution was written by U.S. authorities during occupation in 1947.
- **Abe** says May 15th in news conference. "'In the South China Sea, even as we speak, confrontations between countries are continuing because of unilateral action backed by force...It could very well be our problem.'"
- The U.S. and some Asian nations have welcomed these plans. This is likely because they would like another major military actor to put a check on China.
- But some are quite cautious, not only South Korea and China, but also those within Japan. Those leading the New Komeito Party (part of the coalition of Abe's Liberal Democratic Party) are expressing caution and say that Japan can already come to the U.S.' aid as written in the constitution. Katsumasa Suzuki, an opposing lawmaker said previously that 'Lifting the limits on the right for self-defense will bring us right back to the concept before the last war that led us to destruction' WSJ, "Japan's Abe Takes Step to Enhance Military's Role "May 15 2014

Japan's Reaction Continued – Check on China

- Invaded in the 1930s, China feels threatened by U.S.- Japan ties, rising nationalism in Japan, and a fear of "Japanese militarism." China believes that historical as well as current issues warrant China and other Asian nations to be weary of a rising Japan.
- South Korea is similarly concerned and 'stresses that defense and security-related discussions in Japan must take place in a way that uphold the spirit of Japan's pacifist constitution, maintains transparency and contributes to stability and peace in the region' says a Foreign Ministry spokesman.
- For the constitution to be rewritten there needs to be 2/3 support in parliament and a public majority, but it could be reinterpreted by Abe and instituted. "Once a cabinet decision on collective self-defense is made—which officials say they hope to complete by late summer—Tokyo plans to implement by the end of the year a cascade of changes to its defense-related laws to reflect the new interpretation."
- Japanese officials contend that this is about an equalization with the U.S. and an ability to defend the United States. The ban on collective self-defense, they say, requires the U.S. to defend Japan, but not necessarily the other way around.
- Abe has worked to increase ties with Asian nations of a similar mind to thwart China and her military build-up. This could increase relations with ASEAN member states Vietnam and Philippines which would like assistance in checking China. Vietnam has requested patrol ships from Japan and this assistance could be expedited given the recent South China Sea dispute.
- WSJ, "Japan's Abe Takes Step to Enhance Military's Role "May 15 2014

Choke Points

Energy Flows Through South China Sea

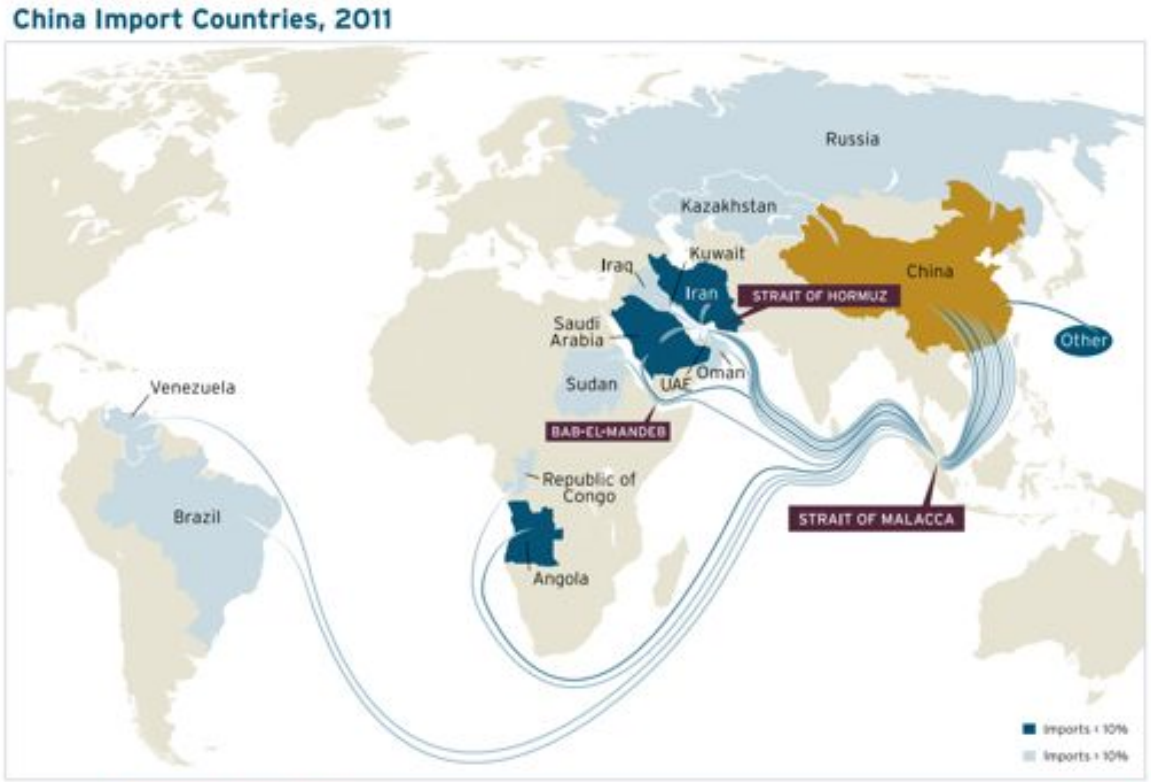


Source: WSJ, May 14, 2014, "Beijing Pays a Price for Assertiveness at Sea"

Lack of Import Route Diversification

- Nearly all waterborne LNG and oil imports traverse the Strait of Malacca
- Should China lose access to the Strait, or see relations deteriorate with Indian Ocean/South China Sea nations, the results could be economically catastrophic
- Russia and Kazakhstan are the only reliable option for land based imports of oil and gas
- Will soon receive LNG in summer months from Yamal via Arctic route (requires nuclear powered ice breakers)
- Russia would have de facto control over Central Asian pipeline routes. Afghanistan and Pakistan routes could be treacherous
- The emphasis on diversification of supply and investments could prove fruitless without better transit options

