The North American Petroleum Renaissance and Keystone XL – Challenges and Opportunities in Meeting the Infrastructure Needs

Lou Pugliaresi, President
Energy Policy Research Foundation, Inc. (EPRINC)
Platts Pipeline Development and Expansion Conference
September 20th, 2012

Who is EPRINC?

EPRINC stands for ***Energy Policy Research Foundation, Inc.*** Non-profit research group that does economic and policy analysis on the petroleum industry

Founded in 1944 in New York. Established as a group to explain markets and fundamentals

Previously the Petroleum Industry Research Foundation, Inc (PIRINC) until we moved to Washington in 2007

Grew largely into a downstream organization, but have since moved extensively into upstream and midstream

Extensive work on ethanol, refining, U.S. shale plays, Keystone XL

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Main Discussion Points

1) Trends in production throughout the Northern Tier in the next 5-10 years
2) Likely markets for U.S. light and Canadian heavy crude oils
3) Keystone XL and its relationship to other Canadian and U.S. Midcontinent projects
4) Prospect for movement of new crude supplies to U.S. East and West coasts
5) Regulatory and markets constraints on movement of North American crude production
6) Timely permitting of downstream value added processing facilities
7) Role of exports of refined petroleum products

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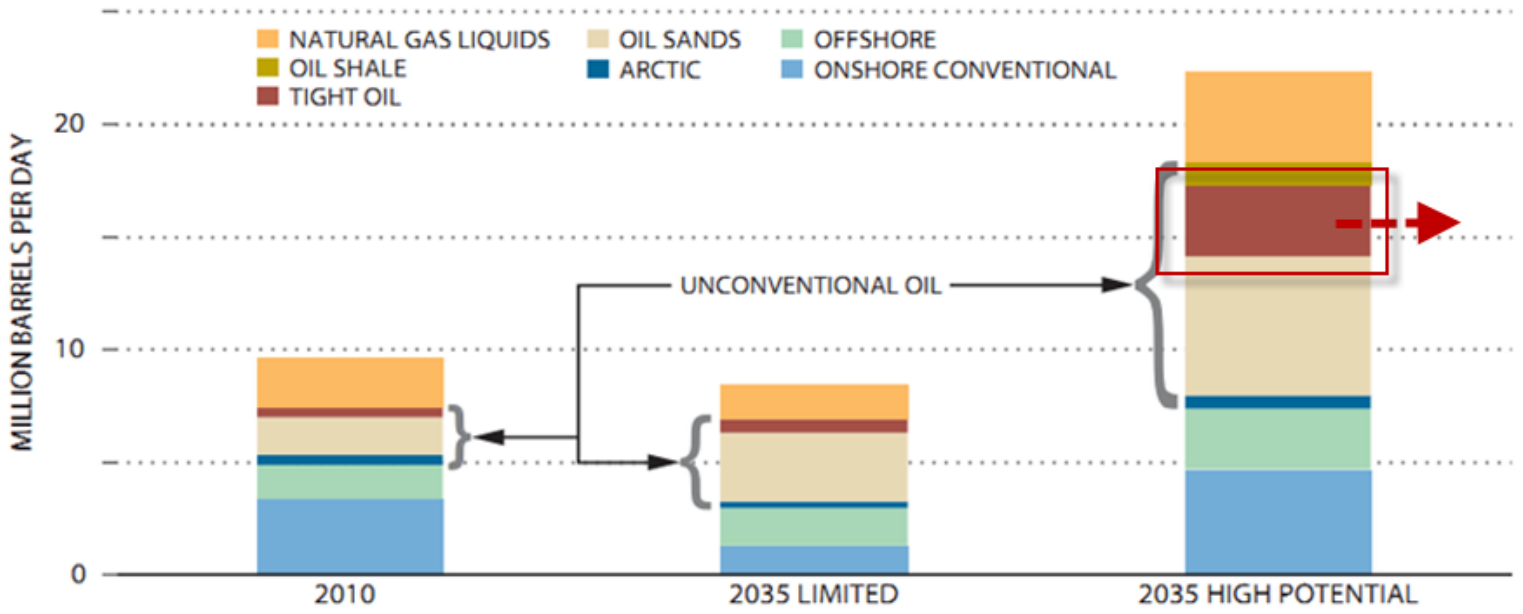
NPC Findings



Note: The oil supply bars for 2035 represent the range of potential supply from each of the individual supply sources and types considered in this study. The specific factors that may constrain or enable development and production can be different for each supply type, but include such factors as whether access is enabled, infrastructure is developed, appropriate technology research and development is sustained, an appropriate regulatory framework is in place, and environmental performance is maintained.

Source: Historical data from Energy Information Administration and National Energy Board of Canada.

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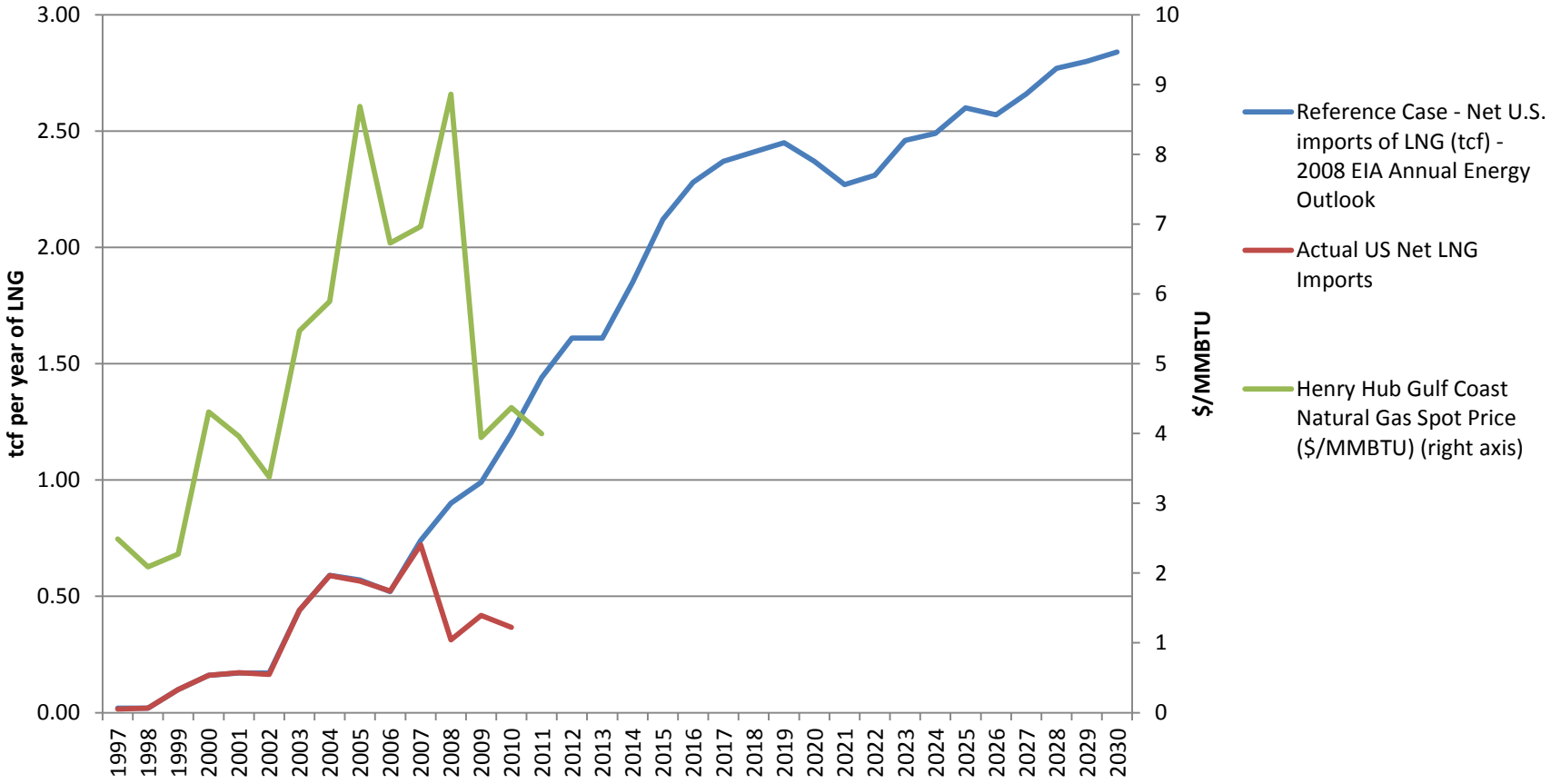
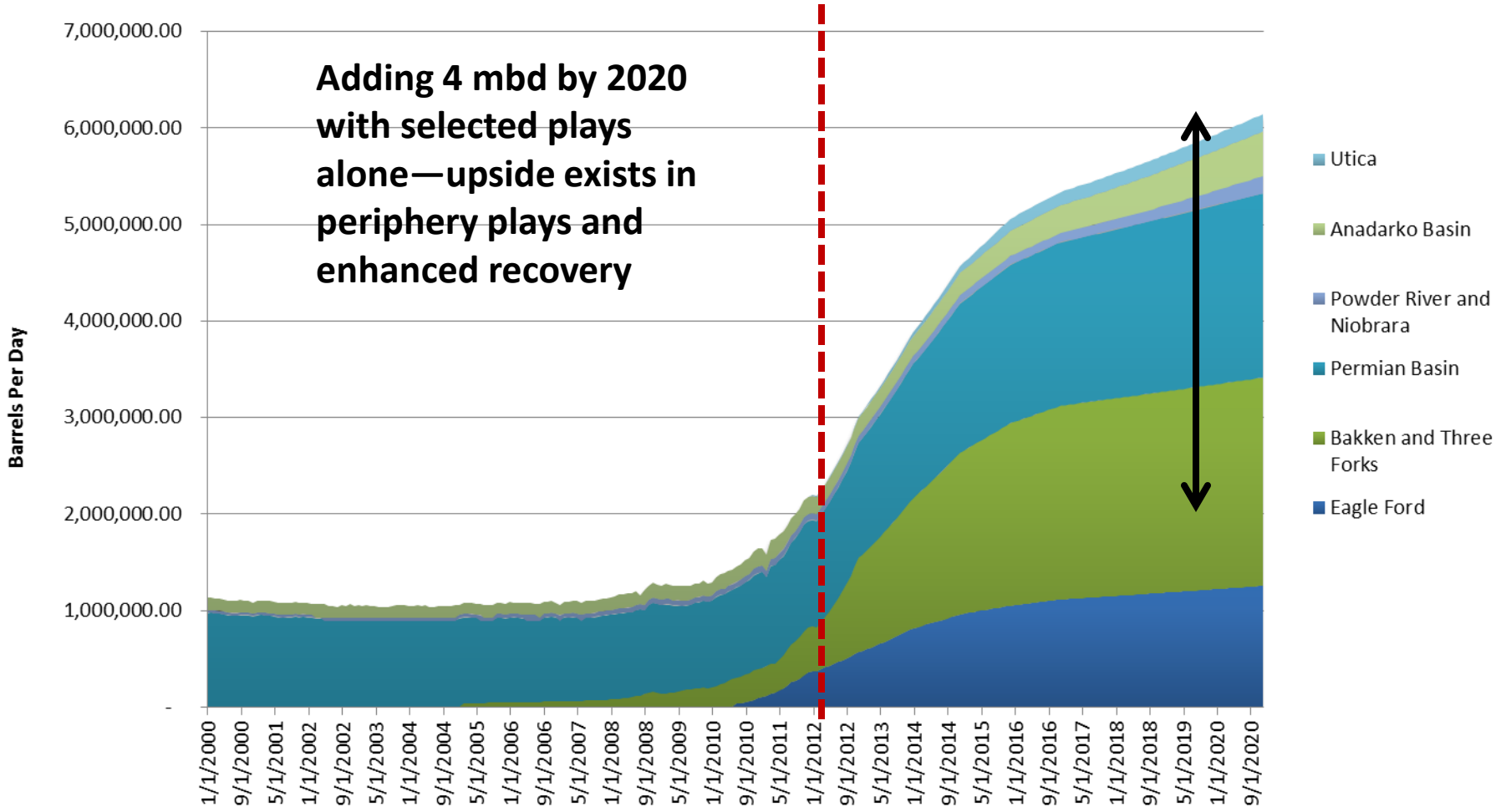
Remember to be humble...Projected Imports of LNG vs. Actual



Source : EIA data and forecasts

EPRINC's Forecast for Major U.S. Shale Plays



Source: HPDI data with EPRINC forecast estimates

The Forecast Numbers

Bentek

- Between 2011-2016 3/1 mbd increase (or 36%) in both Canadian and US oil production
- 900,000 b/d increase in exports from Canada to US
- US oil imports (exclude Canada) drop 2.8 mbd or 41% to 3.9 mbd average by 2016

Raymond James

- *"U.S. oil production (excluding NGLs) will grow from 5.6 MMBpd in 2010 to a whopping 9.1 MMBpd in 2015. Including natural gas liquids, total U.S. petroleum liquid production grows 60% from 7.7 MMBpd in 2010 to 12.2 MMBpd in 2015."*

Citi (from 2011 to 2020)

- US liquids grow from 9 mbd to 15.5 mbd
- Canada liquids grow from 3 mbd to 7 mbd

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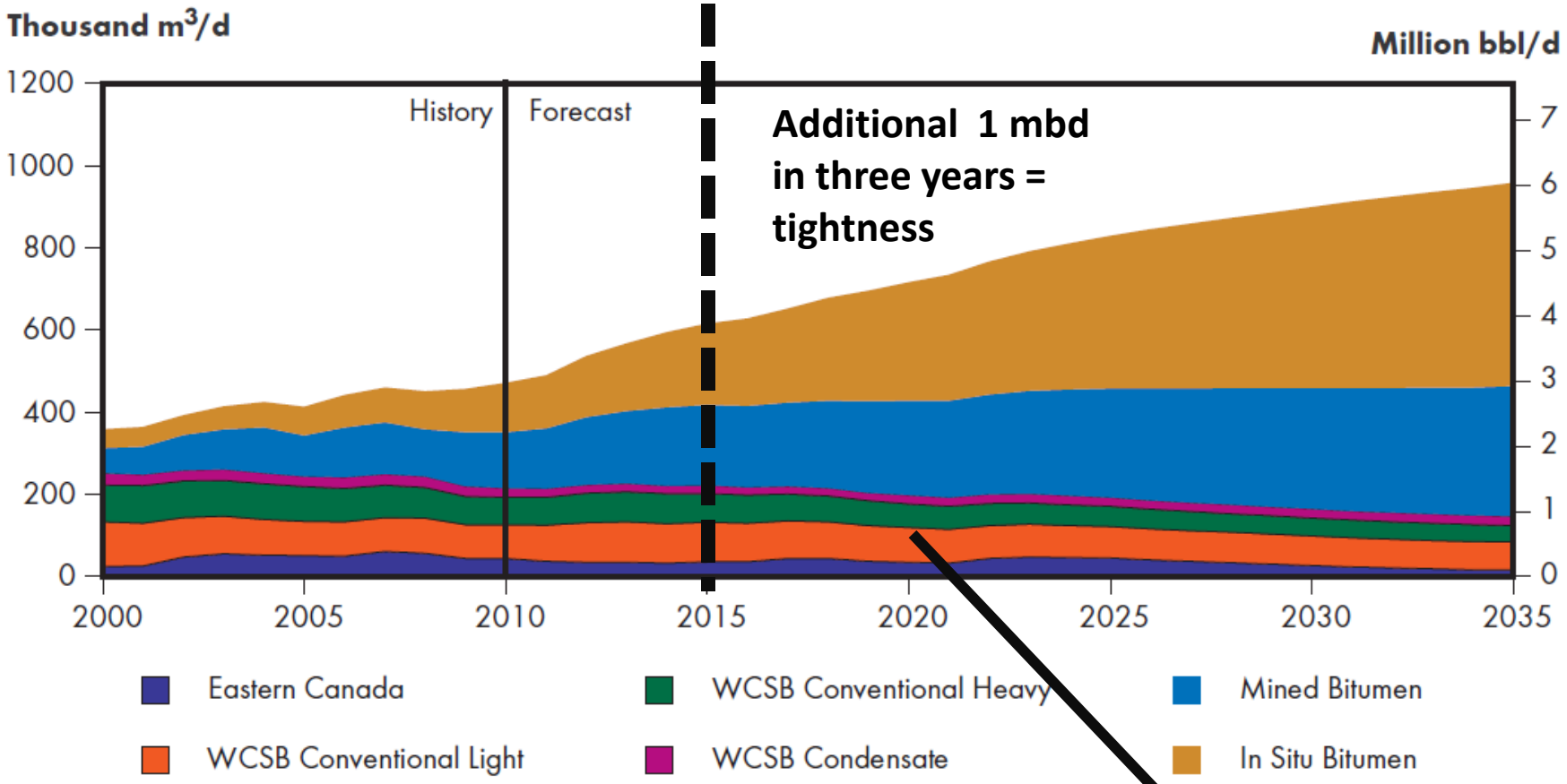
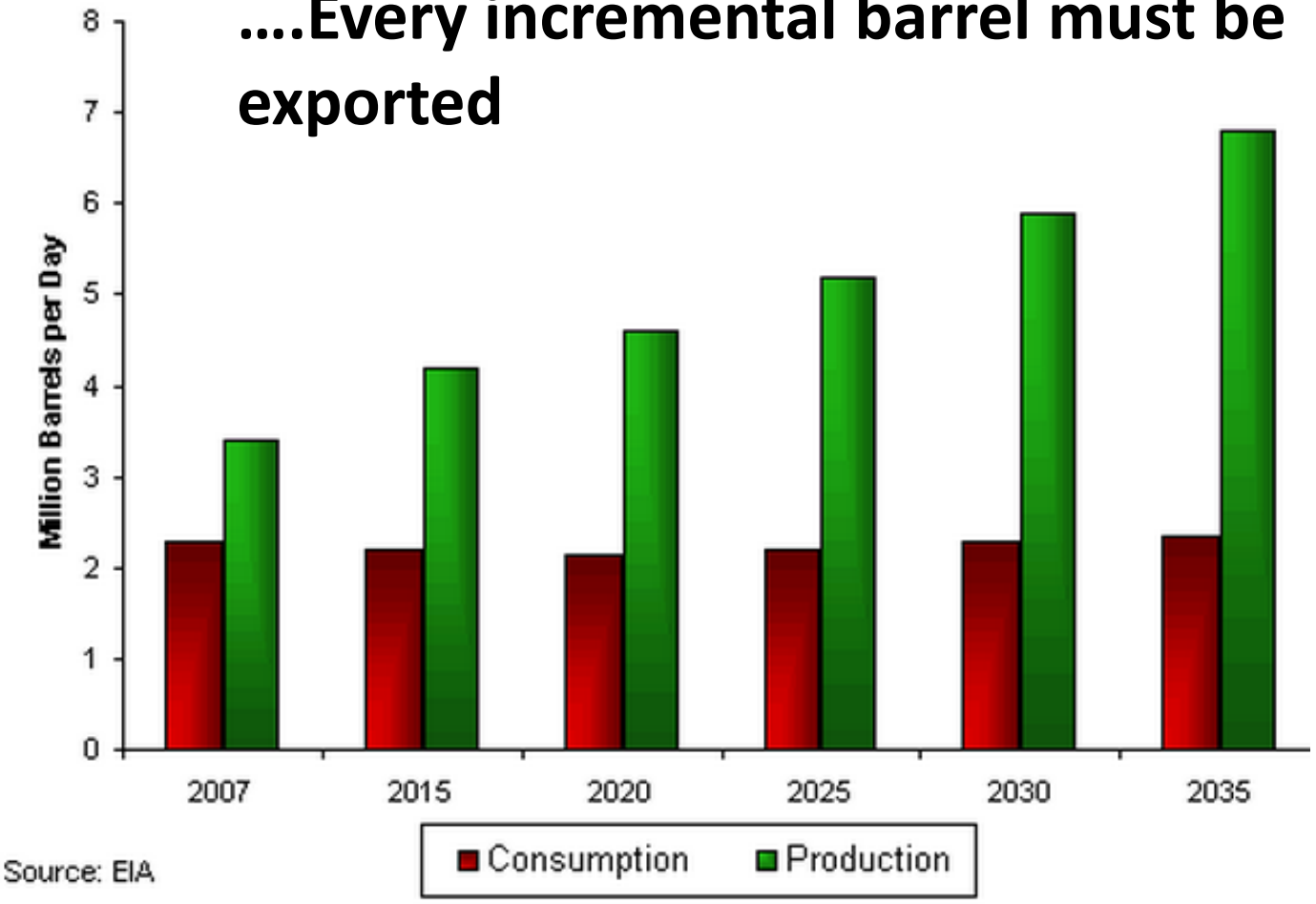
Total Canadian Oil Production (NEB Reference Case)



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

Canadian Consumption to Remain Flat…

….Every incremental barrel must be exported



Source: EIA

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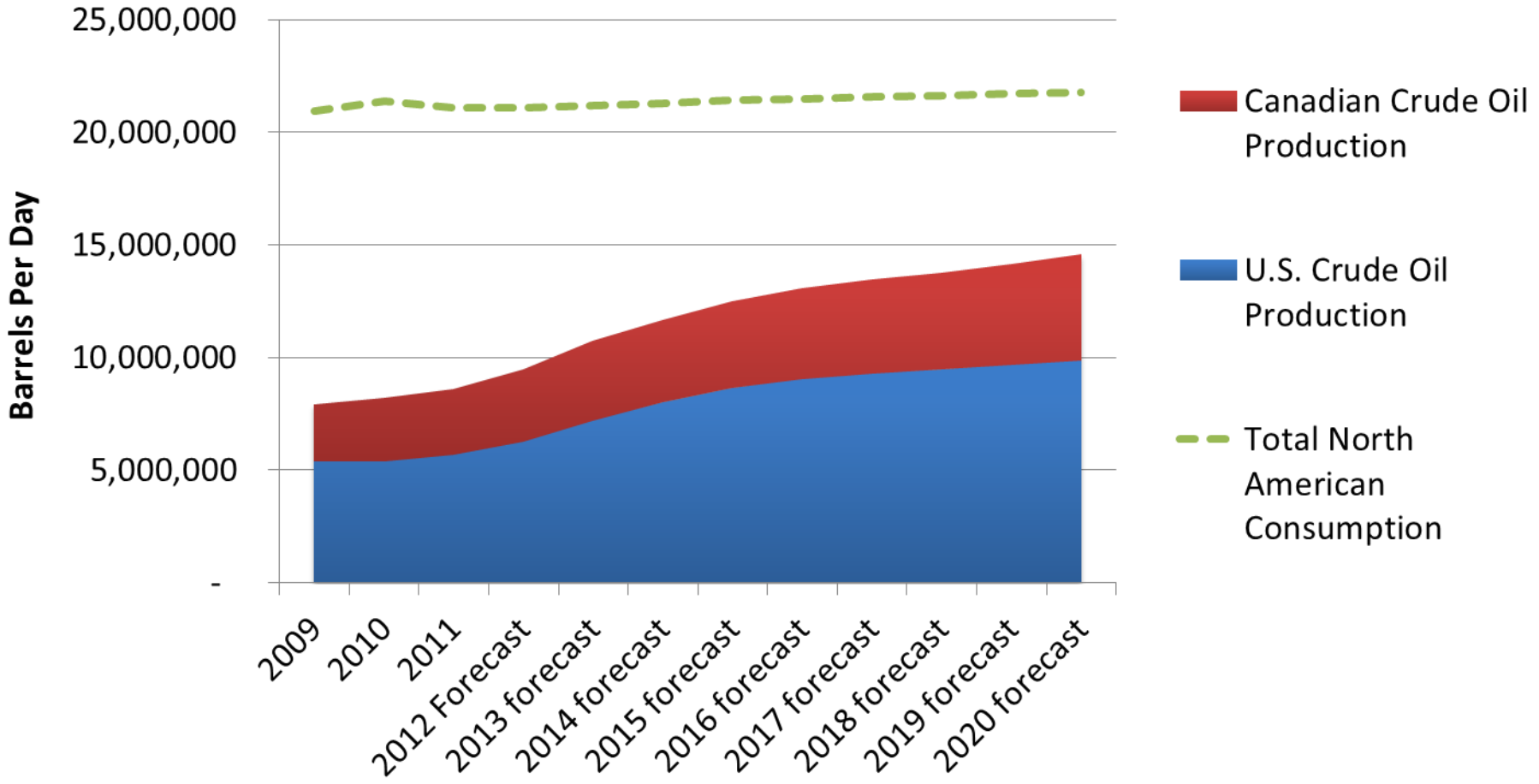
Canadian Consumption to Remain Flat…



Source: EIA

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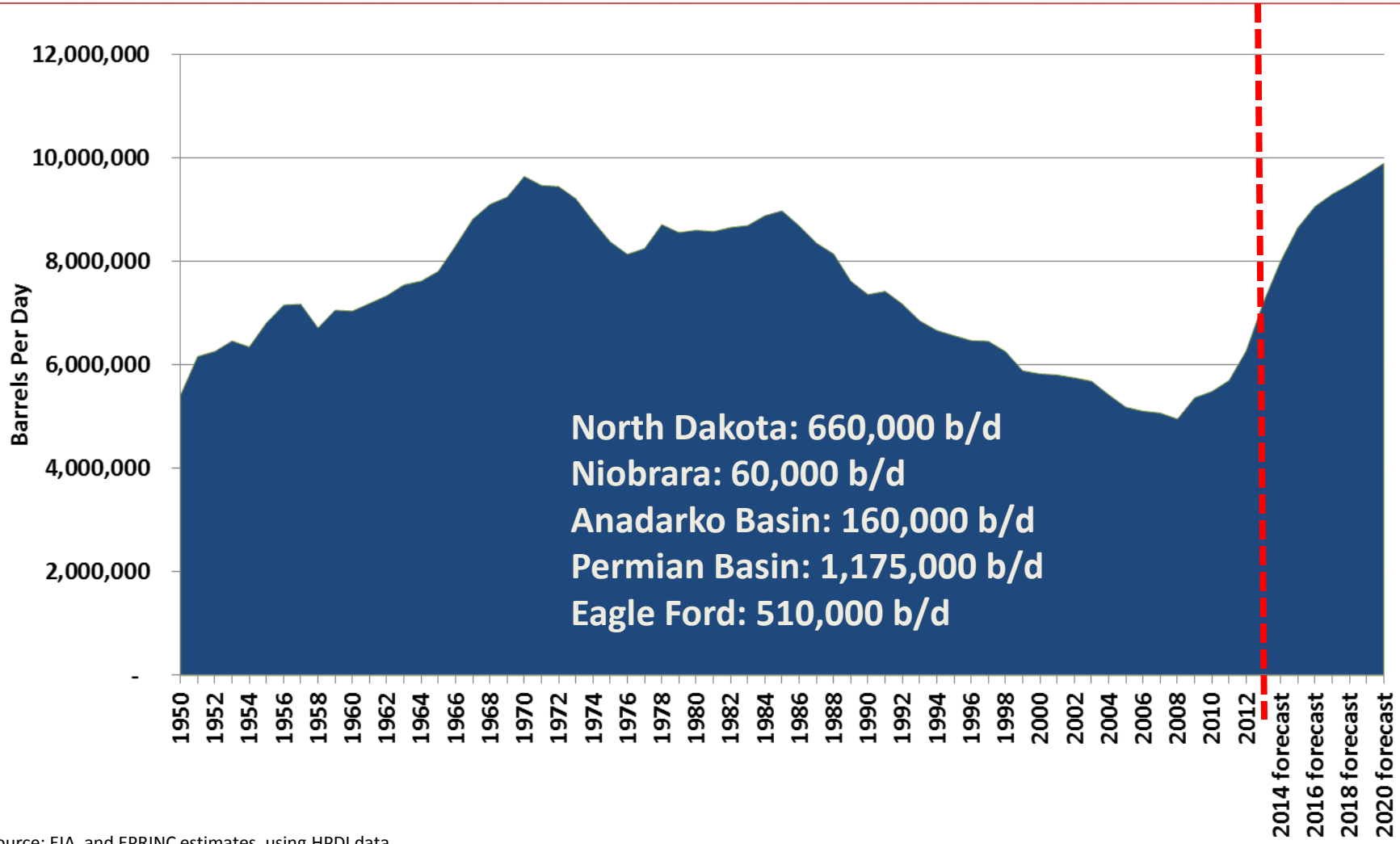
U.S. Production Increases



Source: EIA, and EPRINC estimates using HPDI data

Incremental North American Liquids Production

2010-2017

- Canadian Oil Sands + 1-1.5 mm b/d
- U.S. Onshore Crude Oil + 2.5-3 mm b/d
- U.S. NGLs + 1 mm b/d

5 mm b/d of new onshore production in seven years. U.S. offshore (arctic, gulf), Canadian shale, Mexico provide additional upside potential. Brazil will likely contribute an addition 1-1.5 mm b/d.

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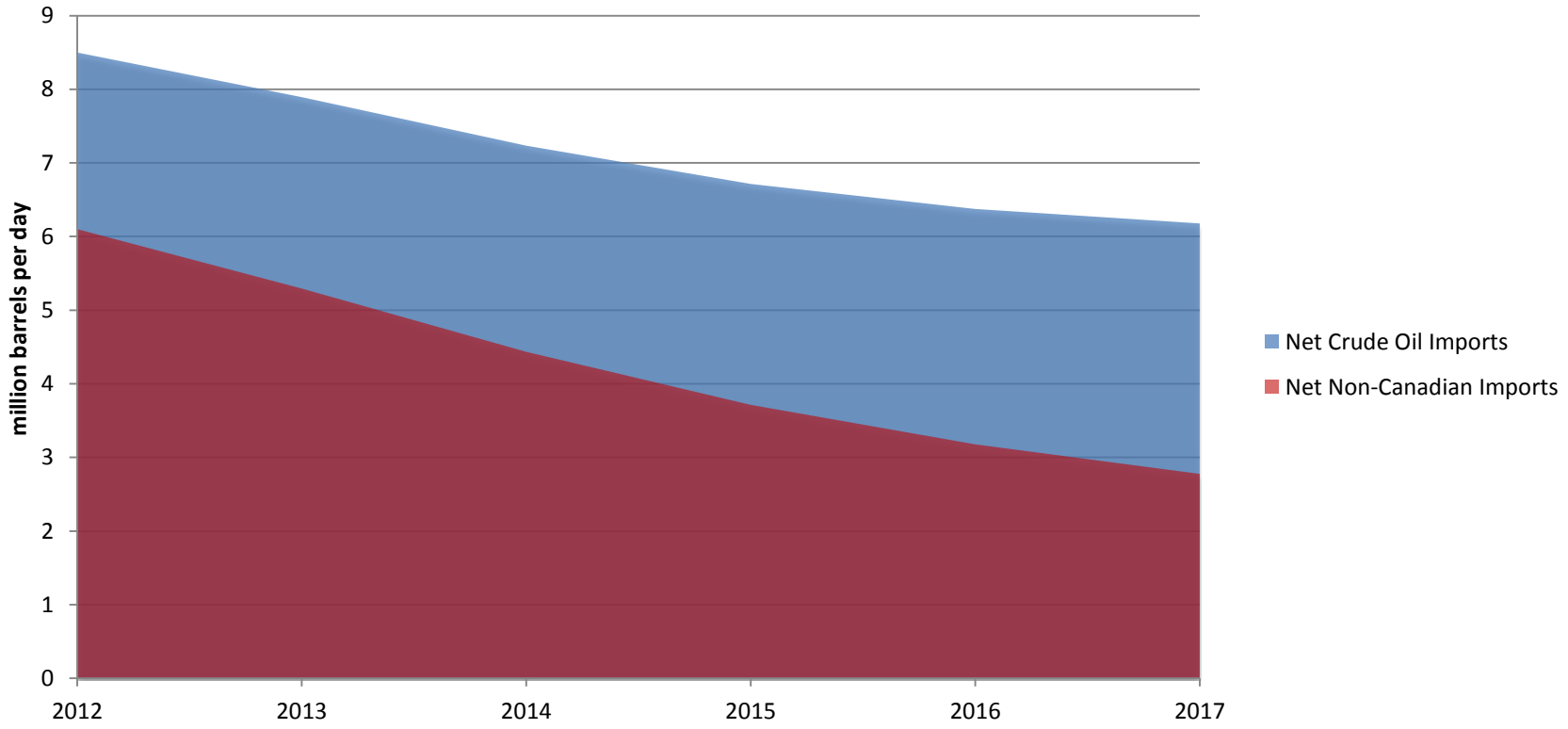
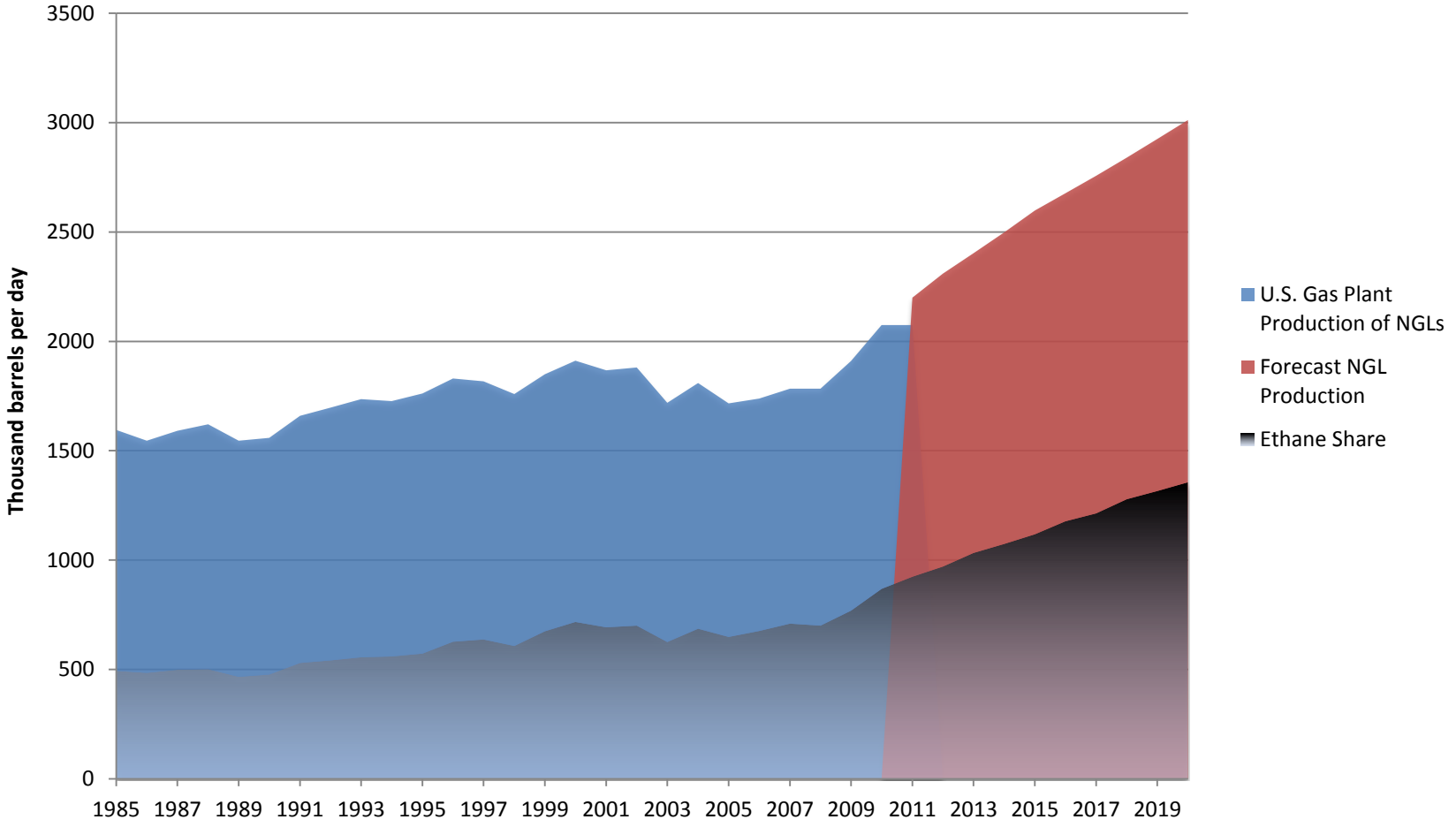
Resulting Decline in US Net Imports*



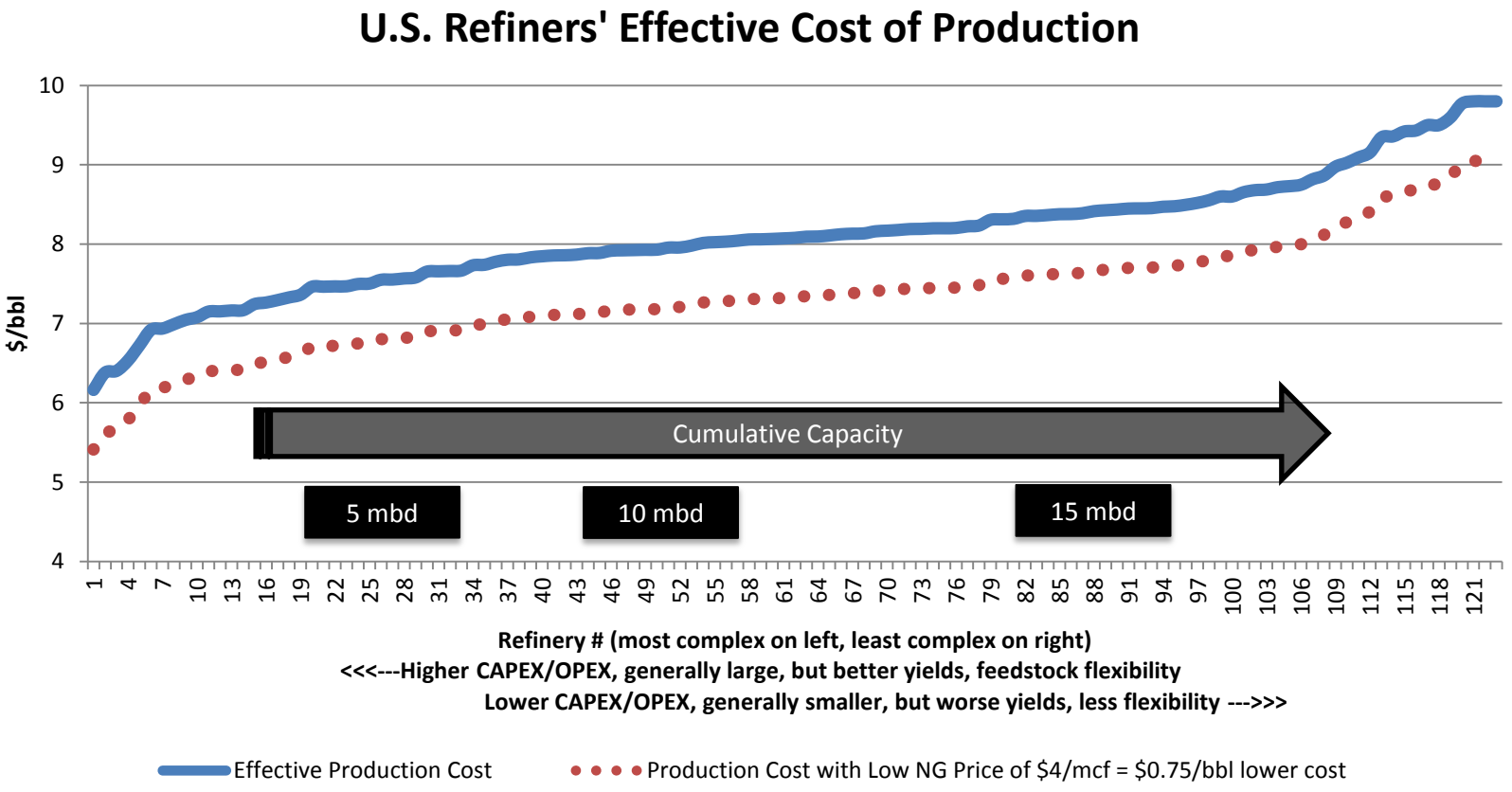
*Holds all US crude oil and biofuel production constant except for the plays listed in the previous slides. Assumes 1 mm bd of Canadian production growth dispersed evenly over 5 years, and that all incremental Canadian production enters the US. Also assumes US demand remains unchanged from current levels.