Nearly all imports via Malacca

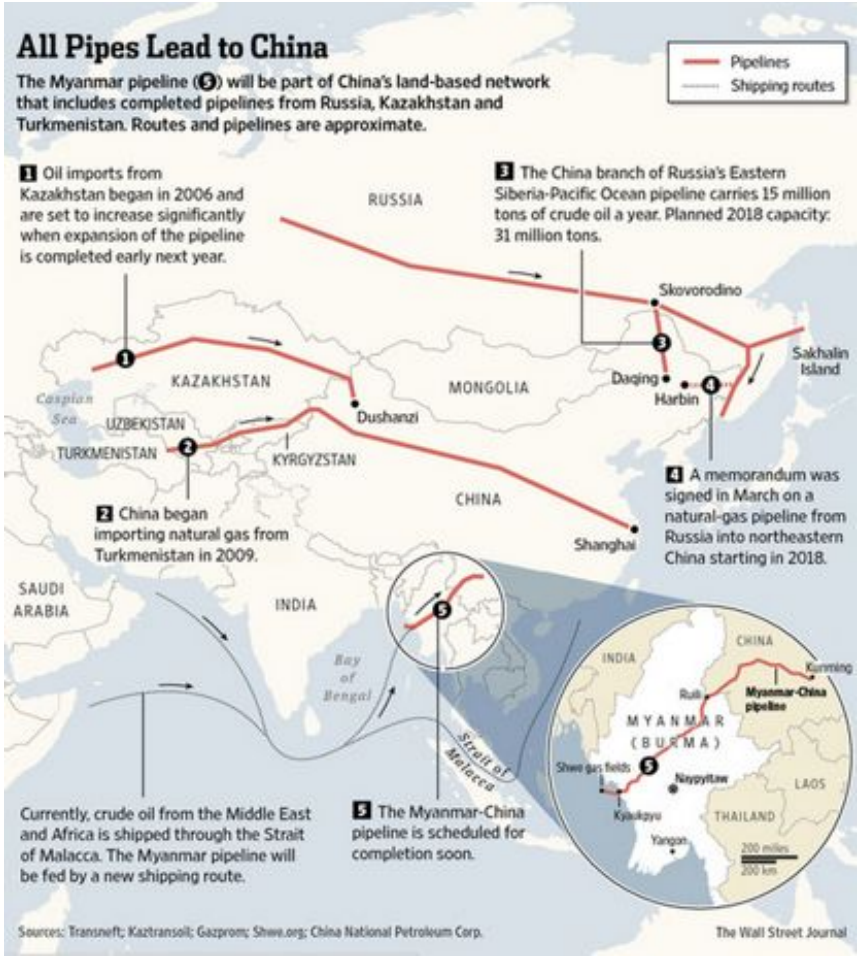


Country	Saudi Arabia	Angola	Iran	Russia	Oman	Iraq	Sudan	Venezuela	Kazakhstan	Kuwait	UAE	Brazil	Republic of Congo	Other
Percentage of Imports	19.8	12.3	10.9	7.8	7.2	5.4	5.1	4.5	4.4	3.8	2.7	2.6	2.2	11.3
Thousand Barrels	366,825	227,395	202,575	144,175	132,495	100,740	94,900	83,950	81,760	69,715	49,275	48,910	41,245	208,780

Created by Marcia Underwood of the Brookings Institution with data compiled from the U.S. Energy Information Agency's China Country Report 2012. http://www.eia.gov/countries/cab.cfm?fips=CH

Source: Fueling a new Disorder? the new Geopolitical and security consequences of energy Project on international order and strategy at BrooKinGs, March 2014

Pipeline and Land Routes



- China has limited international inbound pipeline capacity. These land bases routes provide import ***route*** diversification when 80% of China's imports flow through the potentially volatile South China Sea.
- Increased oil imports via land from pipeline (and rail) could allow China to more aggressively press claims in the South China Sea (which could create instability in the Strait of Malacca and threaten Chinese crude oil imports).
- Roughly 1.4 mbd can enter China via pipeline, avoiding the Strait of Malacca.

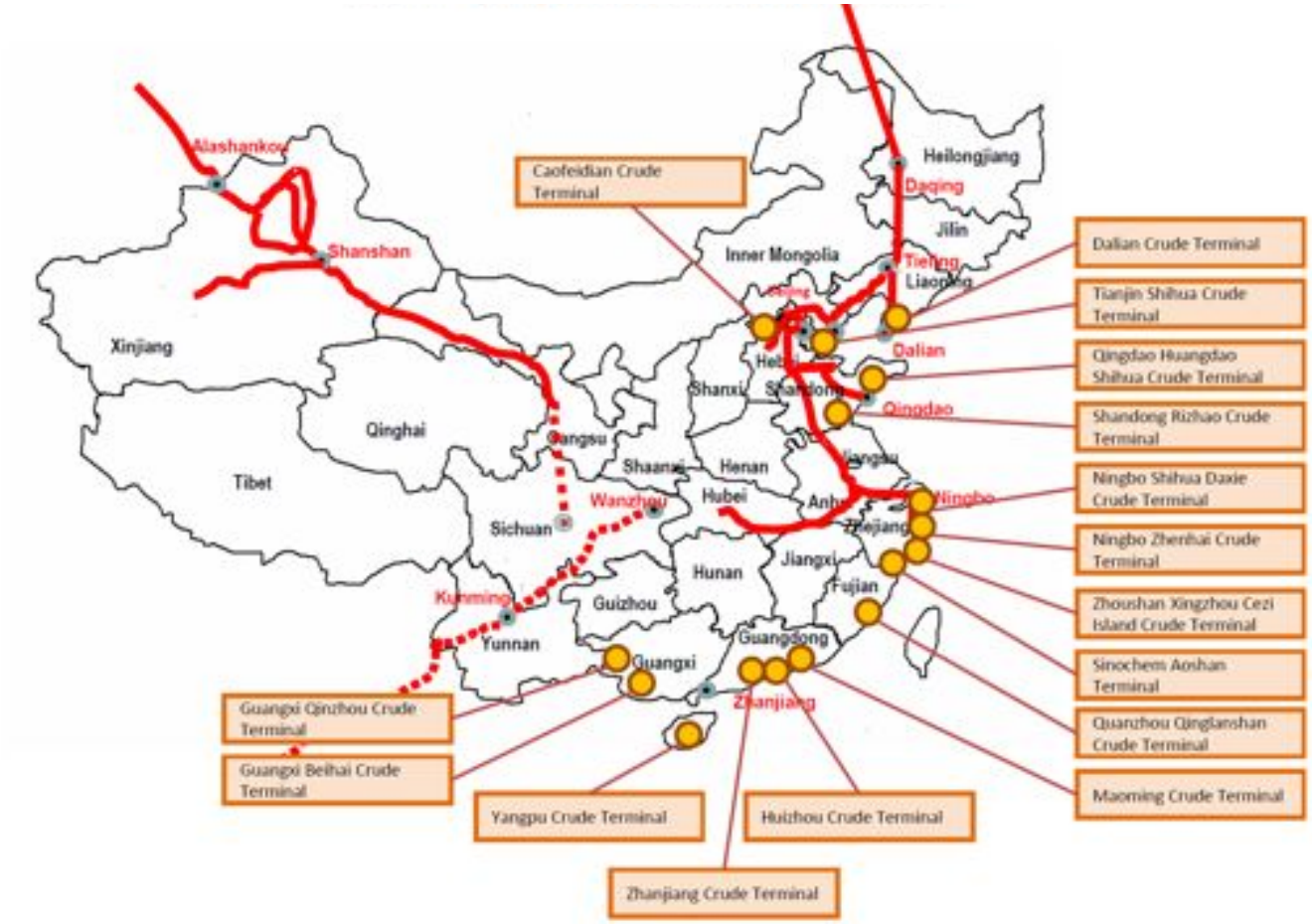
Source, WSJ, May 12, 2013, http://online.wsj.com/news/articles/SB10001424127887324326504578466951558644848?mg=reno64-wsj