NGL Production Outlook to 2020



Source: EIA Data, EPRINC forecast. Assumes ethane continues to incrementally increase its share of the NGL pool.

Low Cost Nat Gas Lowers Production Costs



Effective Production Cost takes into account a refinery's ability to use heavy crude feedstocks (complexity), product slate (yields) and operating costs (OPEX).

Source : OGJ Data for 2009, EPRINC Calculations

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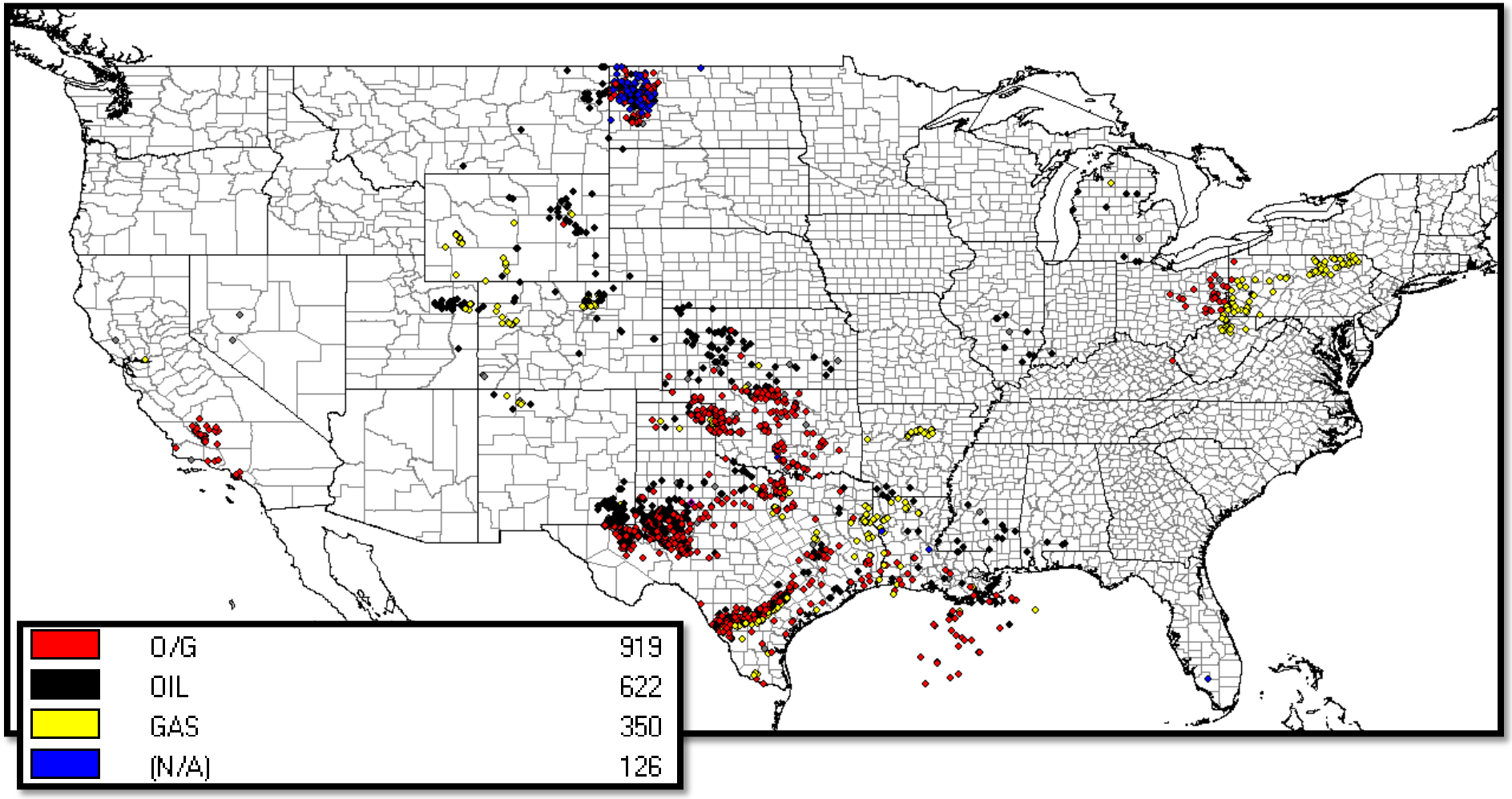
U.S. Rig Count



Source: HPDI September 4h, 2012

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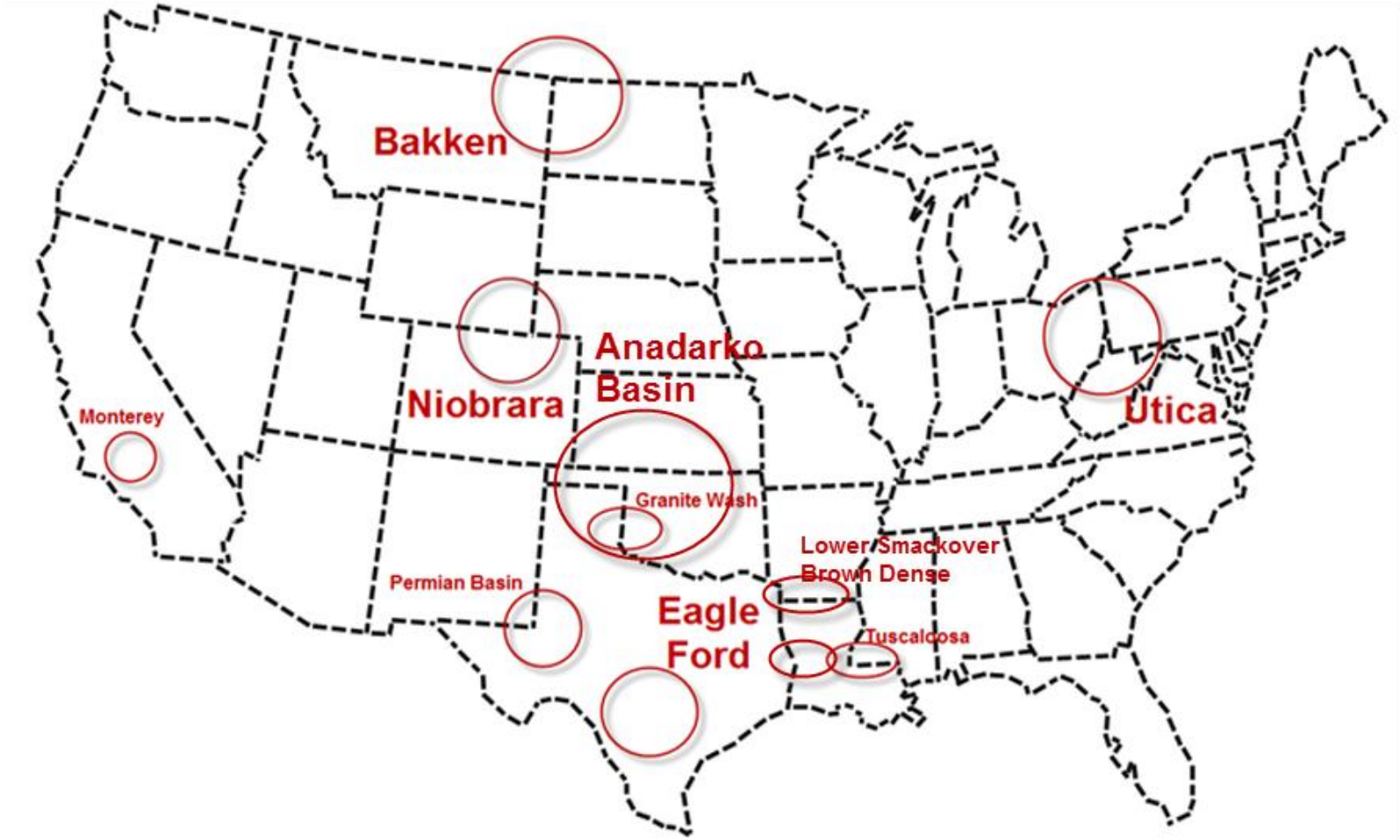
U.S. Shale/Tight Oil and Conventional Plays



Source: EPRINC, not to scale

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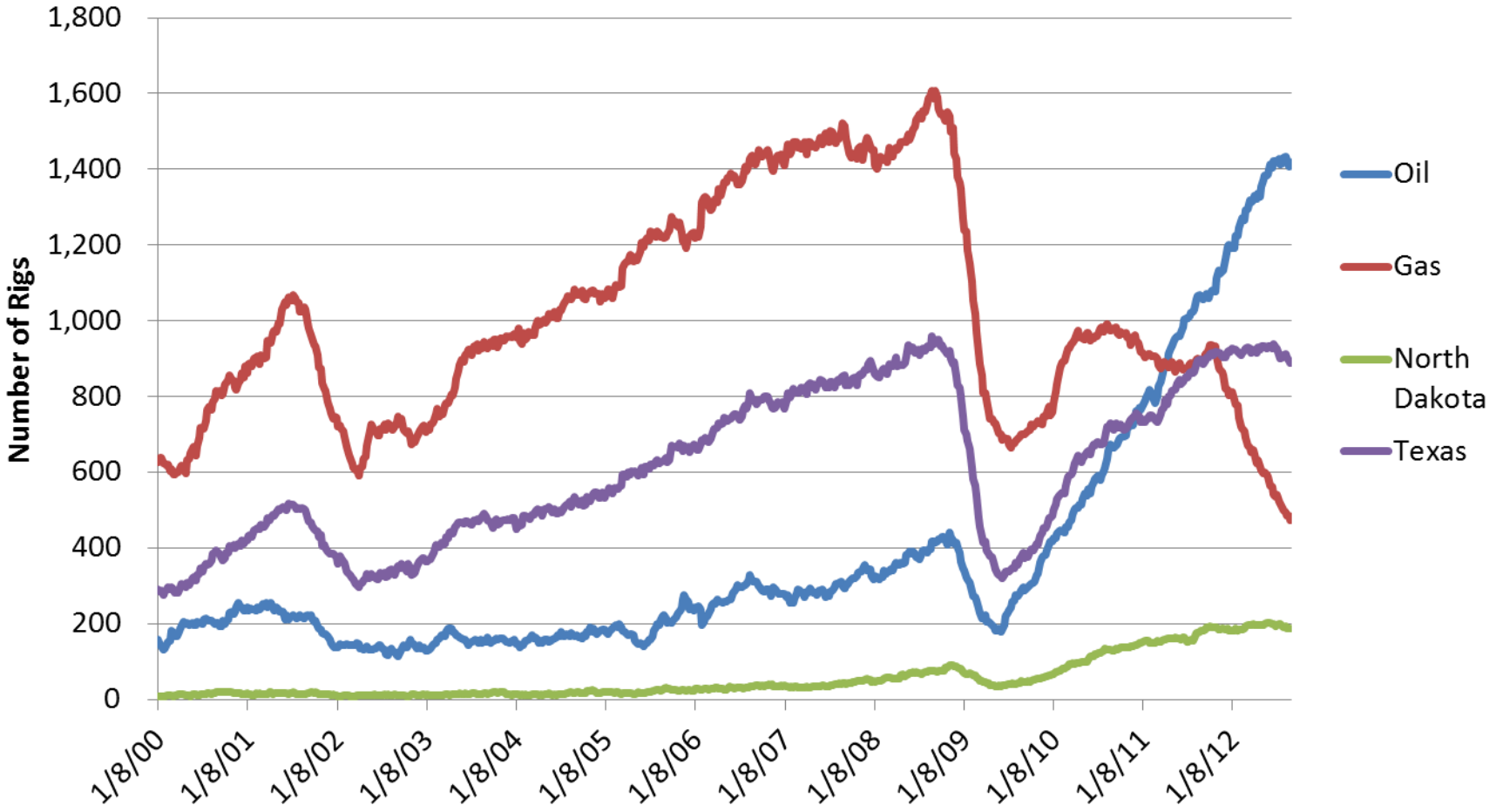
U.S. and North Dakota and Texas Rig Count



Source: Baker Hughes Sept 7, 2012. All but 51 rigs nationwide are onshore.

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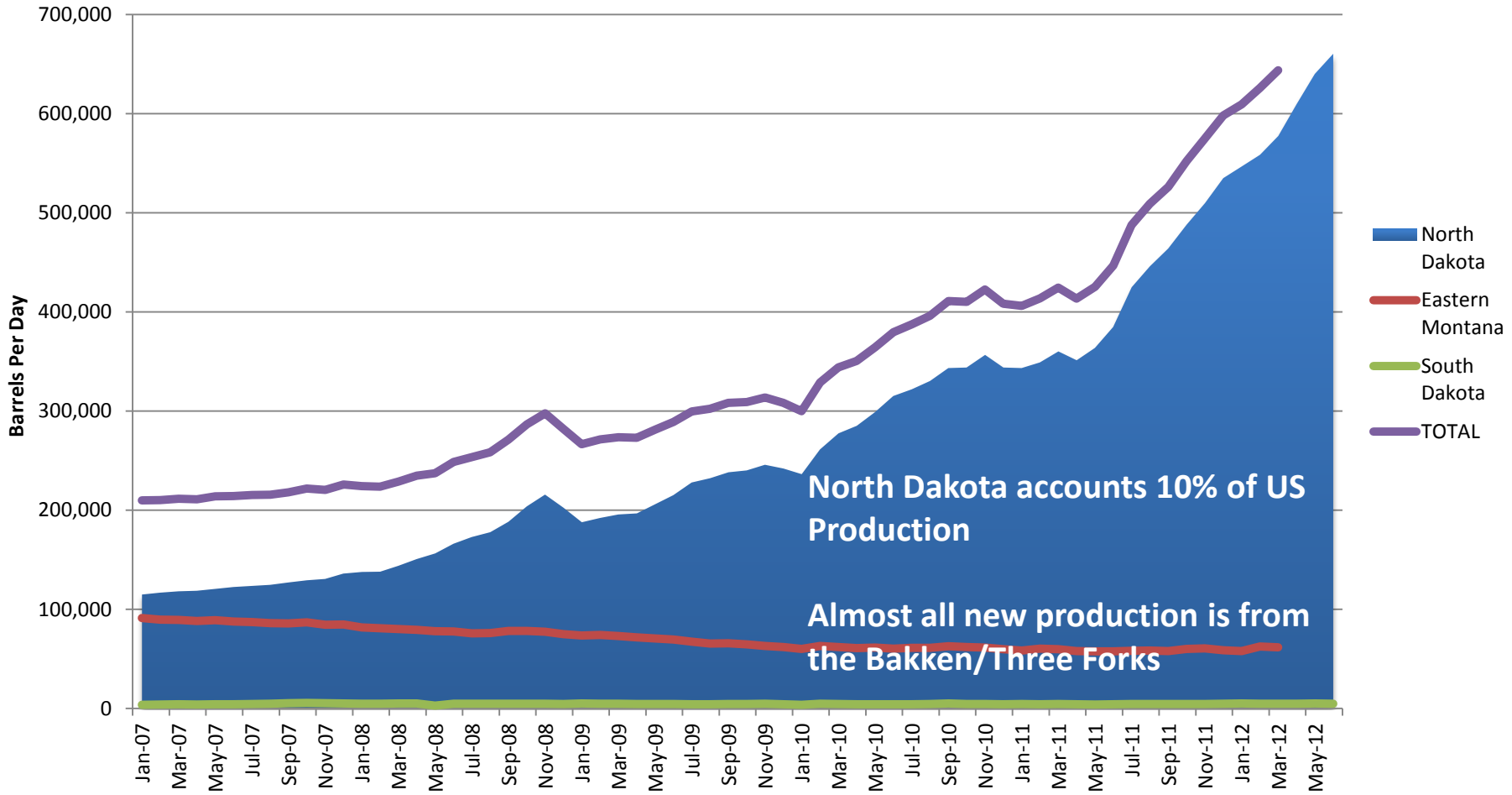
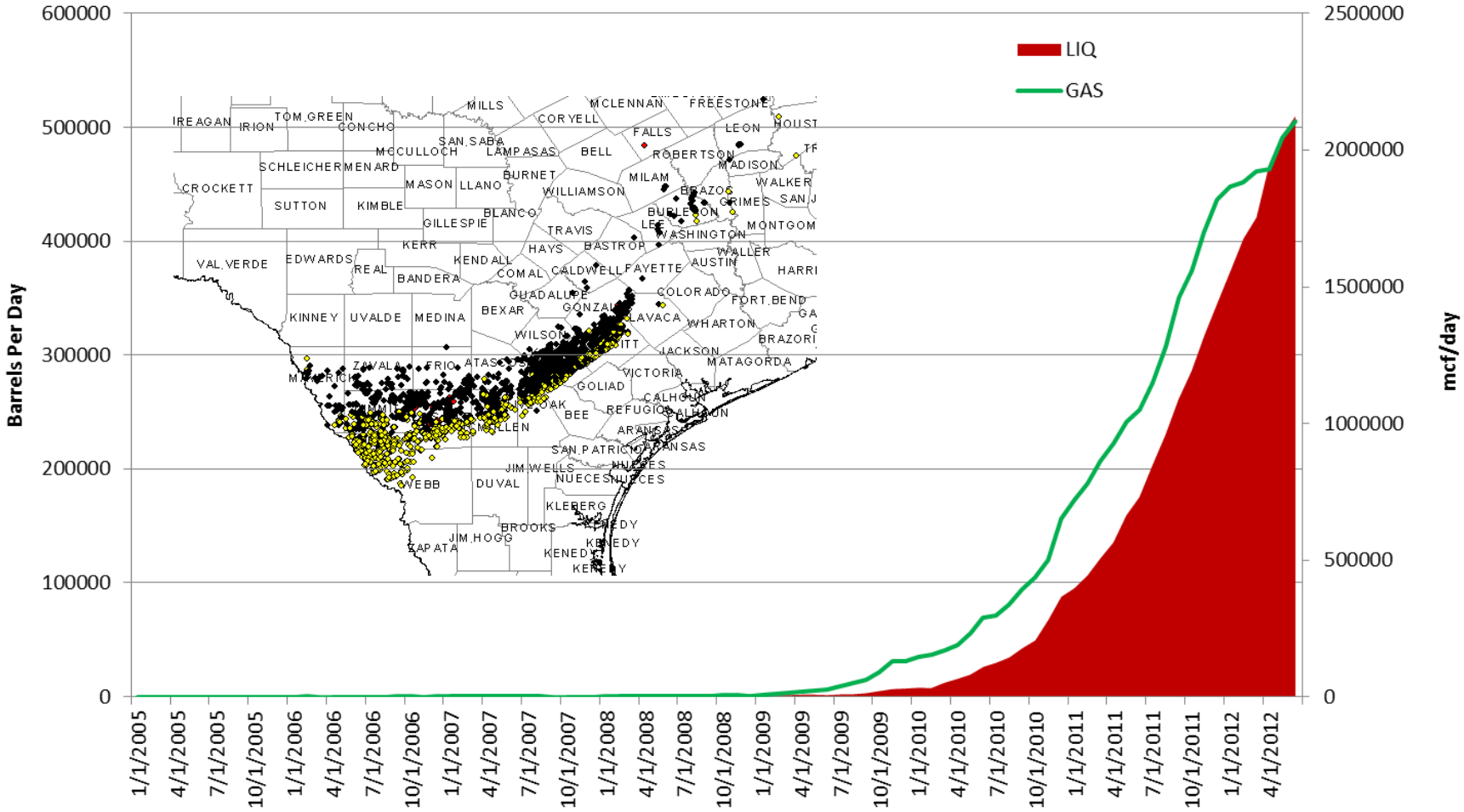
Williston Basin Production



Source: NDIC

Eagle Ford Production



Source: HPDI September 4th, 2012

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What's happening to prices?

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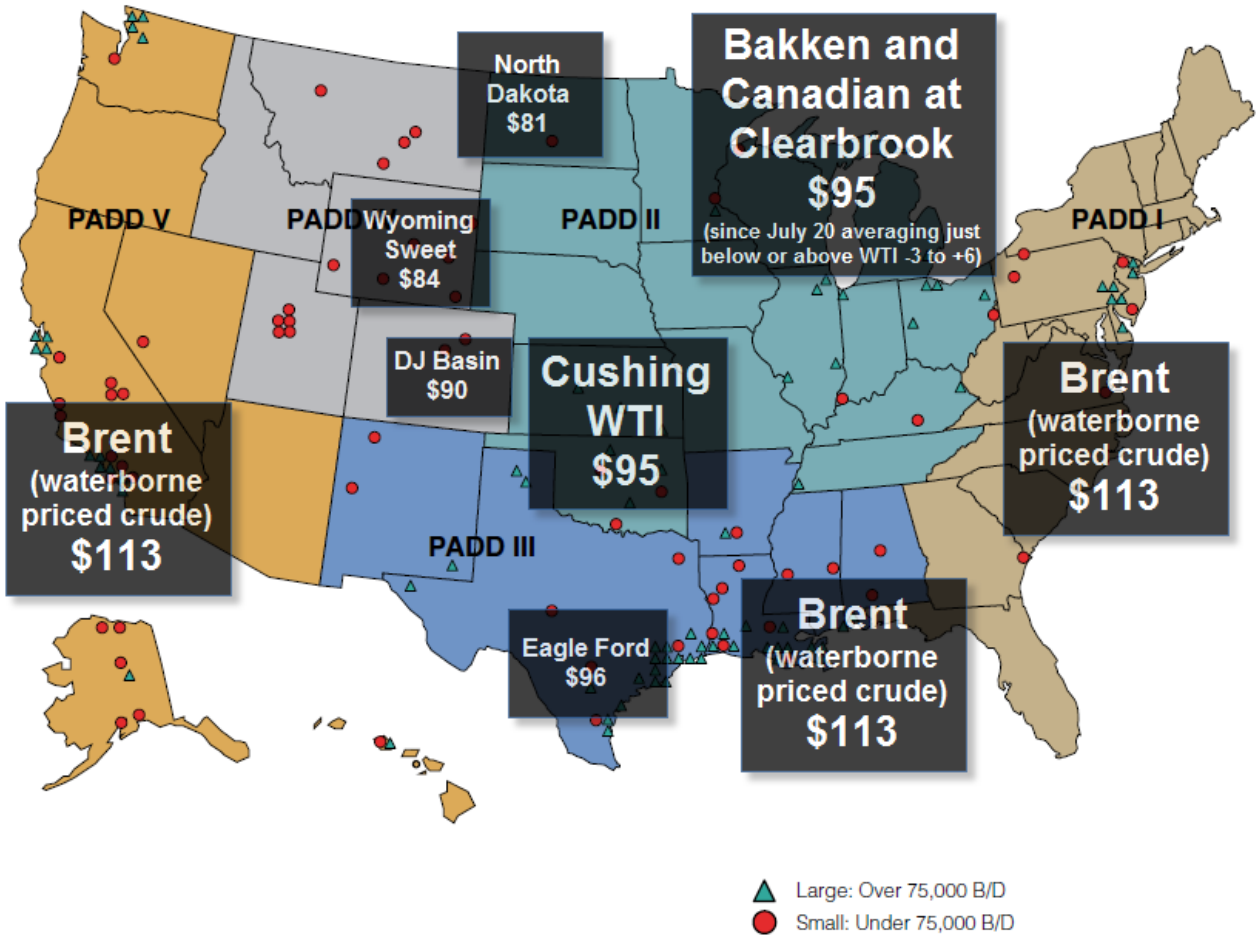
Brent, WTI, and Bakken Markets



Source: AFPM Map,; Sept 6, 2012 Bloomberg Brent and WTI Prices; Flint Hills and estimates, Canadian assumptions

Bakken Prices at Clearbrook

Bloomberg Bakken (Clearbrook MN) Crude Oil Spot Price

Source: Bloomberg, June 14, 2012

Bakken Clearbrook Differentials to WTI

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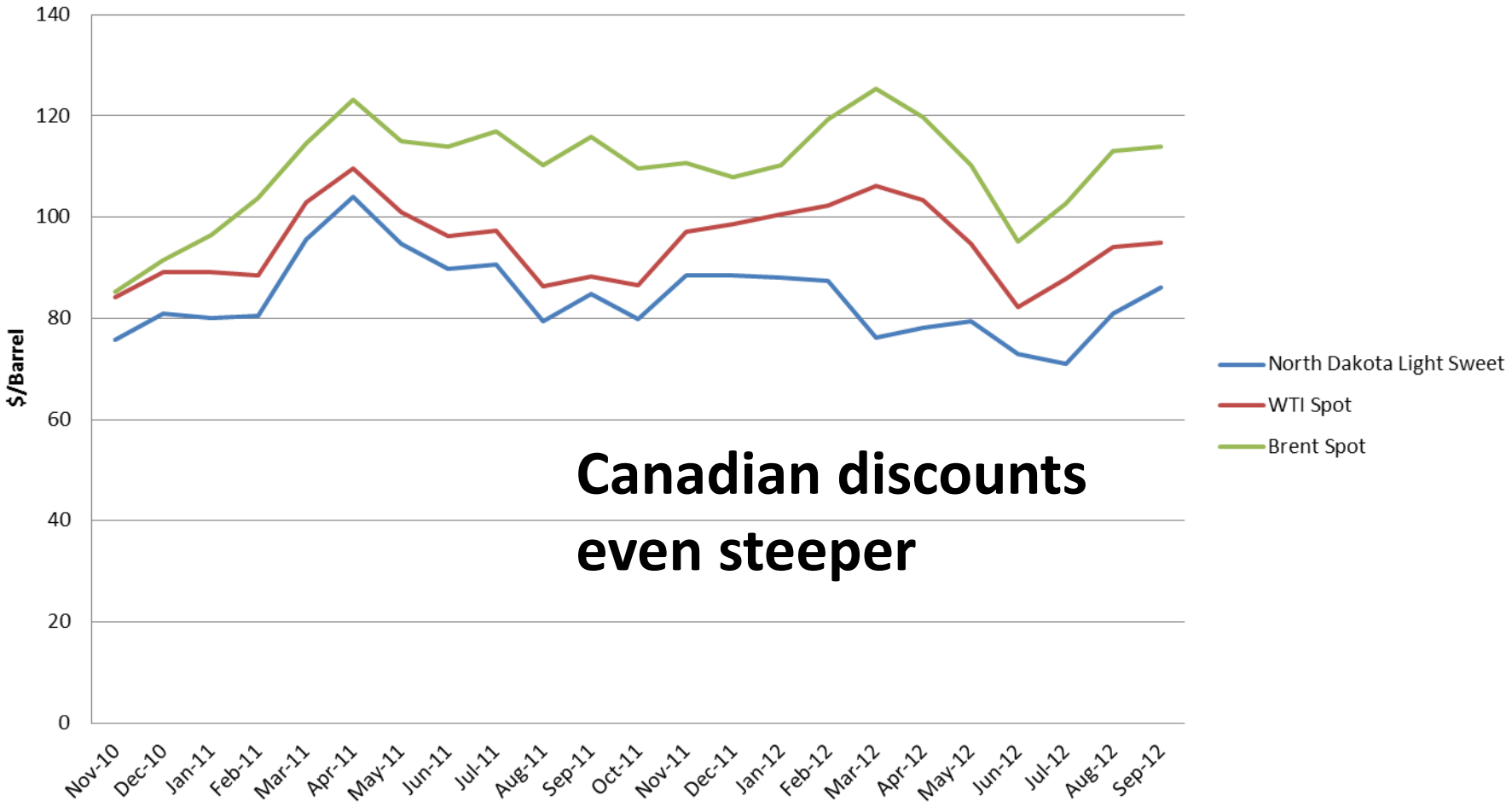
North Dakota Discounts



Source: Flint Hills, EIA, and estimates

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Why?

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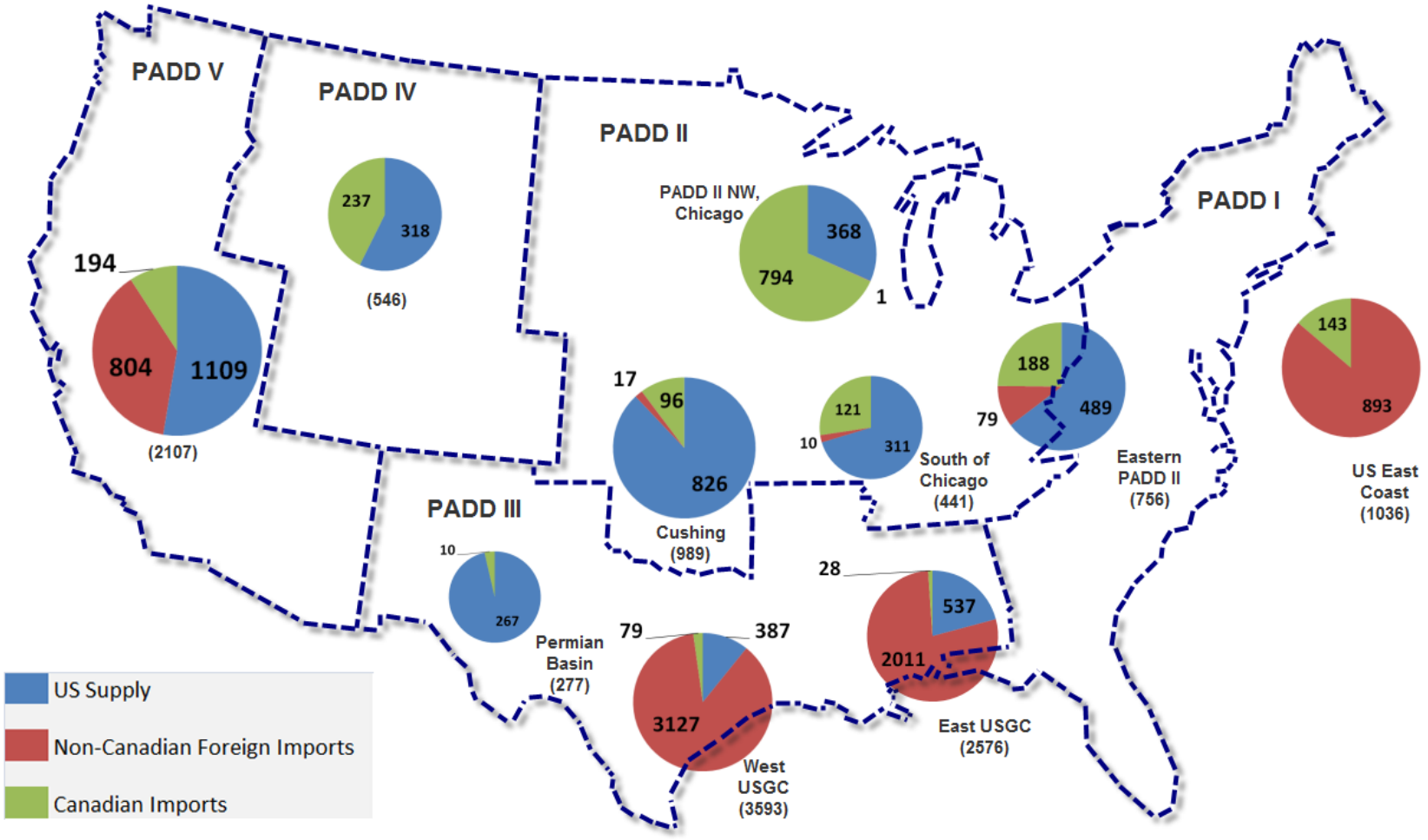
Markets for Canadian Crude

- The current markets for Canadian crude are the Rockies (PADD 4) and the Midwest (PADD 2)

- The potential exists in Asia and the Gulf Coast…substantially knocking out heavy Mexican and Venezuelan imports in the US Gulf Coast

- But due to regulatory and environmental hurdles, PADD III access has been postponed and thereby tightness has been created – and too much light sweet in the market, no need for SCO in the U.S.

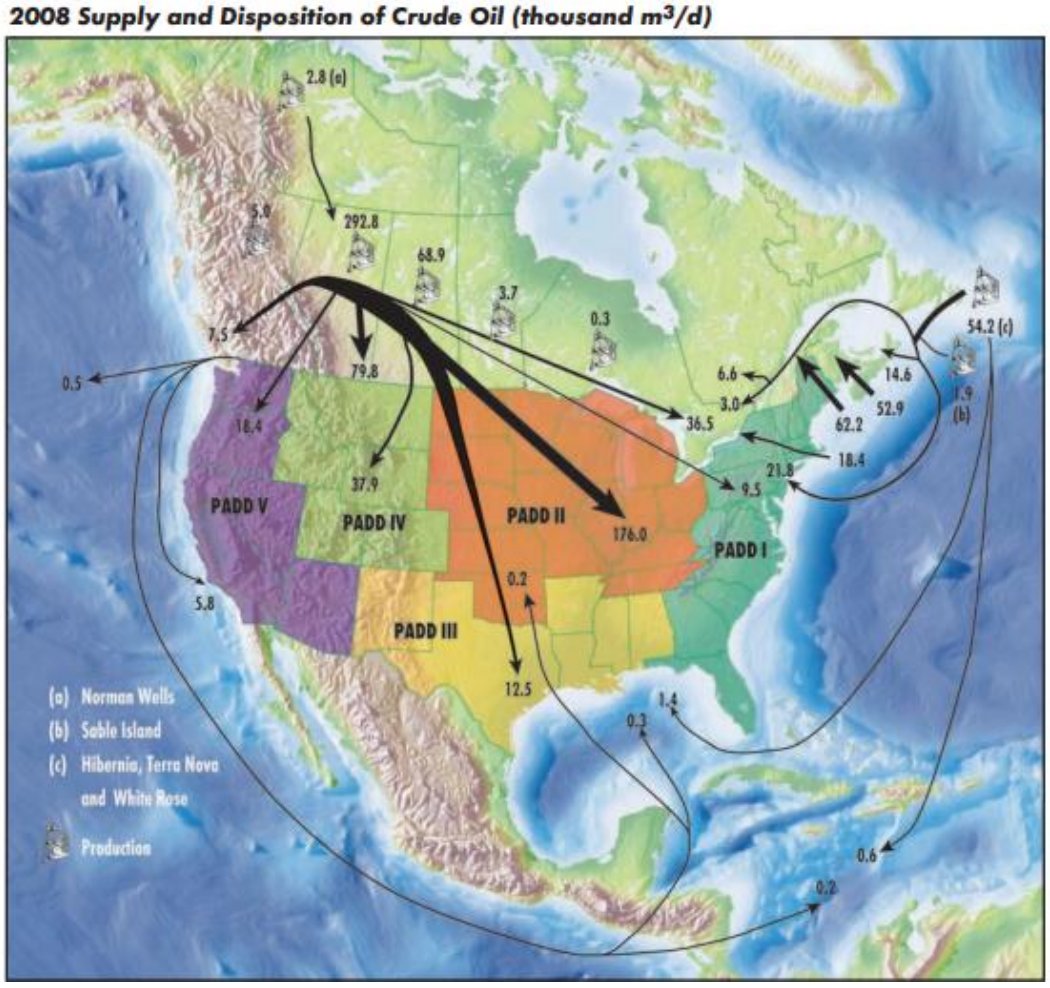
Canadian Imports and Potential Markets



Source: EPRINC rendition from Enbridge. Enbridge; Enbridge used EIA and NEB Data and Enbridge Estimates (with some averages)

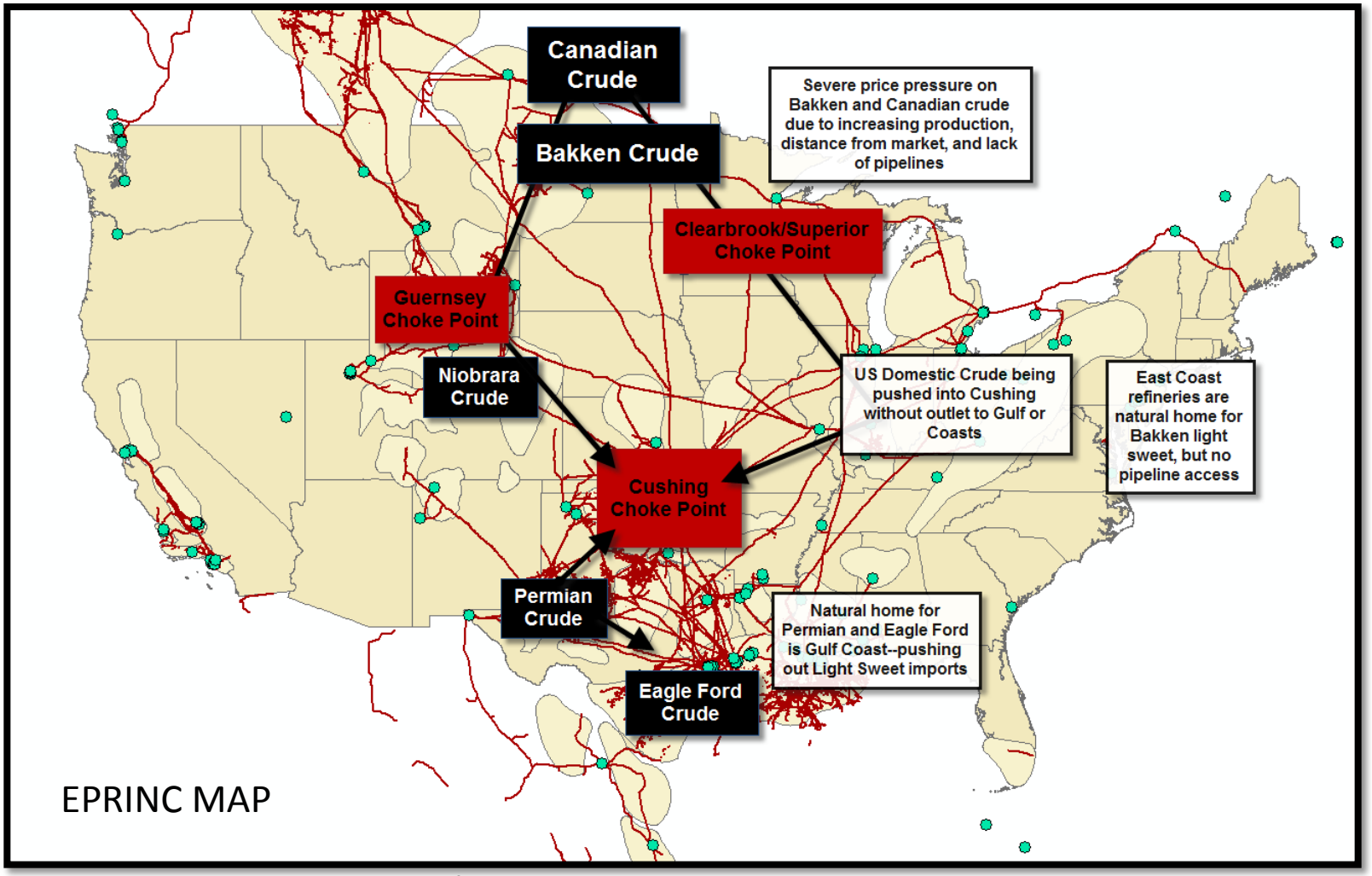
Crude Disposition by Region 2010 (MB/D)