Principal Chinese Oil Pipelines

Oil Pipelines			
Pipeline	Capacity	Route	Status
Northeast crude oil pipeline	803,000 barrels per day	Domestic	Operational
West crude oil pipeline		Domestic	Operational
Lun-Ku	118,000 barrels per day	Domestic	Operational
Ku-Shan	98,630 barrels per day	Domestic	Operational
Ma-Hui-Ning	95,890 barrels per day	Domestic	Operational
Zhong-Yu		Domestic	Operational
A-Du	200,000 barrels per day	Domestic	Operational
Daqing-Fushun crude oil pipeline		Domestic	Operational
Tieling-Qinhuangdao crude oil pipeline		Domestic	Operational
Rizhao-Dongming crude pipeline	200,000 barrels per day	Domestic	Operational
Urumqi-Lanzhou	400,000 barrels per day	Domestic	Operational
Daqing-Tieling	540,000 barrels per day	Domestic	Operational
Mohe-Daqing	300,000 barrels per day	Domestic	Operational
Daqing-Skovorodino	300,000 barrels per day	Domestic	Operational
East Siberia-Pacific Ocean pipeline (Russia-China)	**600,000 barrels per day**	**International**	**2009, 2012 (expansions) and an upgrade under development**
Myanmar to China pipeline (alternative route for crude from ME)	**440,000 barrels per day**	**International**	**Operational**
Kazakhstan-China crude oil pipeline	**400,000 barrels per day**	**International**	**Operational**

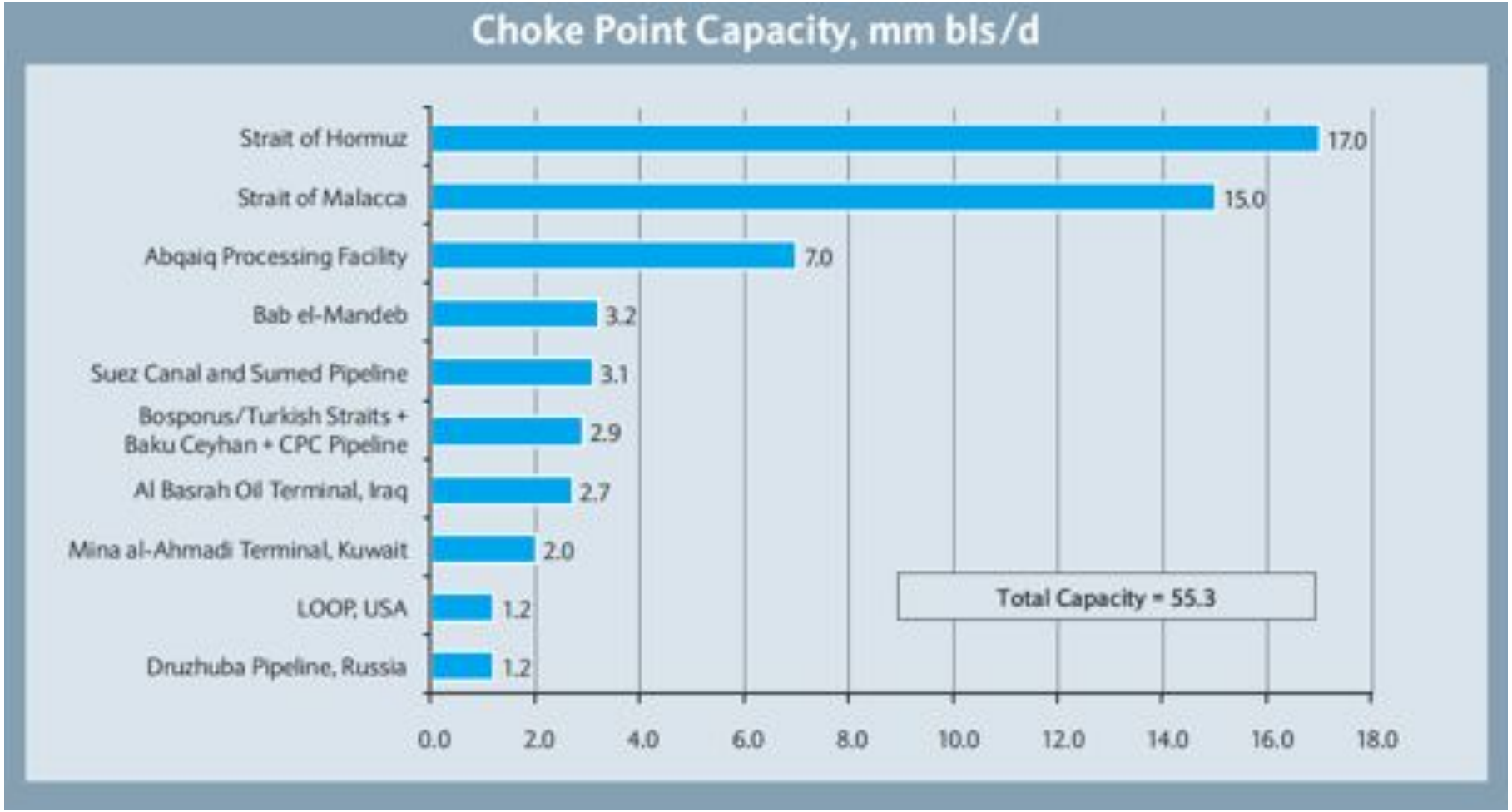
Source, EPRINC Compilation, may not be 100% complete

Major Crude Oil Pipelines and Import Terminals



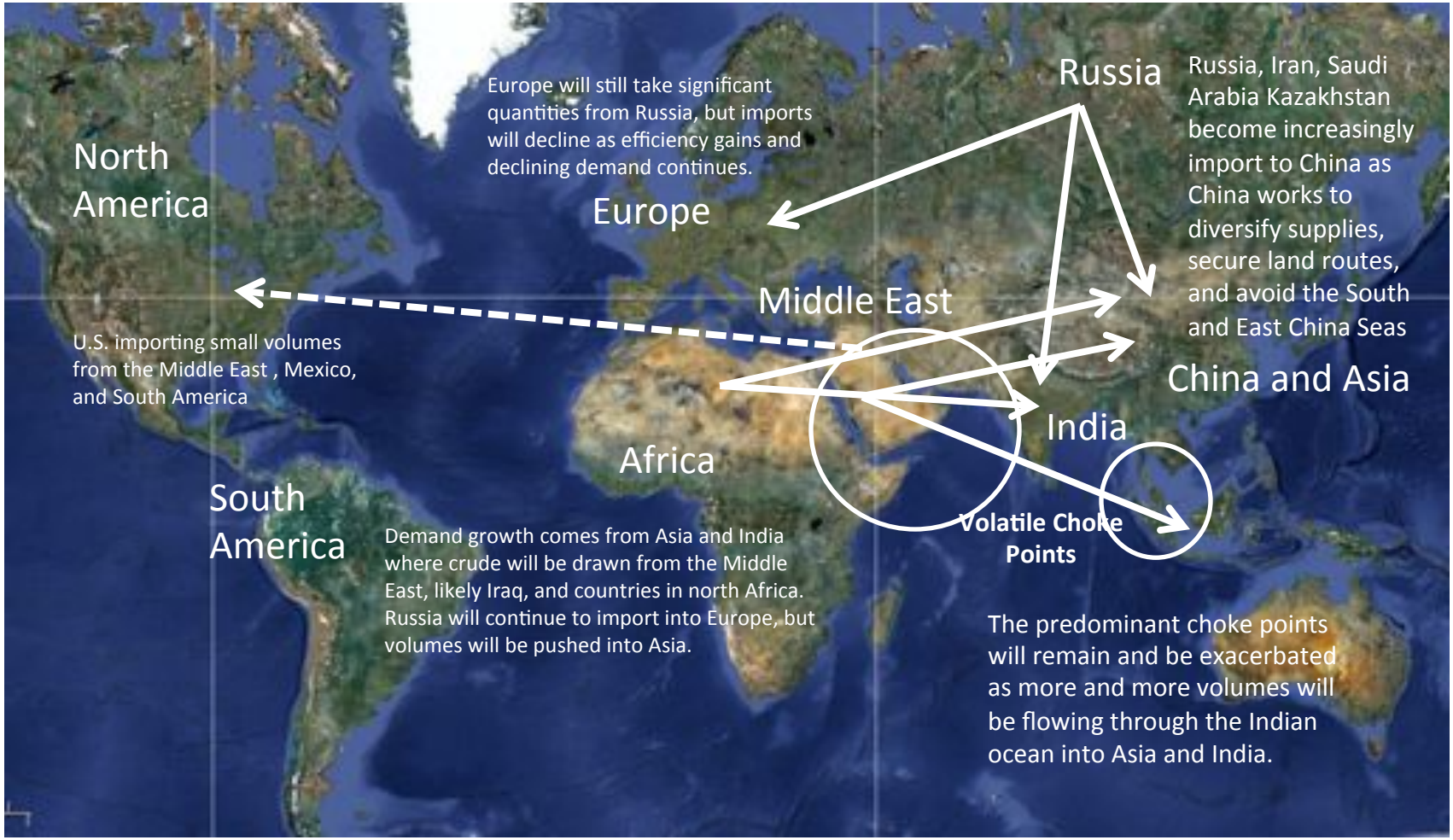
Source: FGE-FACTS Global Energy, Dr. Kang Wu, June 2013 presentation

Choke Point Capacity



Source: "Major Oil Choke Points, Oil Flows and Pipelines 2012," Barclays Equity Research, March 20 2012

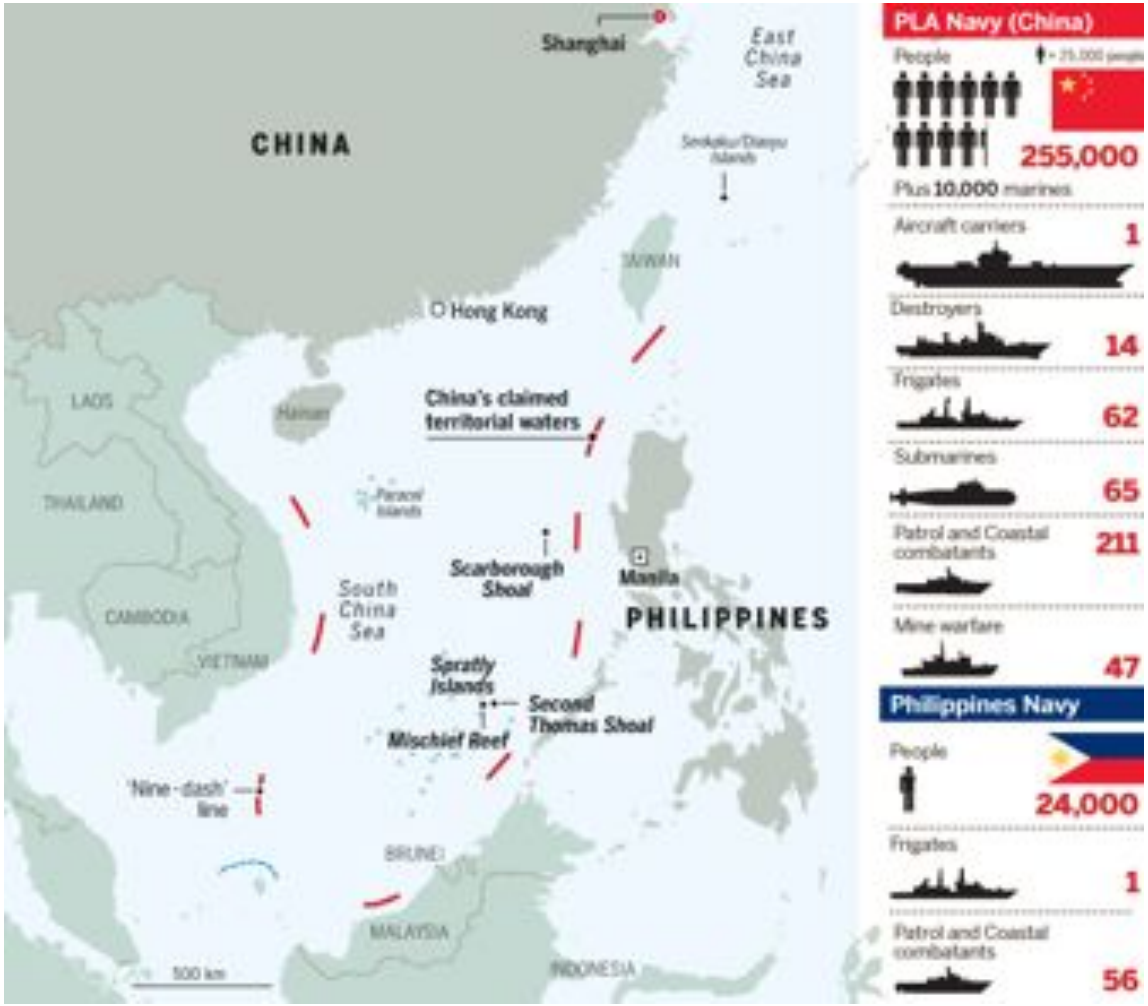
Shifting Crude Flows Exacerbate Existing Choke Points