Canadian Crude Flows



Source: Canadian Pipeline Transportation System, NEB, July 2009

Choke Points



Source: EPRINC Choke Point Map using Hart ArcGIS Mapping software

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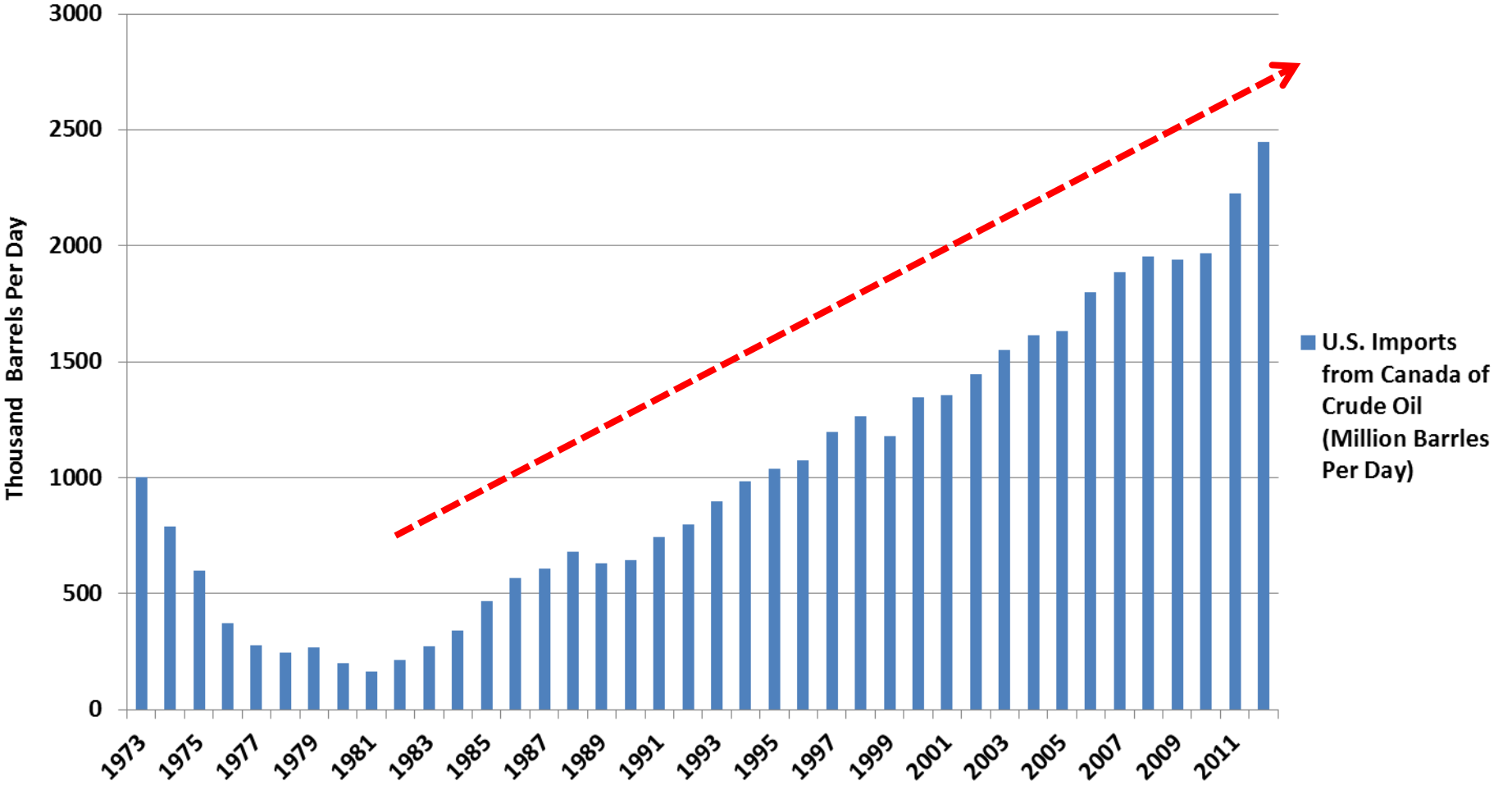
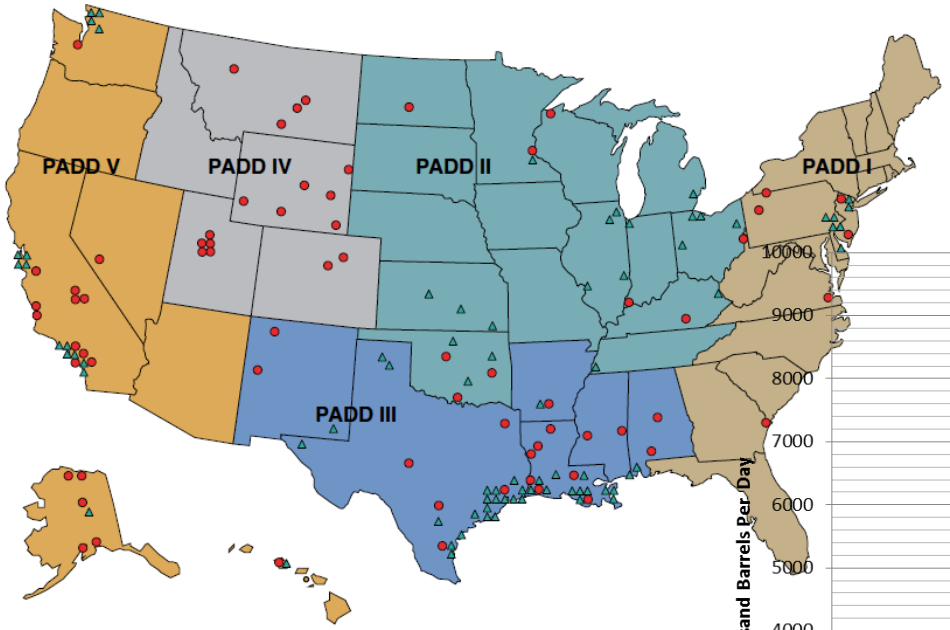
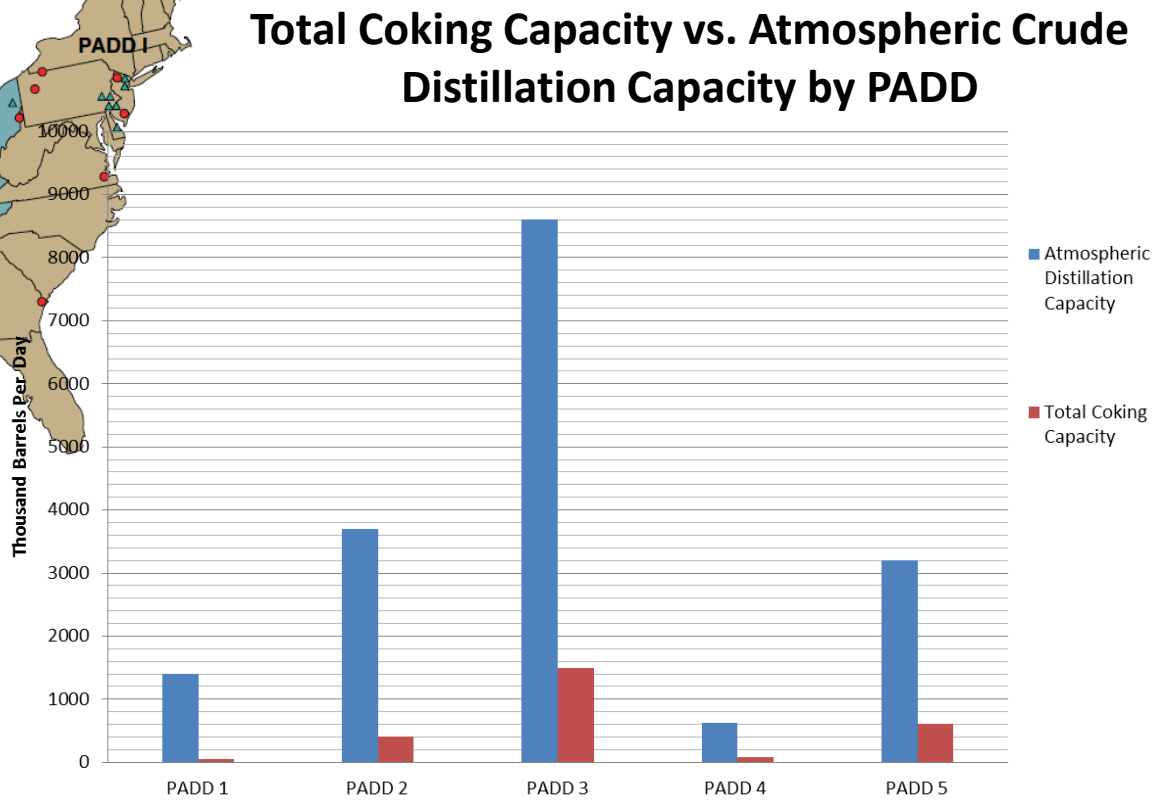
U.S. Imports of Canadian Crude



Source: EIA

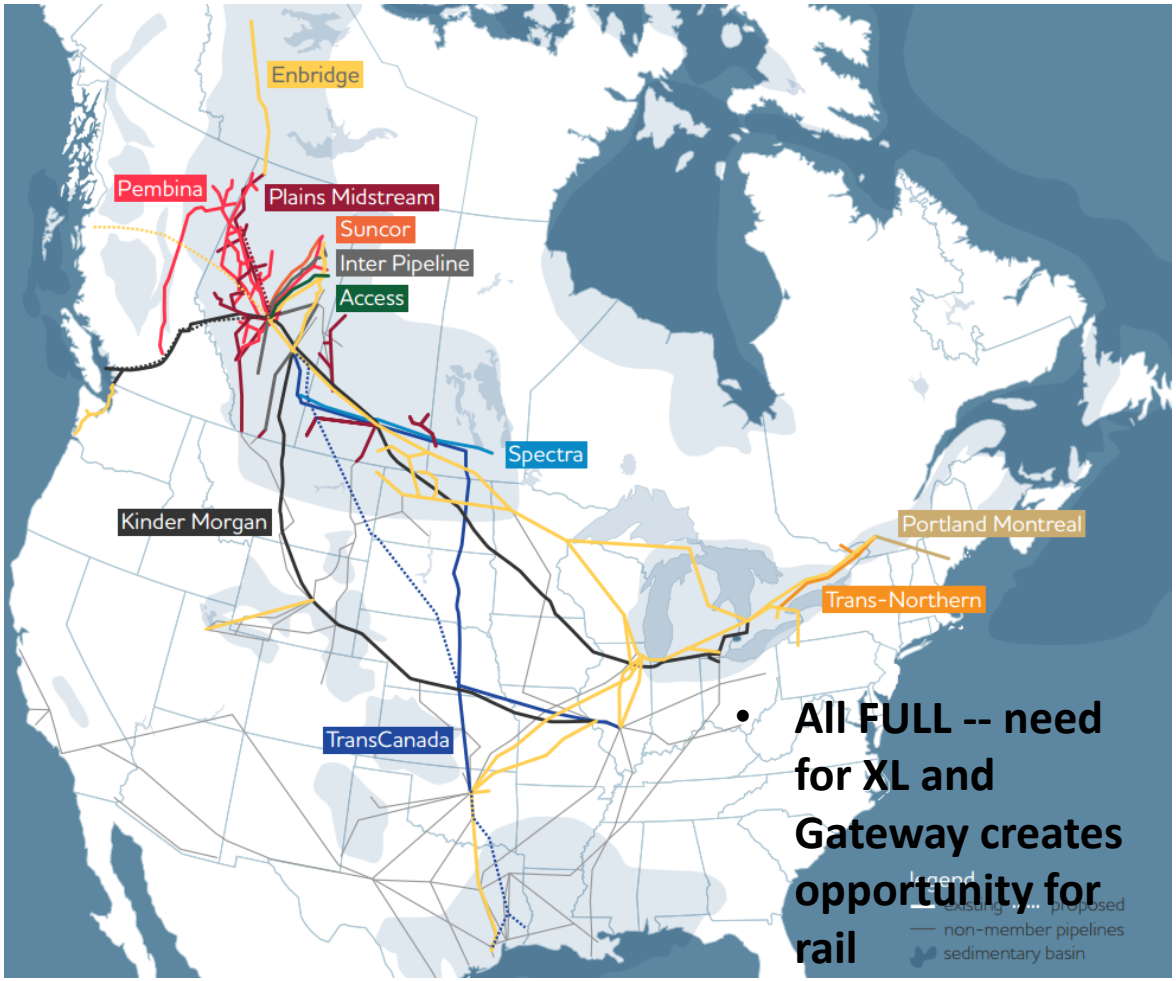
Where heavy (blended bitumen) needs to go…





Source: AFPM map, EIA data for graph

Canadian Pipeline Export Options



- **All FULL -- need for XL and Gateway creates opportunity for rail**

- **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)
- 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**

- **TransCanada's Keystone 581,000 b/d-full**

Source: Canadian Energy Pipeline Association

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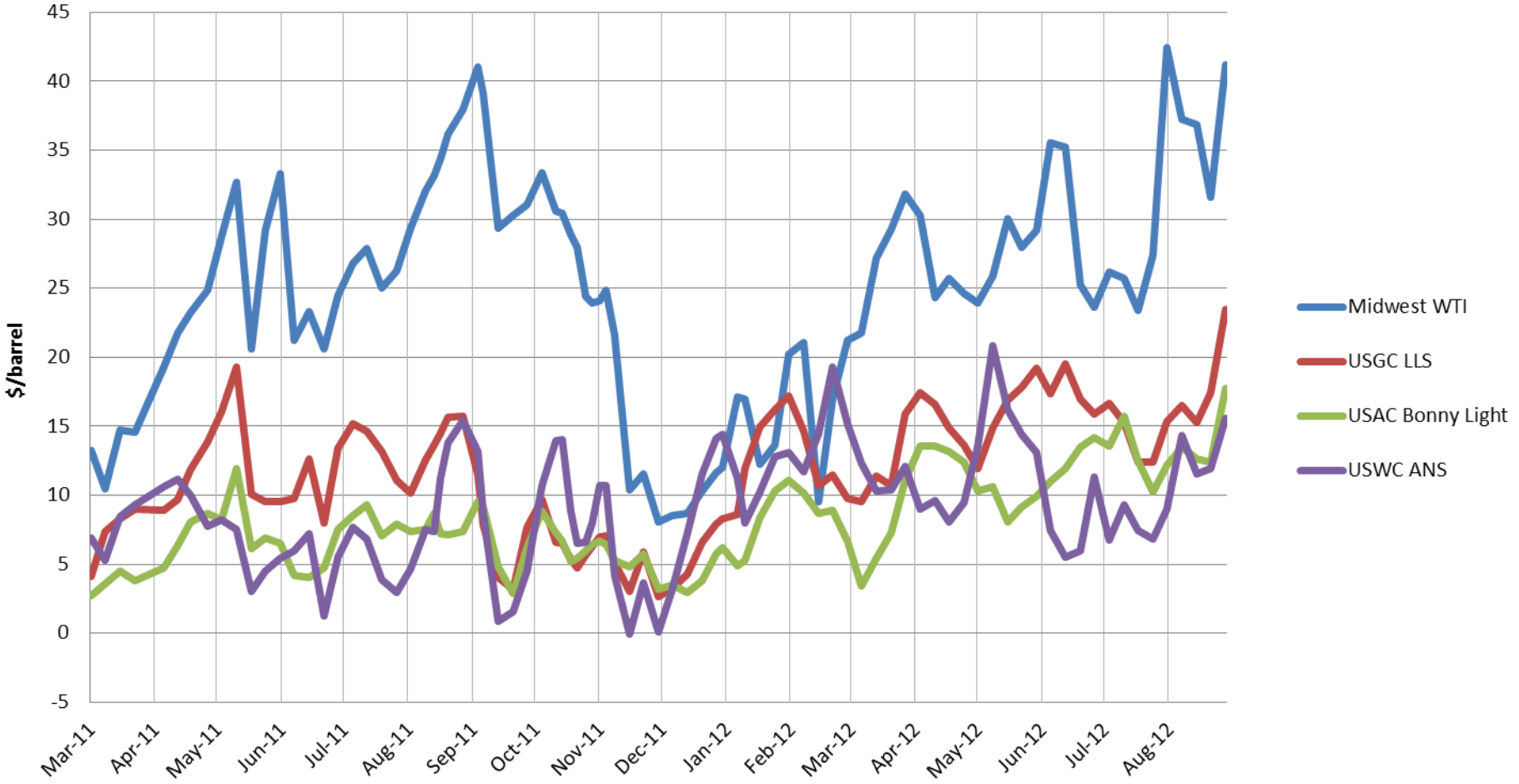
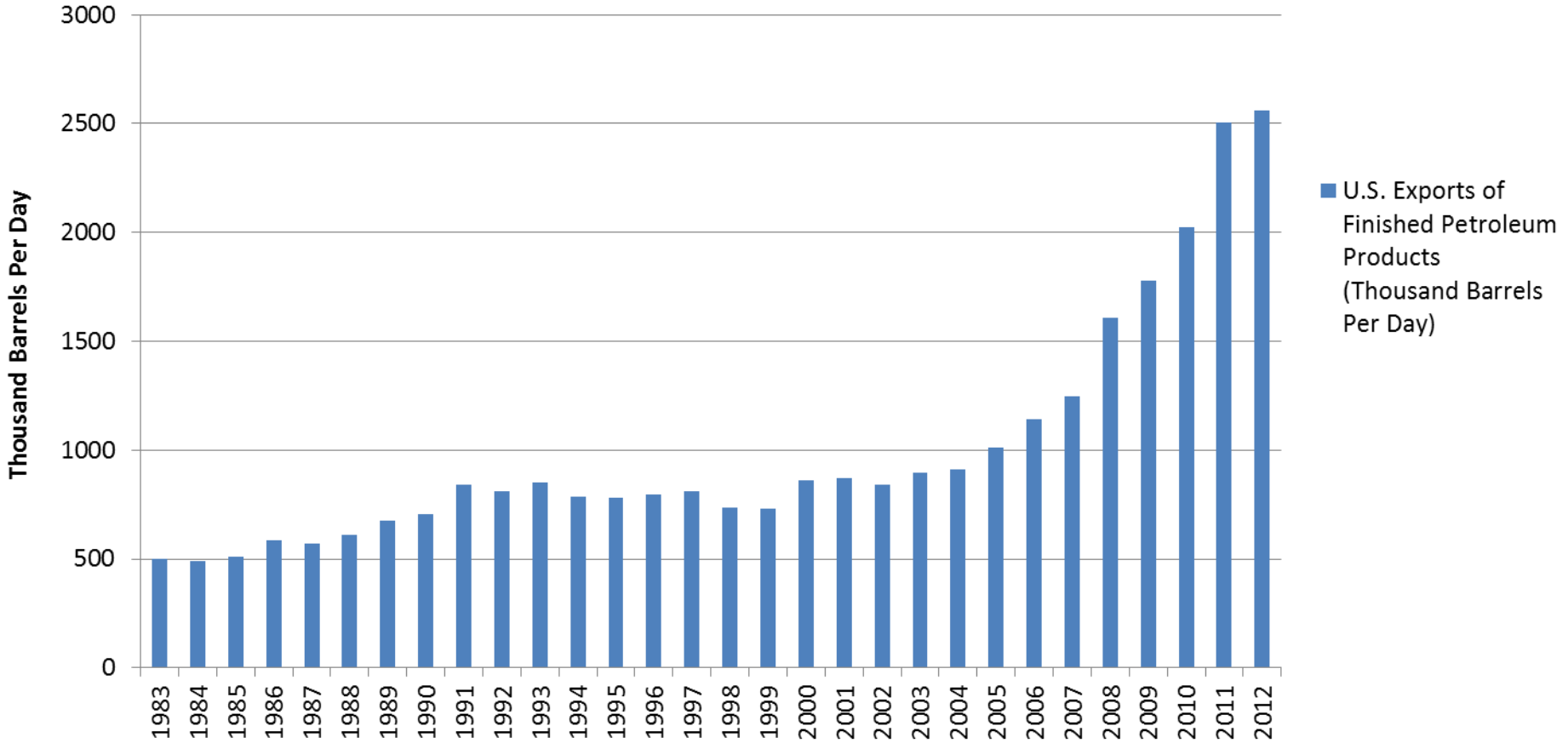
U.S. Cracking Margins



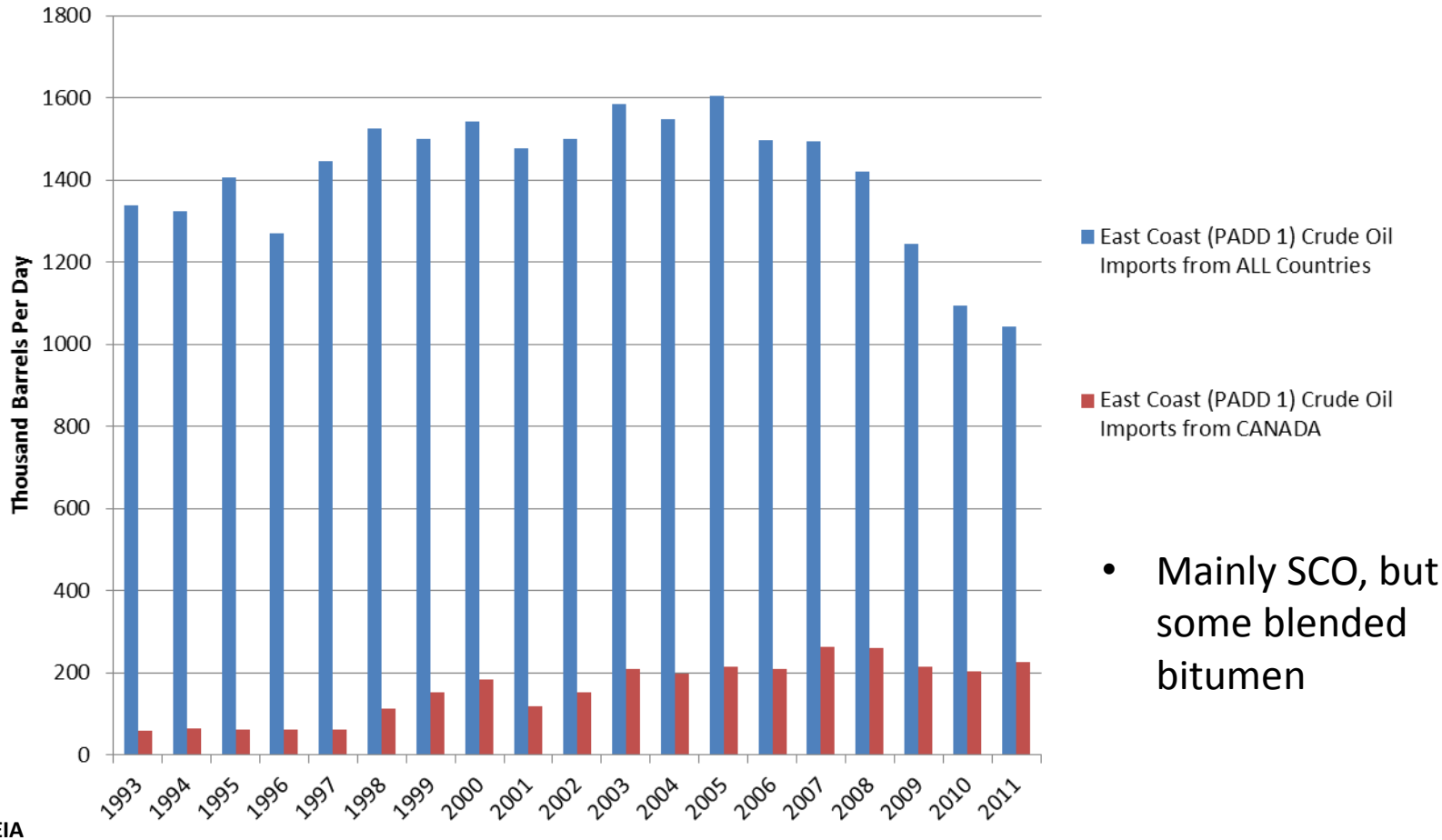
Source: Data from Platts

U.S. Exports of Finished Petroleum Products



Source: EIA

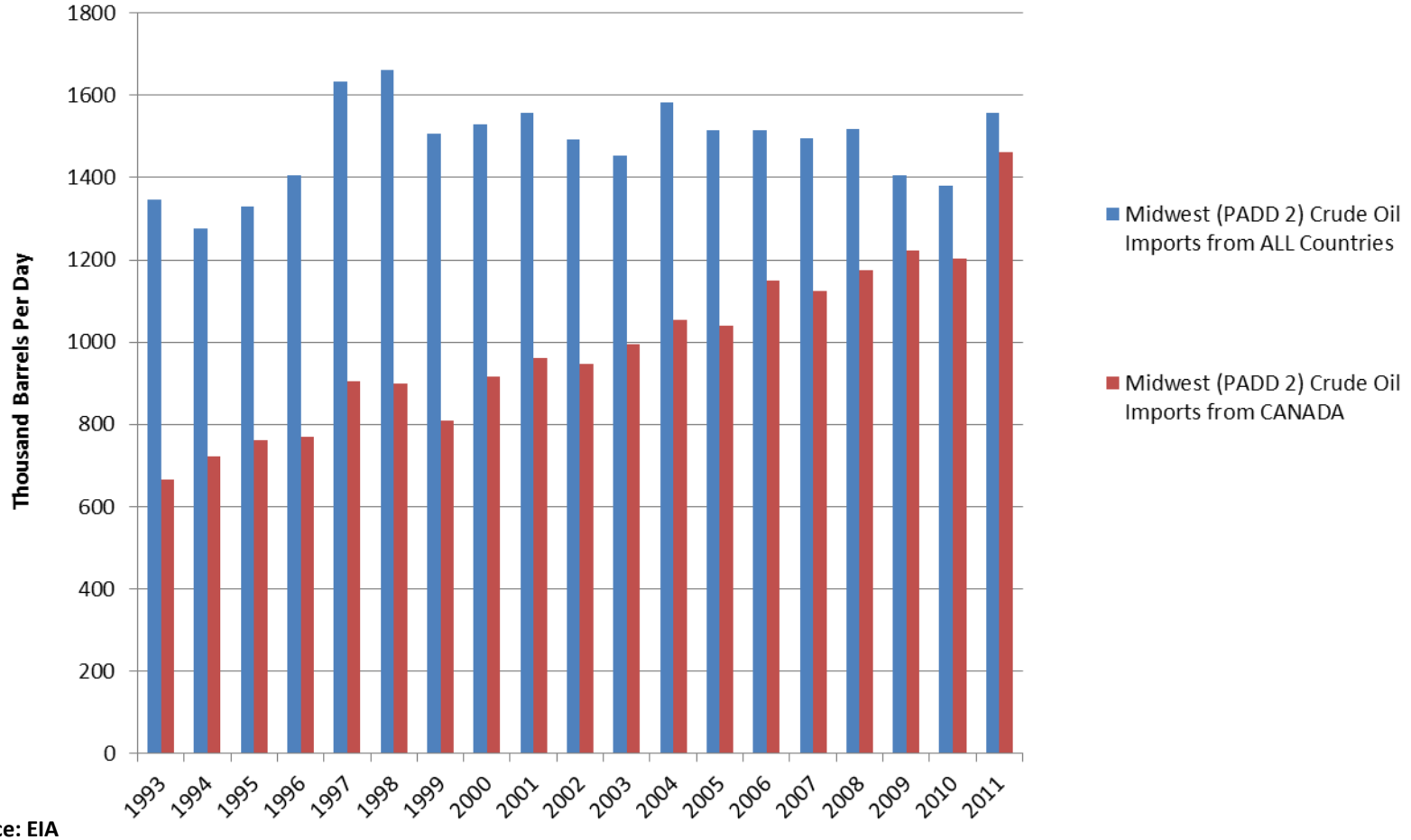
East Coast taking little Canadian Crude



- Mainly SCO, but some blended bitumen

Source: EIA

PADD II imports are almost all Canadian



Source: EIA

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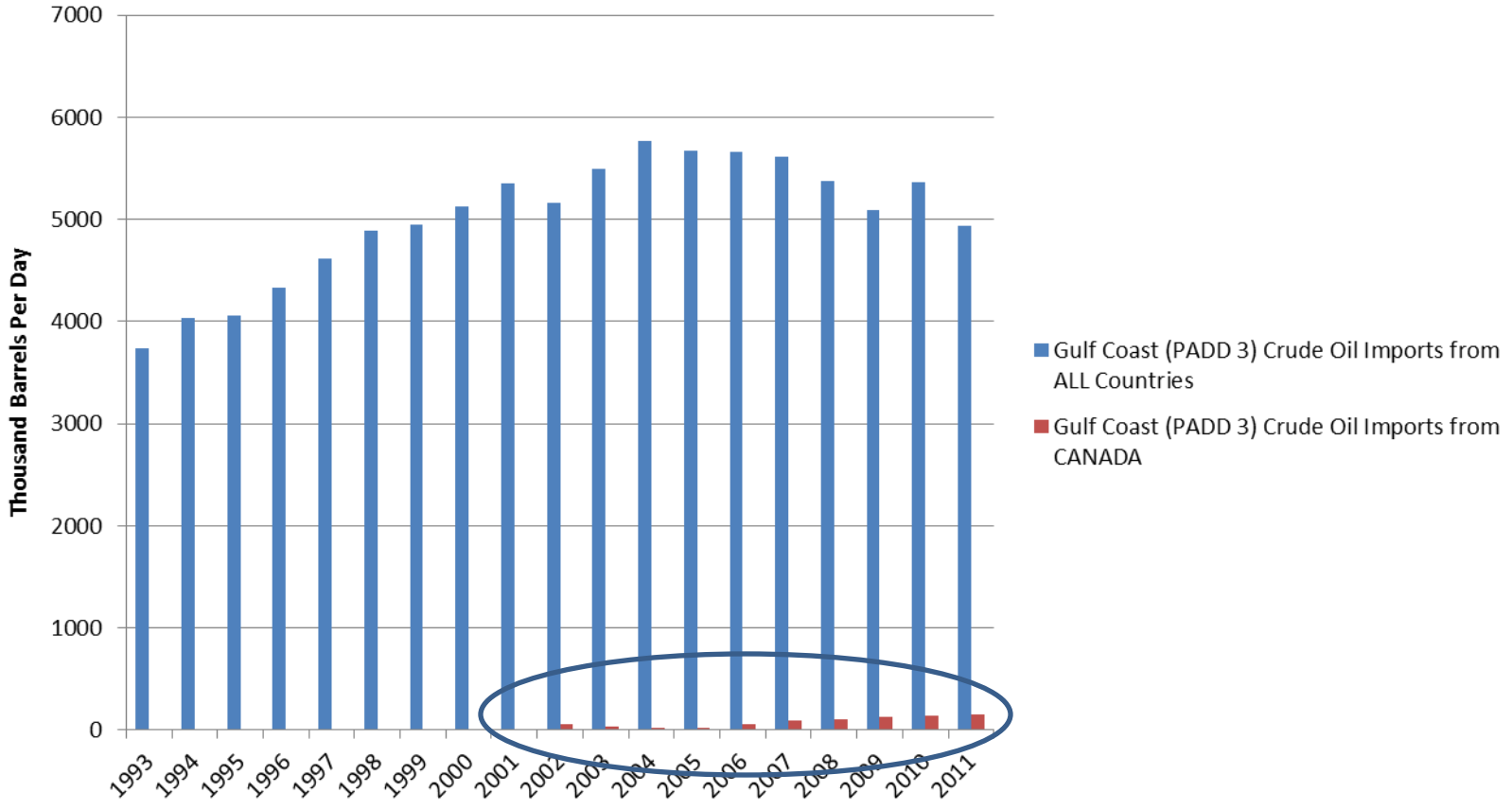
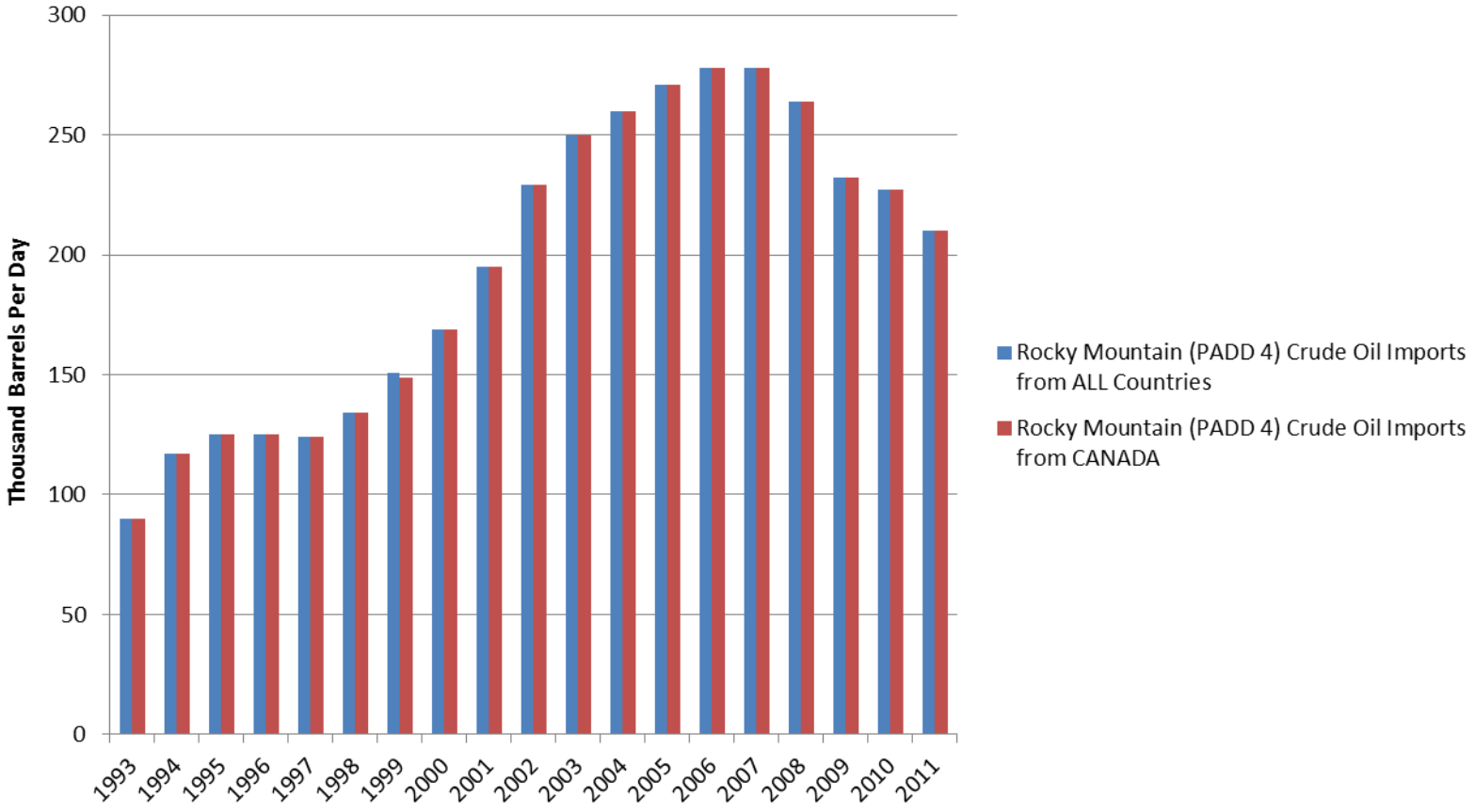
PADD III...has the cokers and is getting none of the crude



Source: EIA

ALL Imports into the Rockies are from CANADA



Source: EIA

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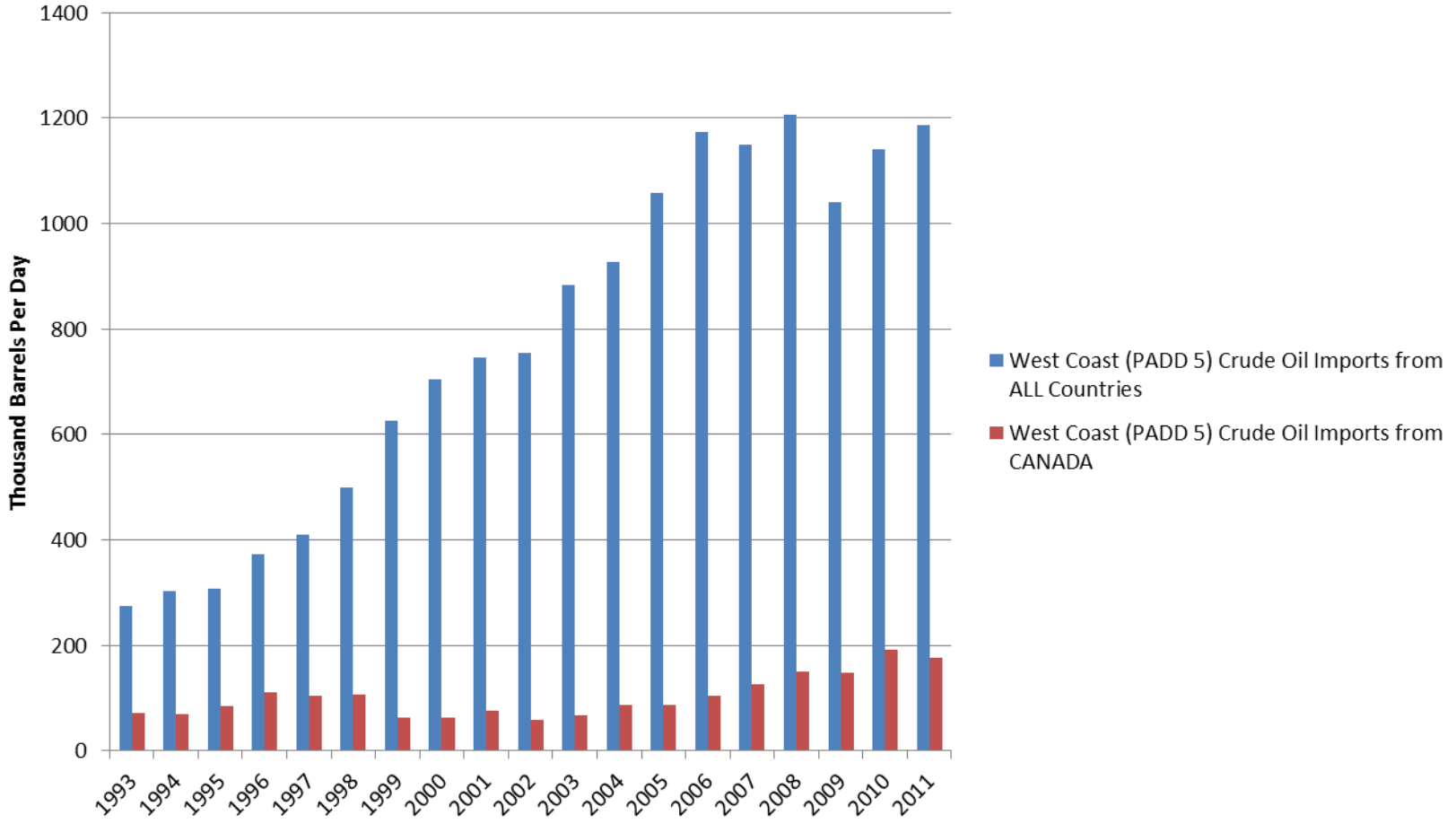
PADD V takes small amounts of Canadian, could take more



Source: EIA

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PADD II will be importing more HEAVY…

….pushing out light

Refinery Feedstock Change (kbpd)			
	Year	Light	Heavy
ConocoPhillips Wood River	2011	-130	+160
BP Whiting	2013	-260	+260
Marathon Detroit	2013	-65	+80
Total		-455	+500

Source: Enbridge presentation April 2012, Denver, Platts Rockies Oil and Gas Conference

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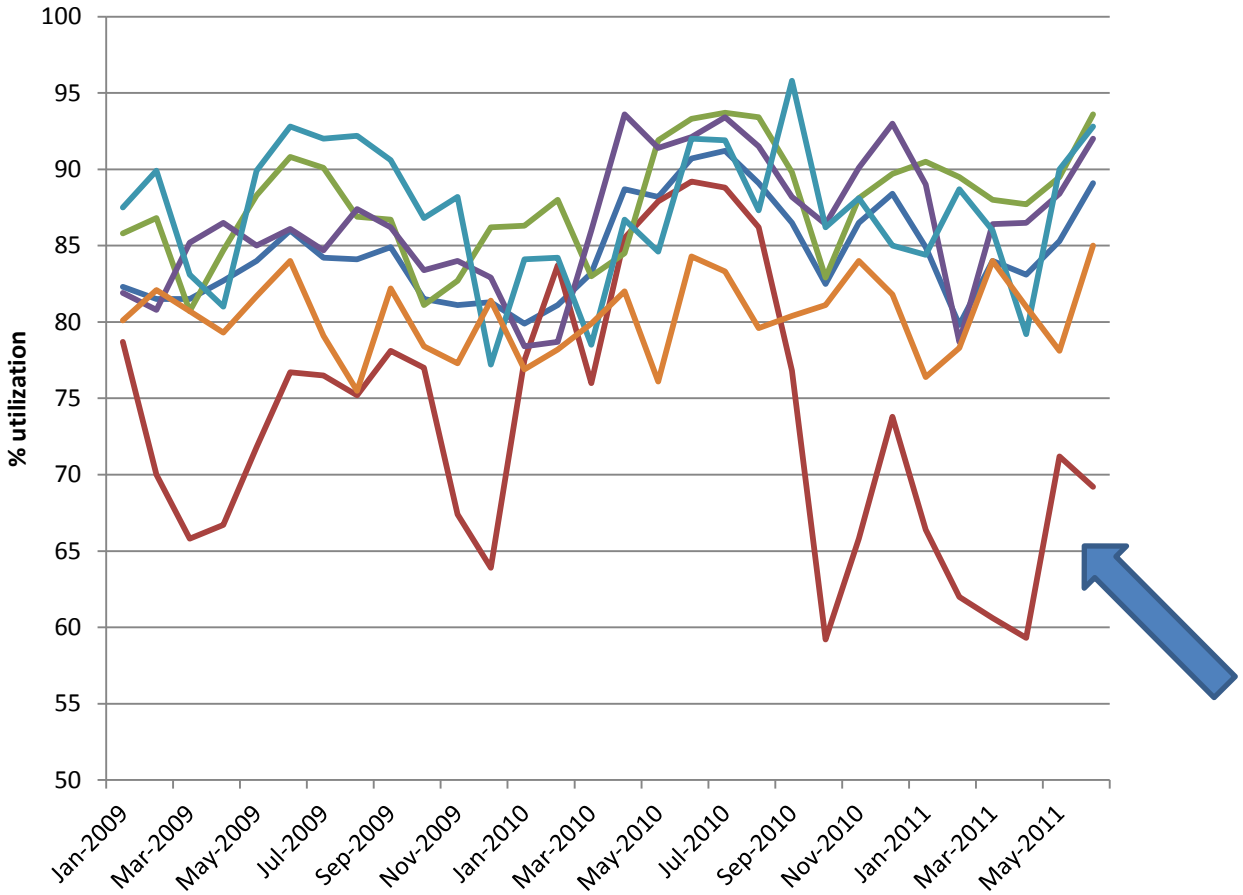
Refinery Utilization by PADD



Low Utilization in PADD I

PADD I refiners face high feedstock and regulatory costs declining demand—leading to capacity losses.