Source: Google maps

South and East China Seas: Choke Points and Territorial Claims

The Nine Dash Line



Source: The Economist

China's Nine Dash Line

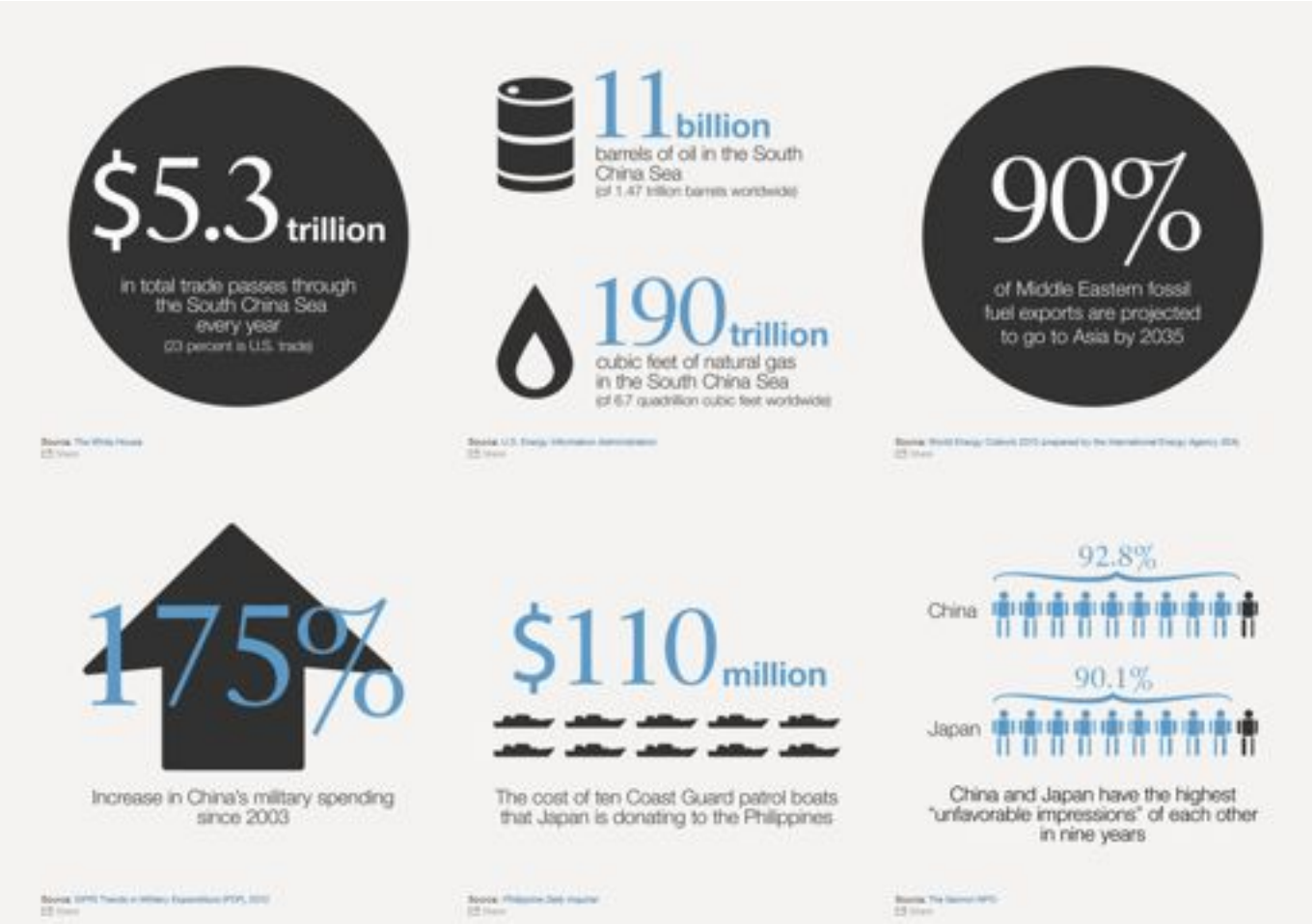
- China's infamous "nine-dash line" used to depict China's territorial claims in the South China Sea is disputed by the many other countries in the region including Vietnam, Brunei, Malaysia, and the Philippines.
- The line, literally nine dashes, is also referred to as the cow's tongue and has only recently become and increasingly important piece of territorial claims. It was originally eleven dashes and included a large portion of the Gulf of Tonkin, encroaching Vietnam, but the Chinese backed from these claims.
- In the 1960s the UN released a report on the natural resources thought to be in place on the ocean floor of the South China Sea. Since this time, countries have been increasingly aggressive in staking claims on many of the islands and territories in these waters.
- It was only in 2009 that China submitted a proper map which included the nine dash line to the United Nations. (They claim historical Chinese maps dictate many of the regions as their own.) In 2012 China included the nine dash line on its passports which incited animosity among Asian neighbors.