Source: EIA Data

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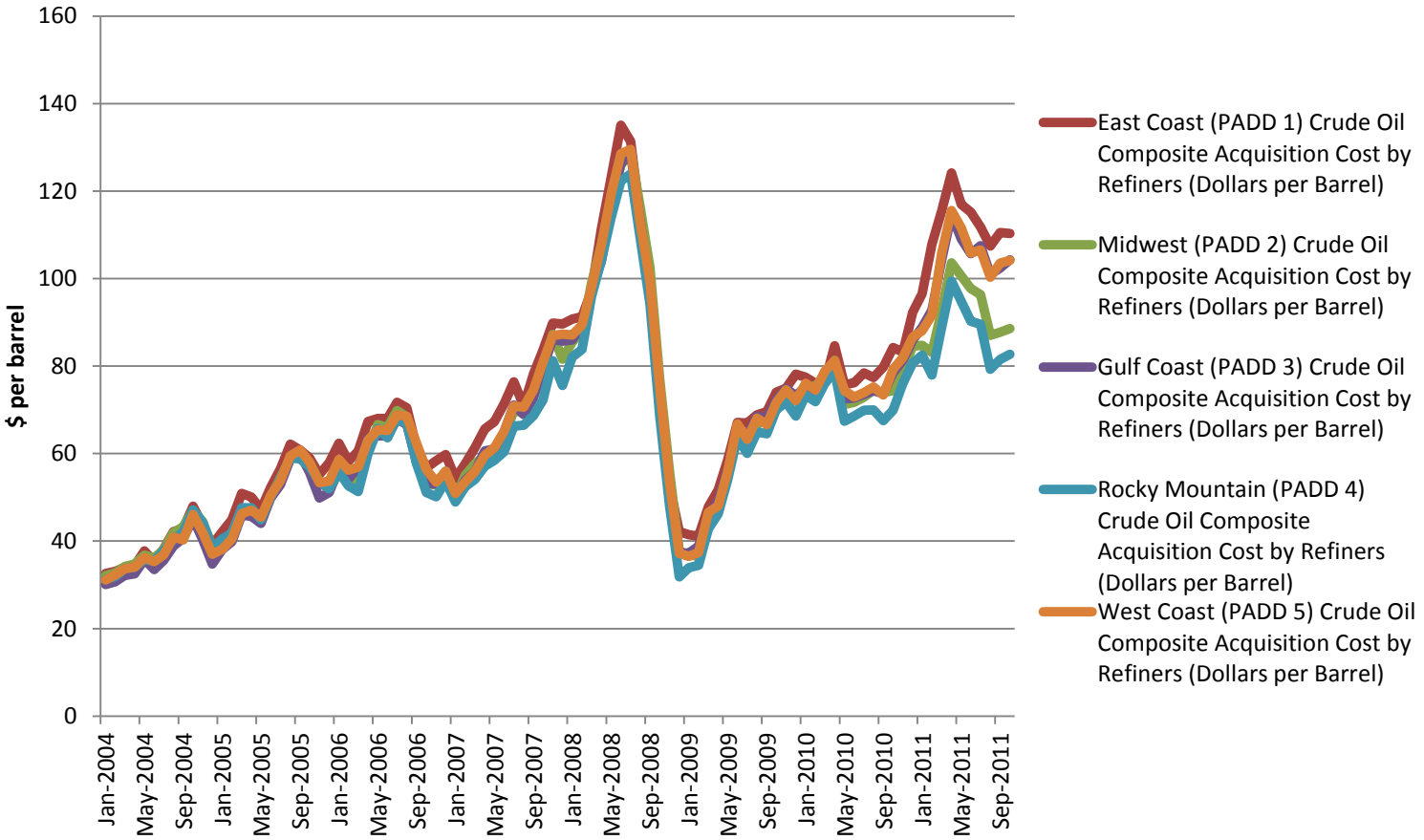
Refinery Acquisition Cost of Crude



PADD 1 has the highest RAC in the U.S. – and the least heavy crude processing capability

Source: EIA Data

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U.S. Crude Production Directly Impacting PADD I

Table 1. U.S. East Coast Refineries Operating Capacity

Owner	City	State	Operating Crude Unit Capacity (bbl/calendar day)	Percent of Region	Status
Operating and Idled Refineries					
ConocoPhillips	Linden	NJ	238,000	17%	Operating
PBF Energy Co. LLC	Delaware City	DE	182,200	13%	Operating
PBF Energy Co. LLC	Paulsboro	NJ	160,000	12%	Operating
United Refining Co.	Warren	PA	65,000	5%	Operating
American Refining	Bradford	PA	10,000	1%	Operating
Ergon-West Virginia	Newell/Congo	WV	20,000	1%	Operating
Hess Corp.	Port Reading	NJ	0*	0%	Operating
Sunoco Inc.	Philadelphia	PA	335,000	24%	Operating, For Sale
Sunoco Inc.	Marcus Hook	PA	178,000	13%	Idled 12/2011, For Sale
ConocoPhillips	Trainer	PA	185,000	13%	Idled 9/2011, For Sale
Total Operating and Idled			**1,373,200**	**100%**	
Recently Shut Refineries					
Western Refining	Yorktown	VA	66,300		Shut 9/2010
Sunoco Inc.	Eagle Pt/Westville	NJ	145,000		Shut 2/2010

SOLD: Carlyle

SOLD: Delta

SOLD: Plains All American

*Hess Port Reading has a production capacity of 70,000 bbl/calendar day but no crude unit capacity.

Notes: Yellow shading indicates operating refineries for sale and at risk of shutdown. Orange shading indicates idled refineries for sale and at risk of shutdown. Red shading indicates shut refineries. Total refinery capacity excludes two refineries that primarily produce asphalt, as well as the Yorktown VA and Eagle Point refineries that were shut down in 2010.

Source: U.S. Energy Information Administration.

Source: EIA

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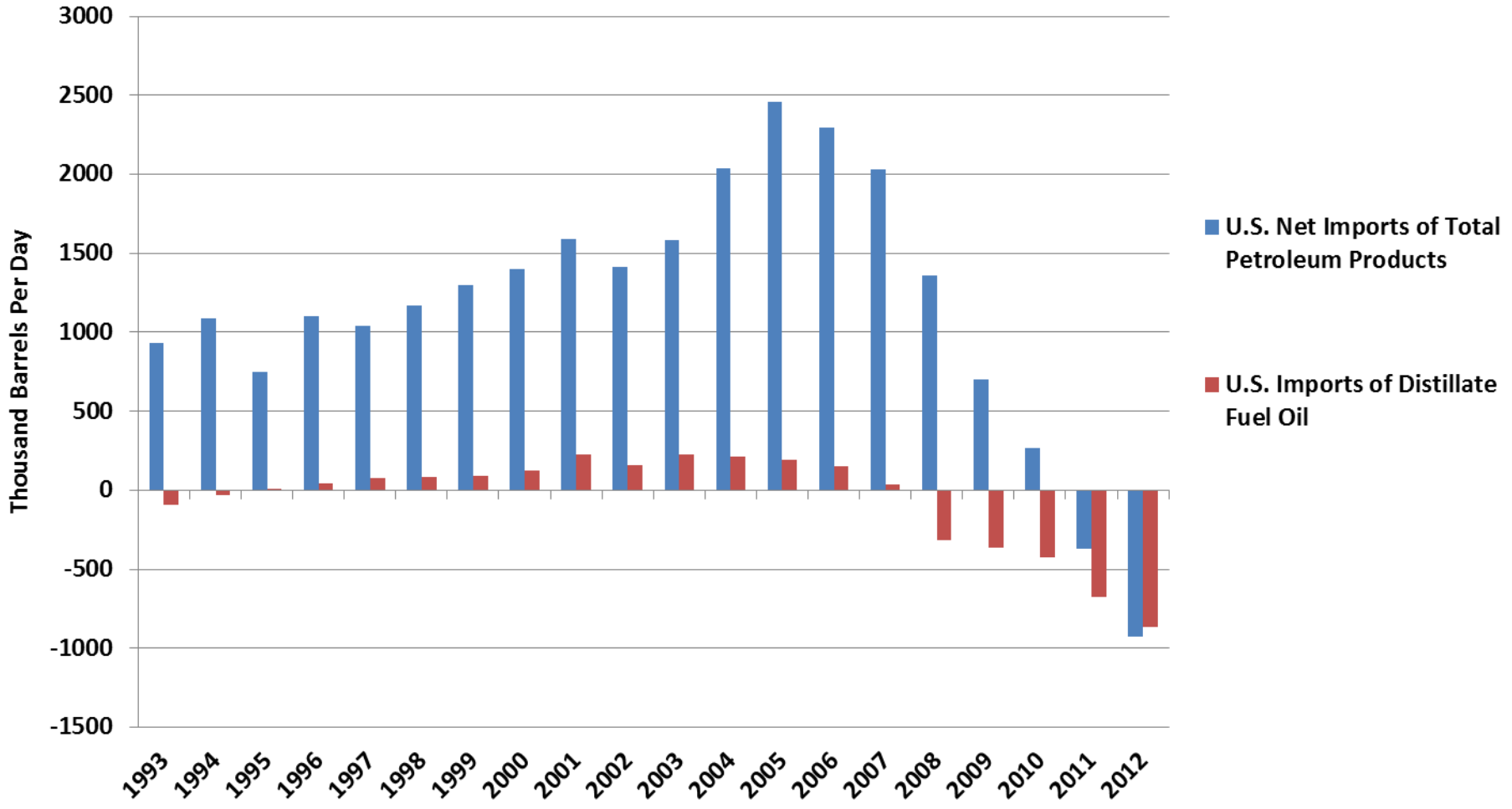
U.S. Exporting about 1 mbd of Product



Source: EIA

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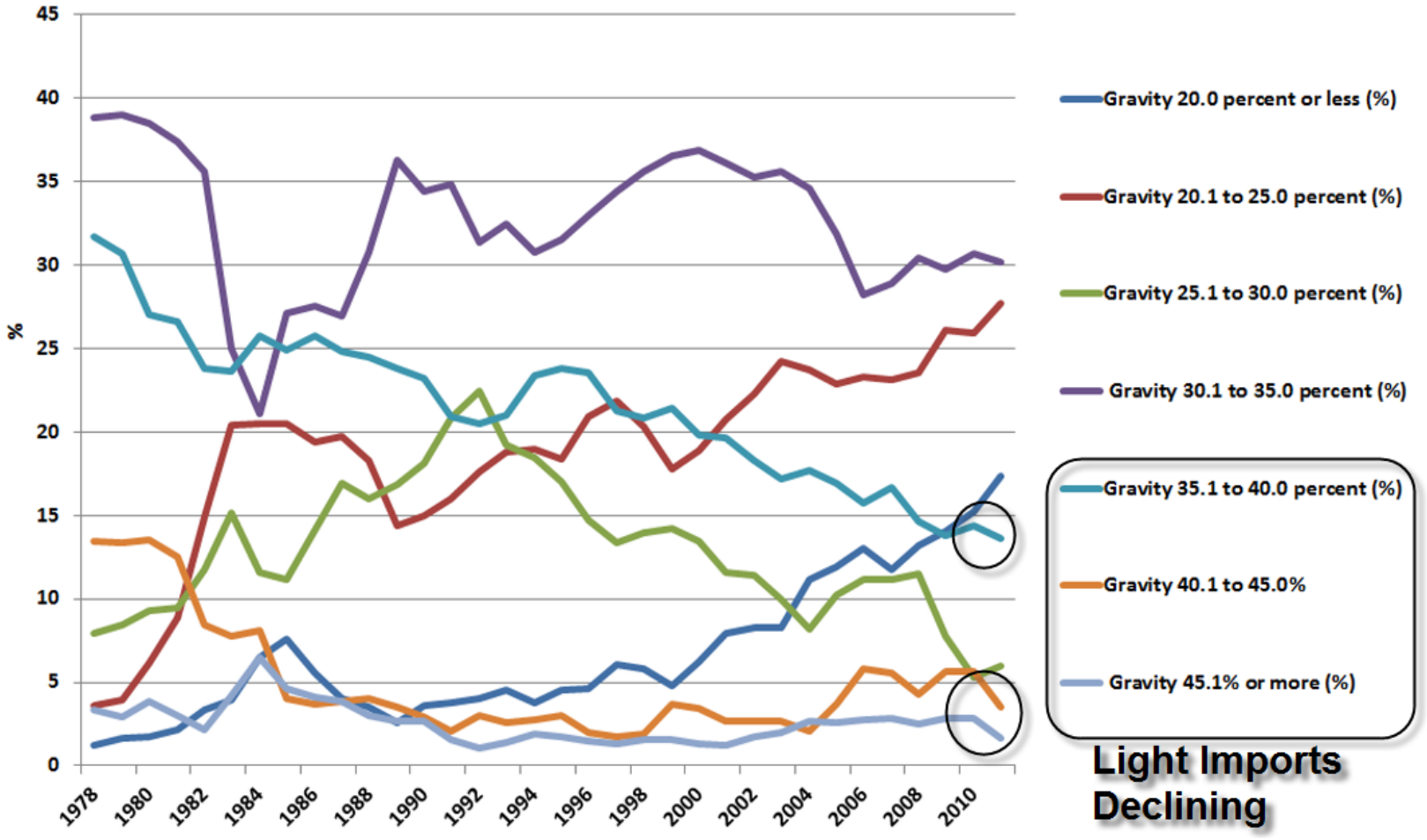
U.S. Imports by API Gravity



Source: EIA

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Infrastructure Options and Outcomes

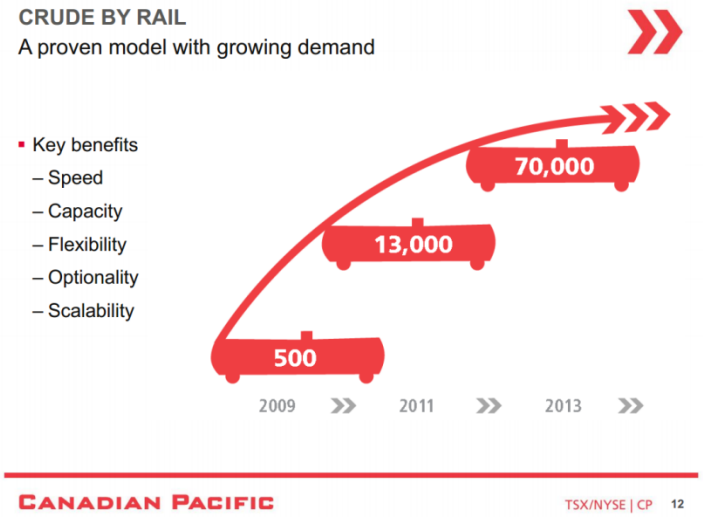
Rail is a Contender

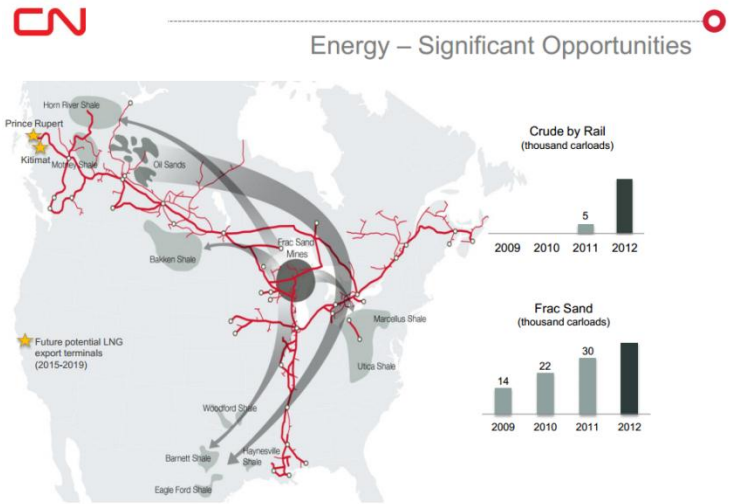
Major rail companies in the U.S. and Canada are moving hundreds of thousands of barrels of crude each day. The Bakken is clearly the leader in this space, but more Canadian crude is beginning to move by rail as crude chases better prices at premium markets.