Philippine Contention with China's 9 Dashes

"On Sunday, the Philippines filed the first-ever legal challenge to the line as part of a 4,000-page submission to a U.N. arbitration tribunal in The Hague. It wants the line declared as without legal weight so that it can exploit the offshore energy and fishery resources within its U.N.-declared exclusive economic zone. China has so far abstained from the proceedings.

Already, Beijing has all but frozen political ties with Manila. In recent days, Chinese ships have been playing cat-and-mouse games with Philippine vessels trying to reprovision marines on a lonely outpost called the Second Thomas Shoal….**A Chinese Foreign Ministry spokesman retorted that 'China's rights and interests in the South China Sea are formed in history and protected by international law.'"** WSJ April 7, 2014

Relevance of South China Seas

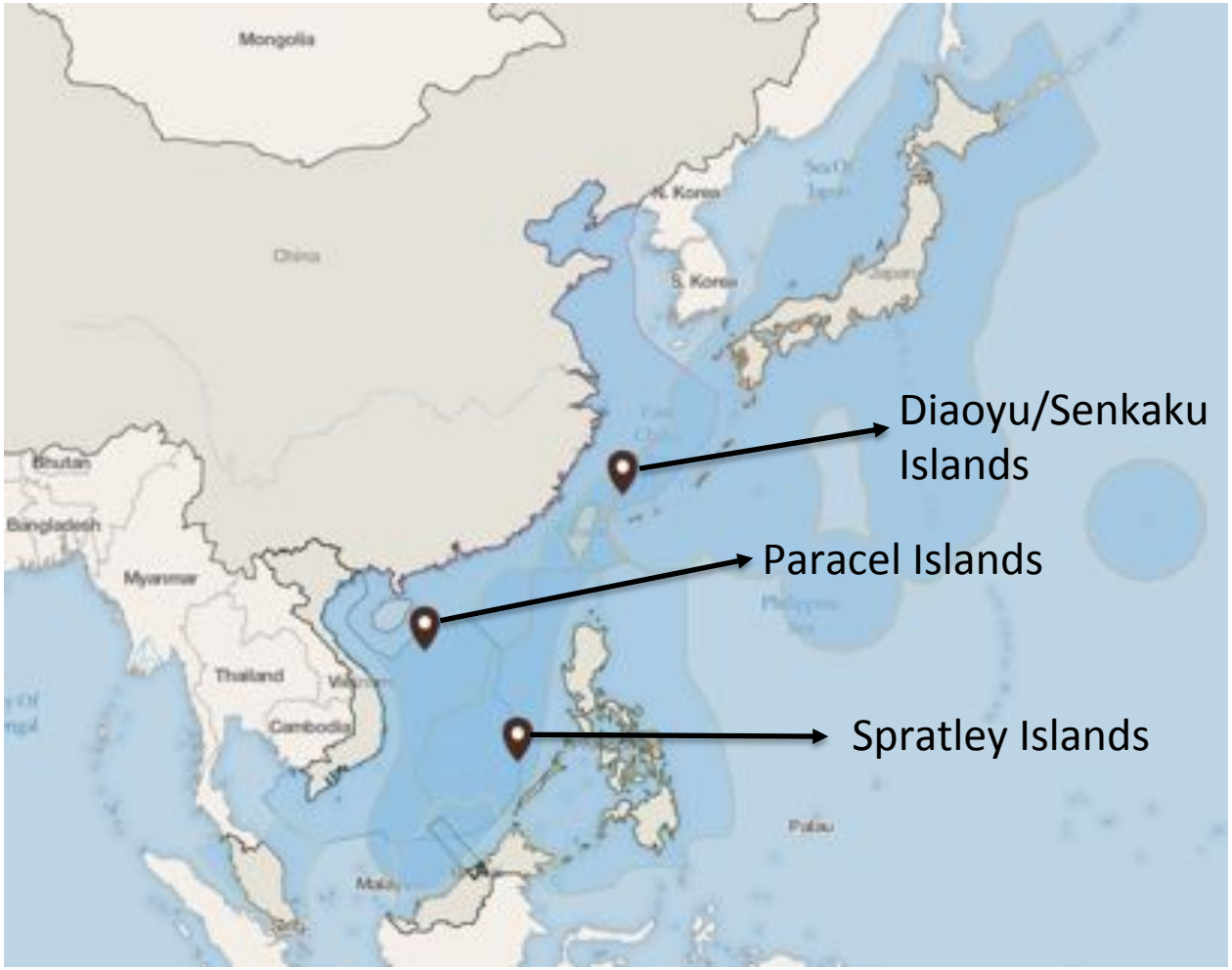


Source: Council on Foreign Relations

China's South and East China Sea Claim

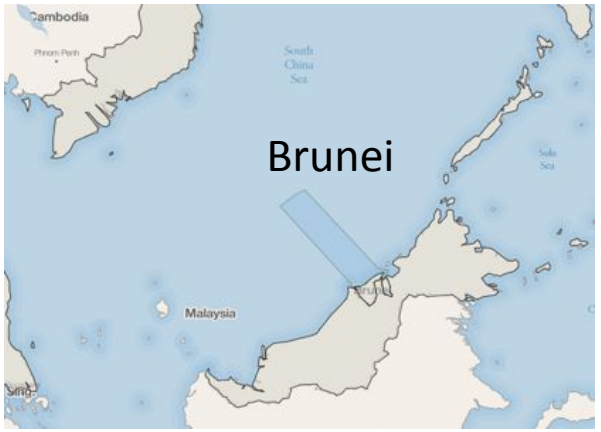
Source: Council on Foreign Relations

Overlapping Sea Claims



Source: Council on Foreign Relations

All the other claims on the Seas….



Source: Council on Foreign Relations

A Russian Like Response to the CNOOC Rig Dispute

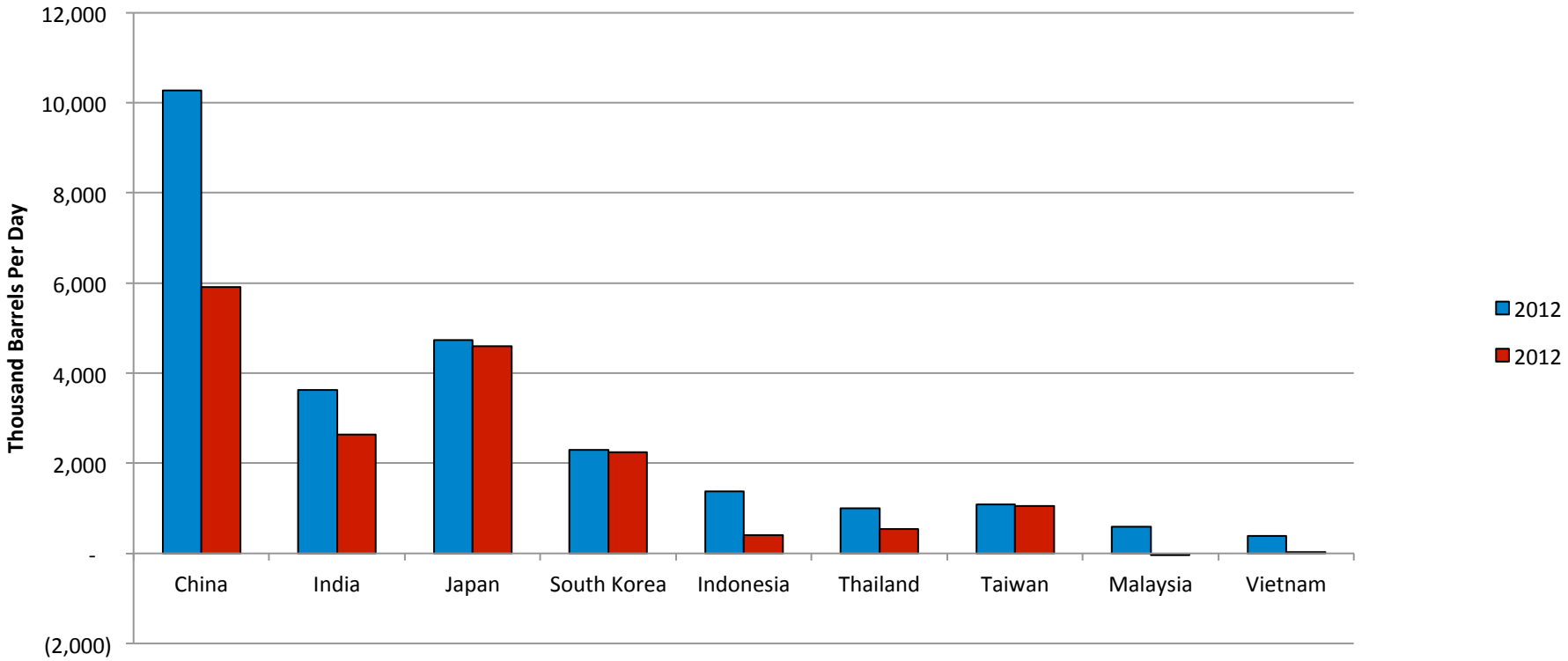
China claims that the deployment of the CNOOC rig was part of regular exploration activity by the Chinese which has been going on for years (Chinese Foreign Ministry official claims).

"'We are deeply shocked by Vietnam's disruptive activities,' said the official, Yi Xianliang, deputy director-general of the Foreign Ministry's Department of Boundary and Ocean Affairs, at a news conference in Beijing."

Source: WSJ, May 8, 2014

Asian Petroleum Demand

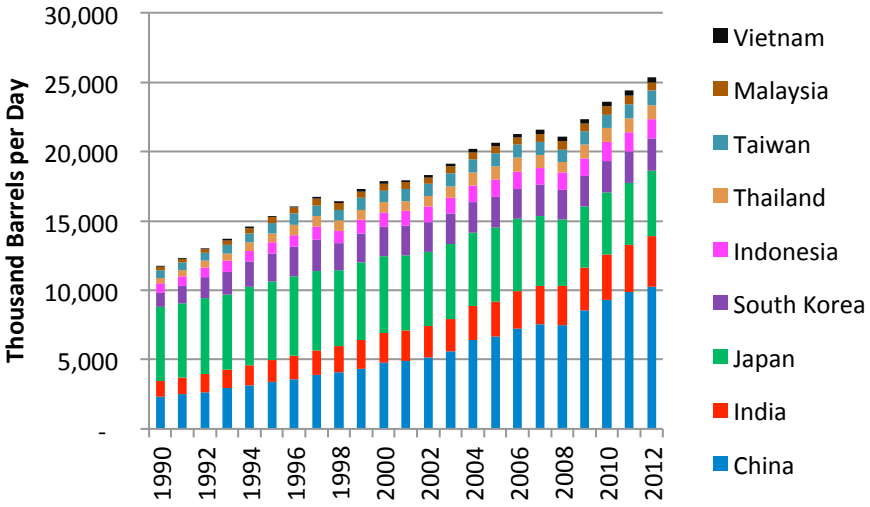
- Most of this crude oil, like China's flows through the Straits of Malacca and the South China Seas.



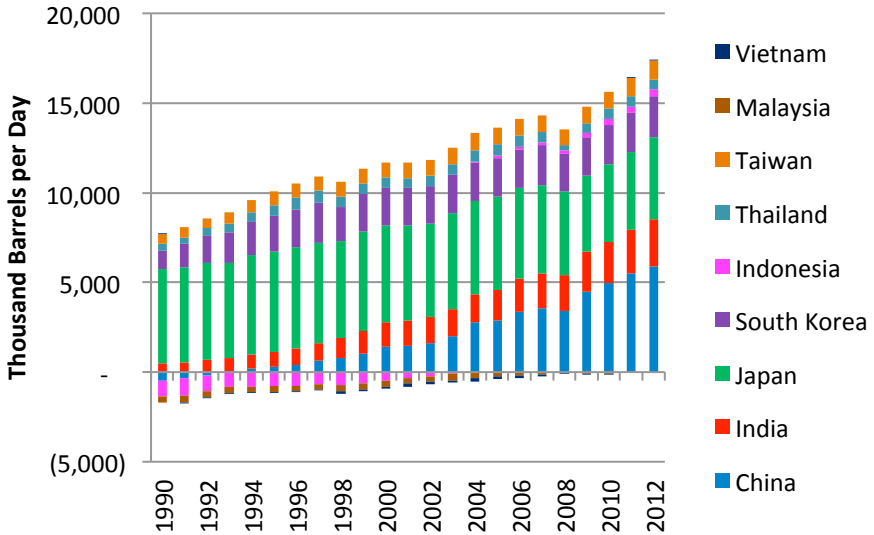
Source: EIA, International Energy Statistics (petroleum and petroleum products)

Asian Petroleum Consumption and Imports

Consumption



Net Imports



Source: EIA, International Energy Statistics (petroleum and petroleum products)

Maritime Choke Points

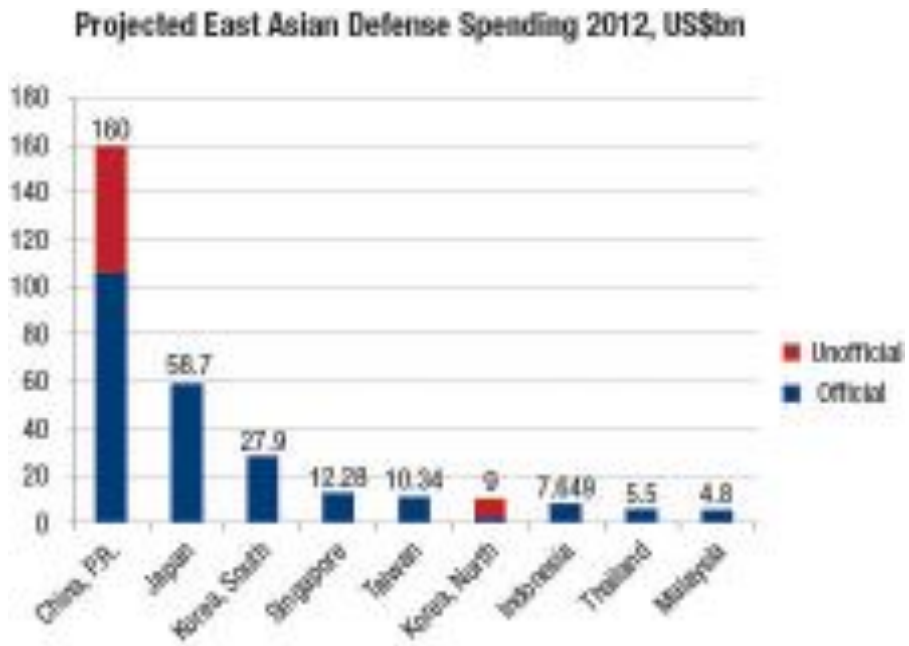
Source: "Major Oil Choke Points, Oil Flows and Pipelines 2012," Barclays Equity Research, March 20 2012

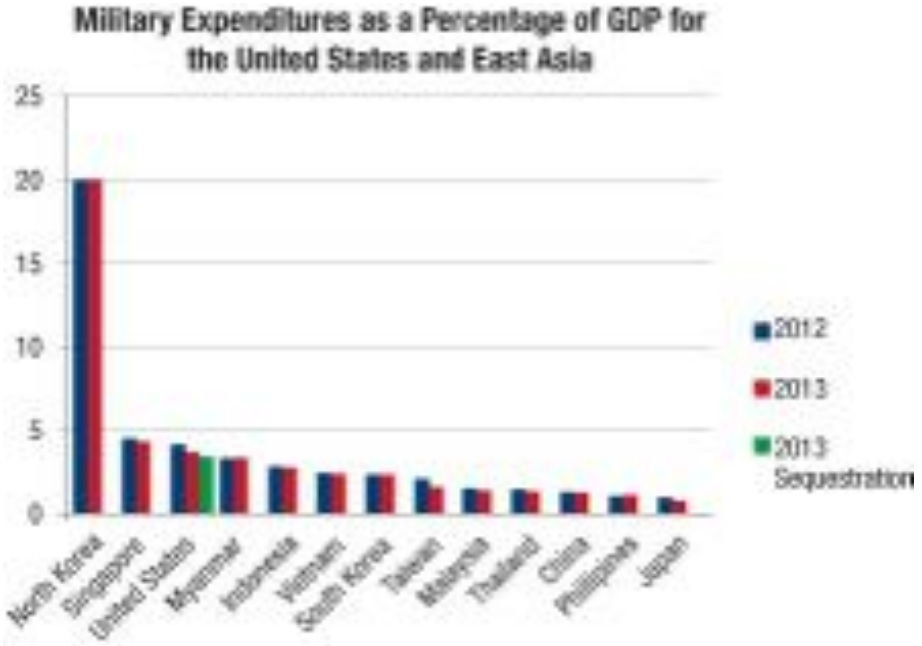
Major Choke Points

Figure 1. China's Critical Sea Lanes. *Like many other industrialized East Asian countries, China is heavily dependent upon critical sea lanes for its energy imports. Over 80 percent of China's crude oil imports transit the Strait of Malacca.*

Source: http://thepolicytensor.files.wordpress.com/2011/09/china-critical-sea-lanes-2009.jpg

Asian Military Expenditures





Source: Brookings

Bulking Up in Response to China

- East Asia is extremely dependent on international and intra-regional trade. China's sheer size and military might makes other nations feel inherently threatened and in itself creates volatility in the South China Sea.

- 'The Chinese never need justifications for their claims. They have a real Middle Kingdom mentality, and are dead set against taking these disputes to court. China denies us our own continental shelf….There are too many claimants to the waters in the South China Sea. The complexity of the issues mitigates against an overall solution so, China simply waits until it becomes stronger.' Quote from unidentified high ranking official of a South China Sea state from Robert Kaplan's "Asia's Cauldron."

Conclusions

- The theories of U.S. decline and China's peaceful rise are beginning to show cracks. China's recent actions not only indicate that it may not necessarily be peaceful, but also point to the fact that they may be having trouble extending their growth run.
- China's investment and relationship push abroad may be enhanced as it seeks to secure resources via land, especially from Russia and Kazakhstan.
- It should also be noted that the views of Houser and Downs with regards to Chinese National Oil Companies, and their 'independent' relationship with the government, are also being debunked given that the CNOOC rig deployment was accompanied by multiple Chinese military vessels for protection.
- The Asia pivot deserves and needs thorough examination. The South and East China Seas are becoming increasingly uncertain and that is driving nations to seek protection and invoke nationalist responses which may in themselves create disruption. There isn't a clear map with rules of the road. Muscle flexing with fishing boats and military vessels creates risk of conflict.
- There are some positive soft power implications here for the U.S. As nations such as Vietnam, Singapore, and the Philippines seek stronger ties with the U.S. and an increased U.S. naval presence.