News Release

BNSF Expands Bakken Oil Transport Capacity to One Million Barrels per day

FORT WORTH, Texas, September 4, 2012:





Source: Images directly from BNSF, CP, and CN websites

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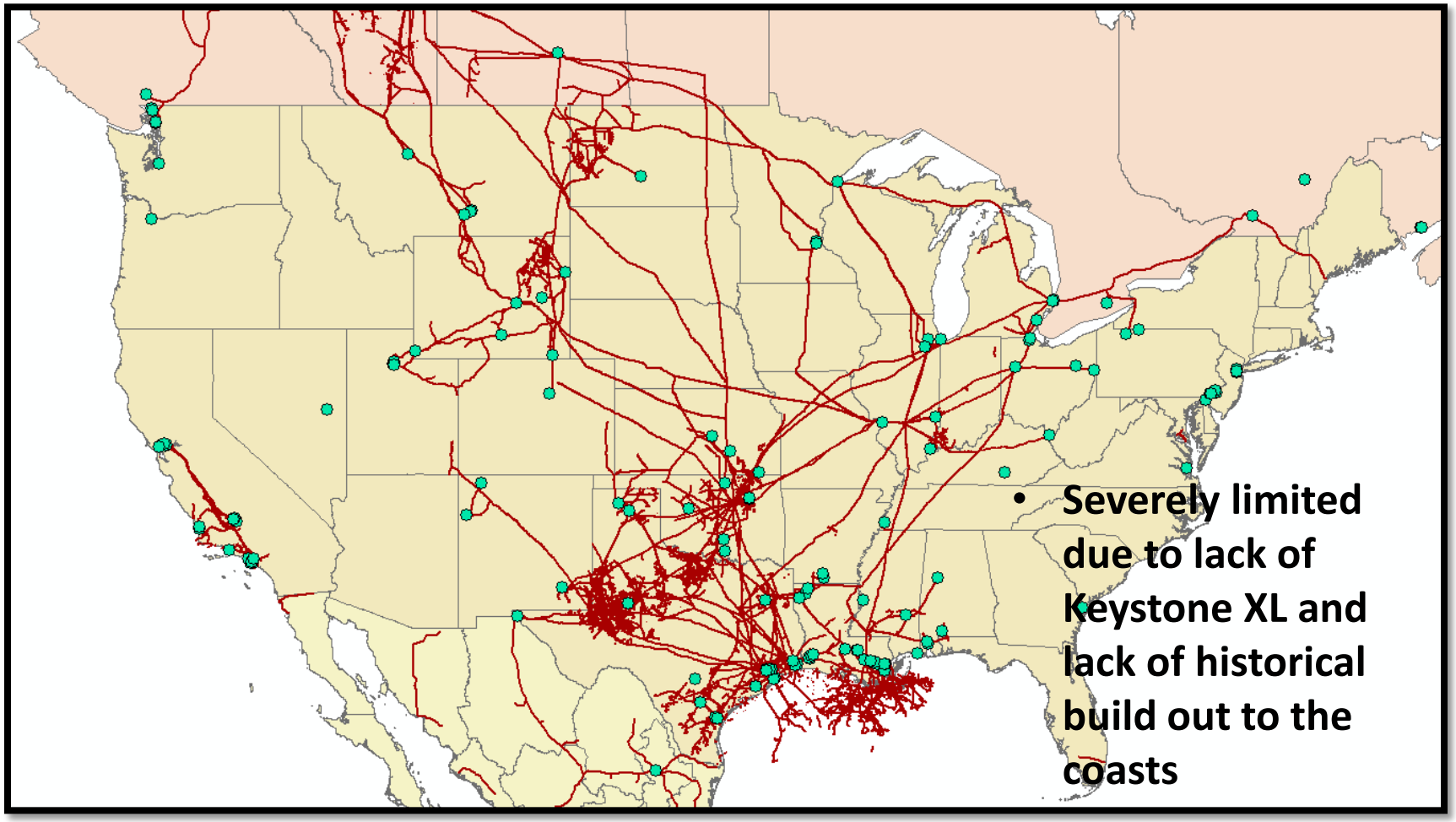
Crude Pipeline Infrastructure



Source: EPRINC Choke Point Map using Hart ArcGIS Mapping software

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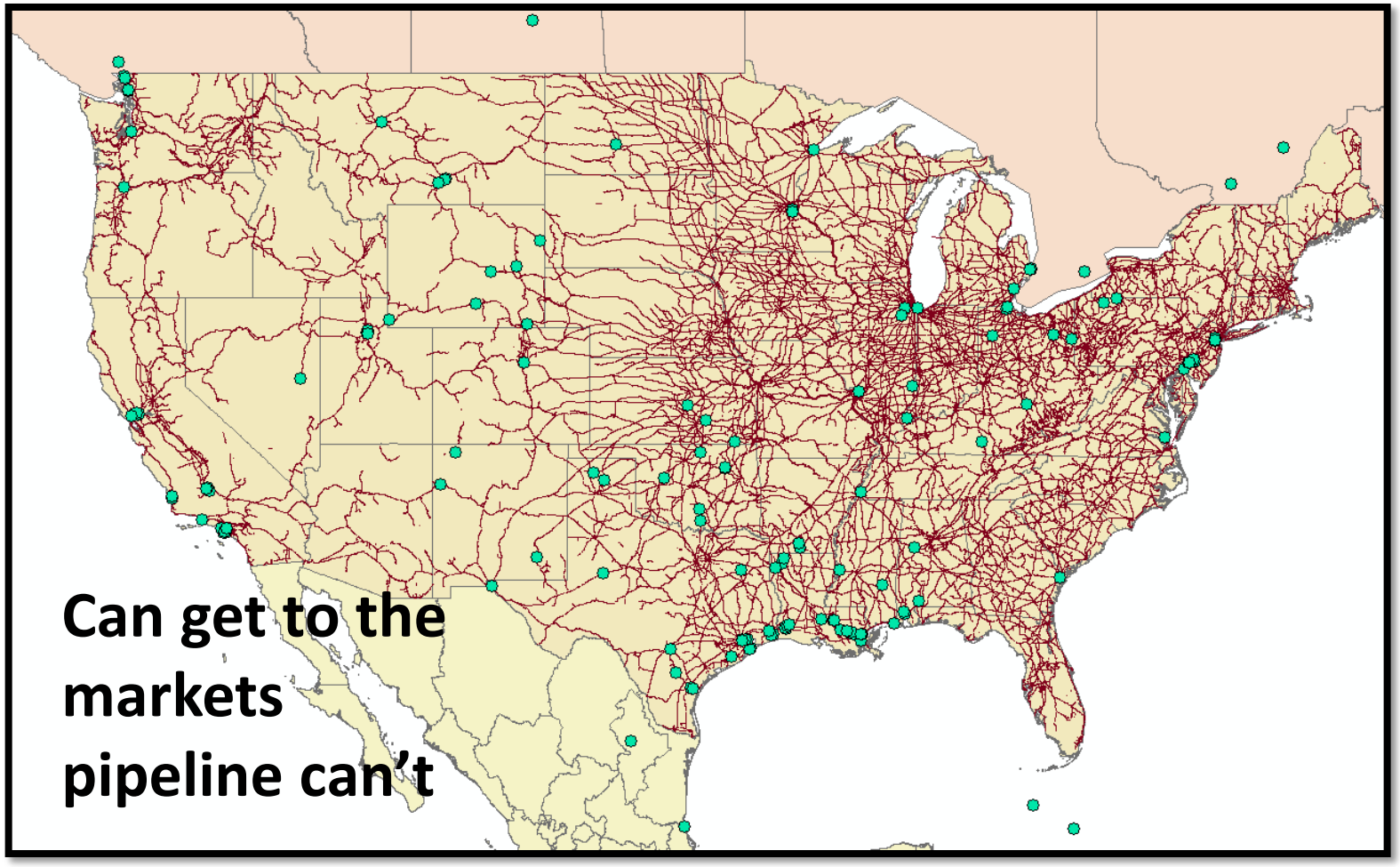
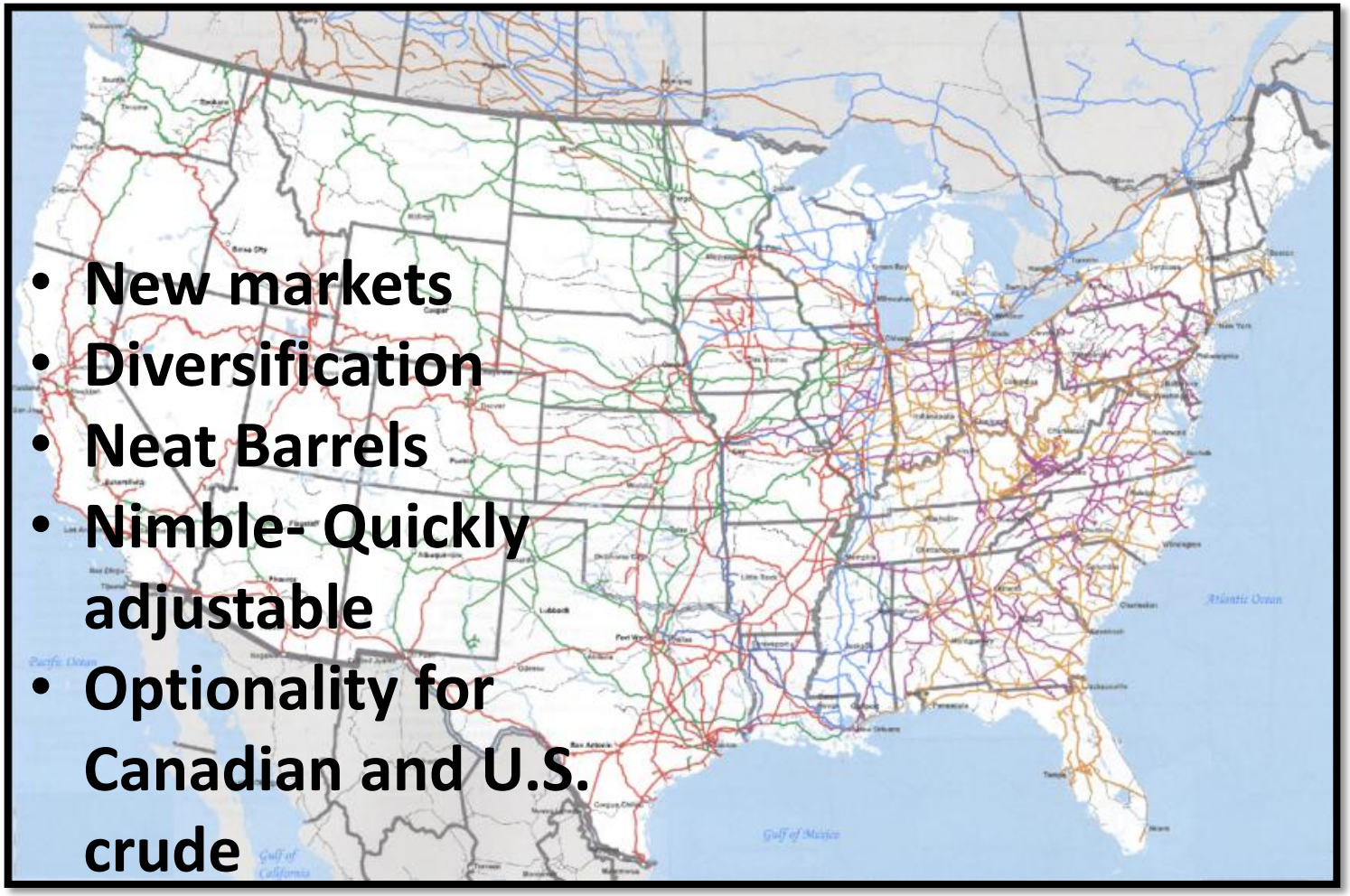
Rail Infrastructure



Source: EPRINC Choke Point Map using Hart ArcGIS Mapping software

North American Rail Map



Source: Watco Companies LLC, Presentation Bakken Product Markets and Take-Away Denver Jan 31-Feb 1 2012

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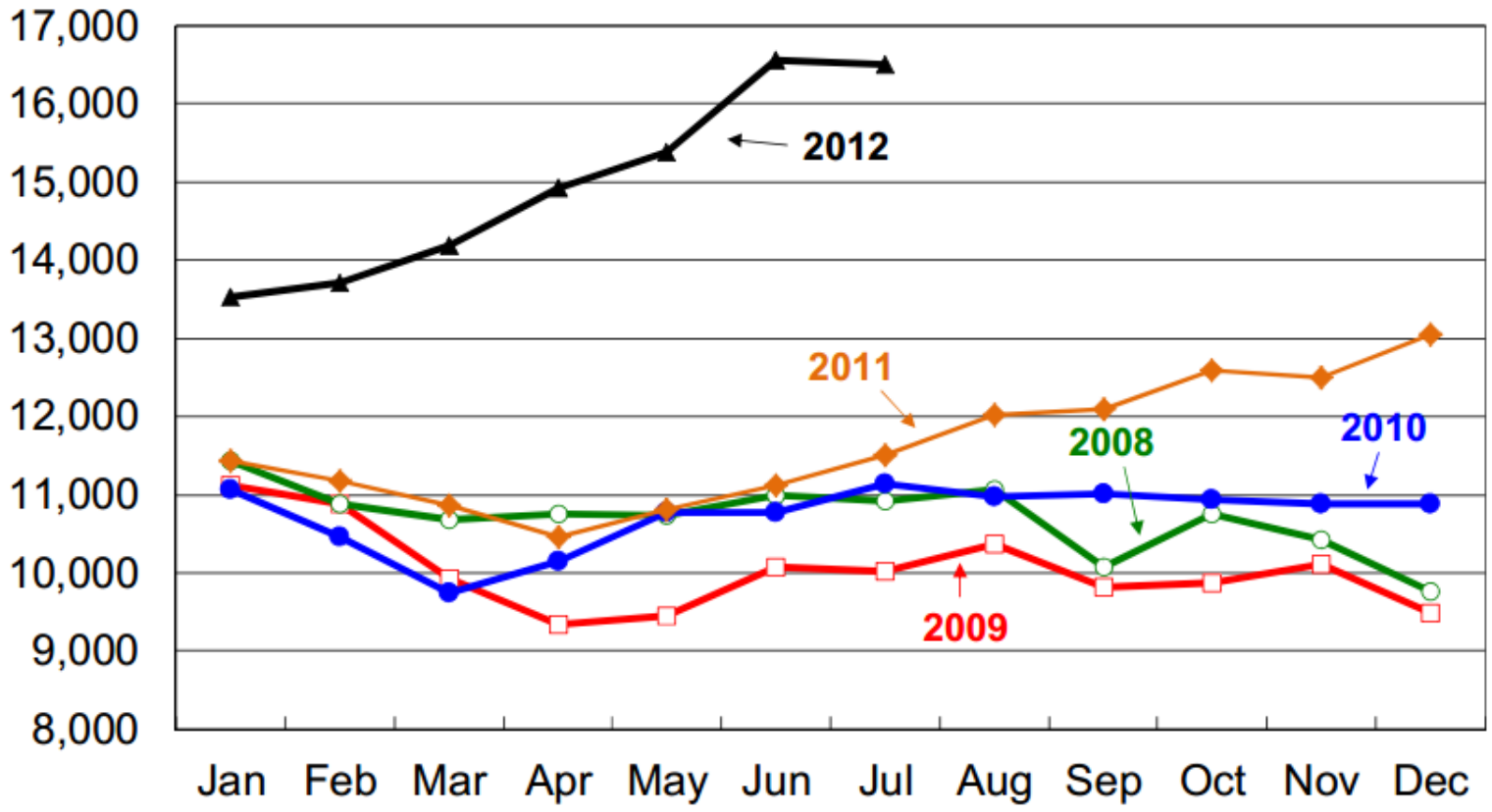
Average Weekly U.S. and Canadian Railcar Loads of Crude Oil and Petroleum Products



Source: Association of American Railroads. Weekly Railroad Traffic
Note: Data are weekly average originations for each month, are not seasonally adjusted*; one carload holds 30,000 gallons (or 714.3 barrels).*

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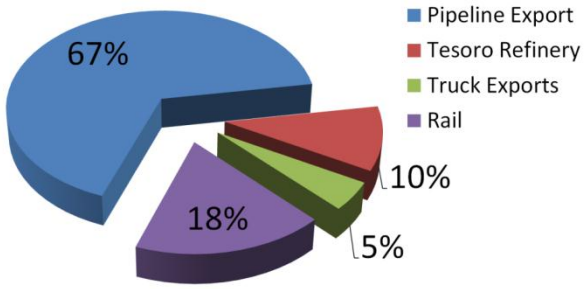
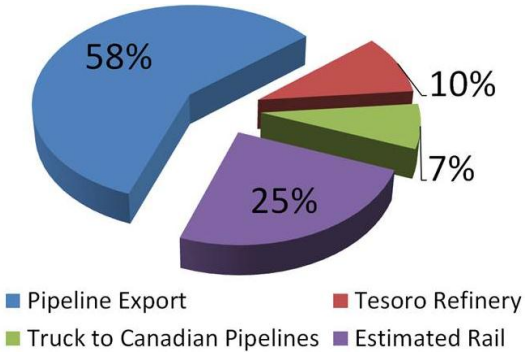
Williston Basin Crude Oil Transport

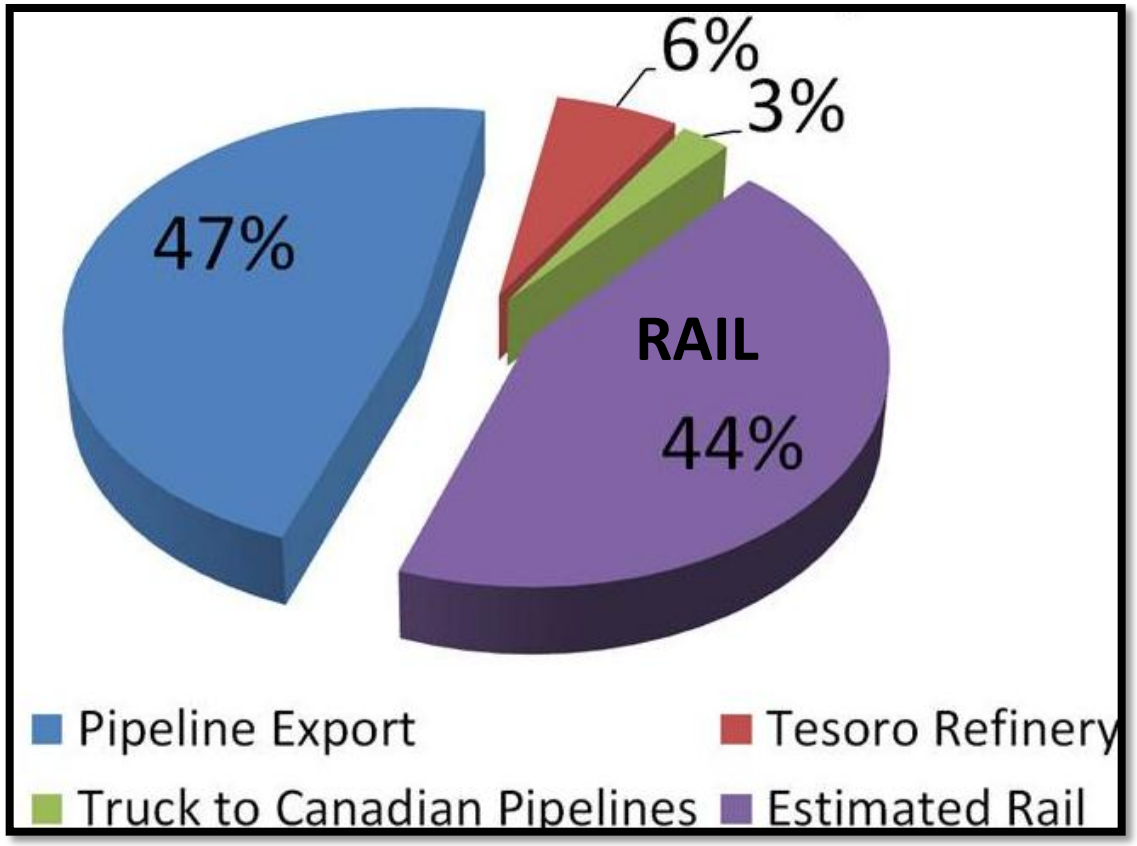
October 2011 Estimates



January 2012 Estimates



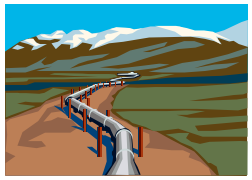
June 2012 Estimates (Current)



Source: North Dakota Pipeline Authority

Current Williston Basin Take-Away

Production: 727,000 b/d (660k ND; 62k East MT; 5k SD)



Pipeline Capacity 380,000 b/d: about *350,000 running*...(down from 362,000 in June 2012)

Tesoro Mandan Refinery Capacity 58,000 b/d: 45,000 b/d running (down from 59,000 in June 2012 due to maintenance)

Truck to Canada (then put in pipeline): 7,000 b/d running (down from 20,000 in June 2012)

Rail: 325,000 b/d running (up from 180,000 b/d in May)

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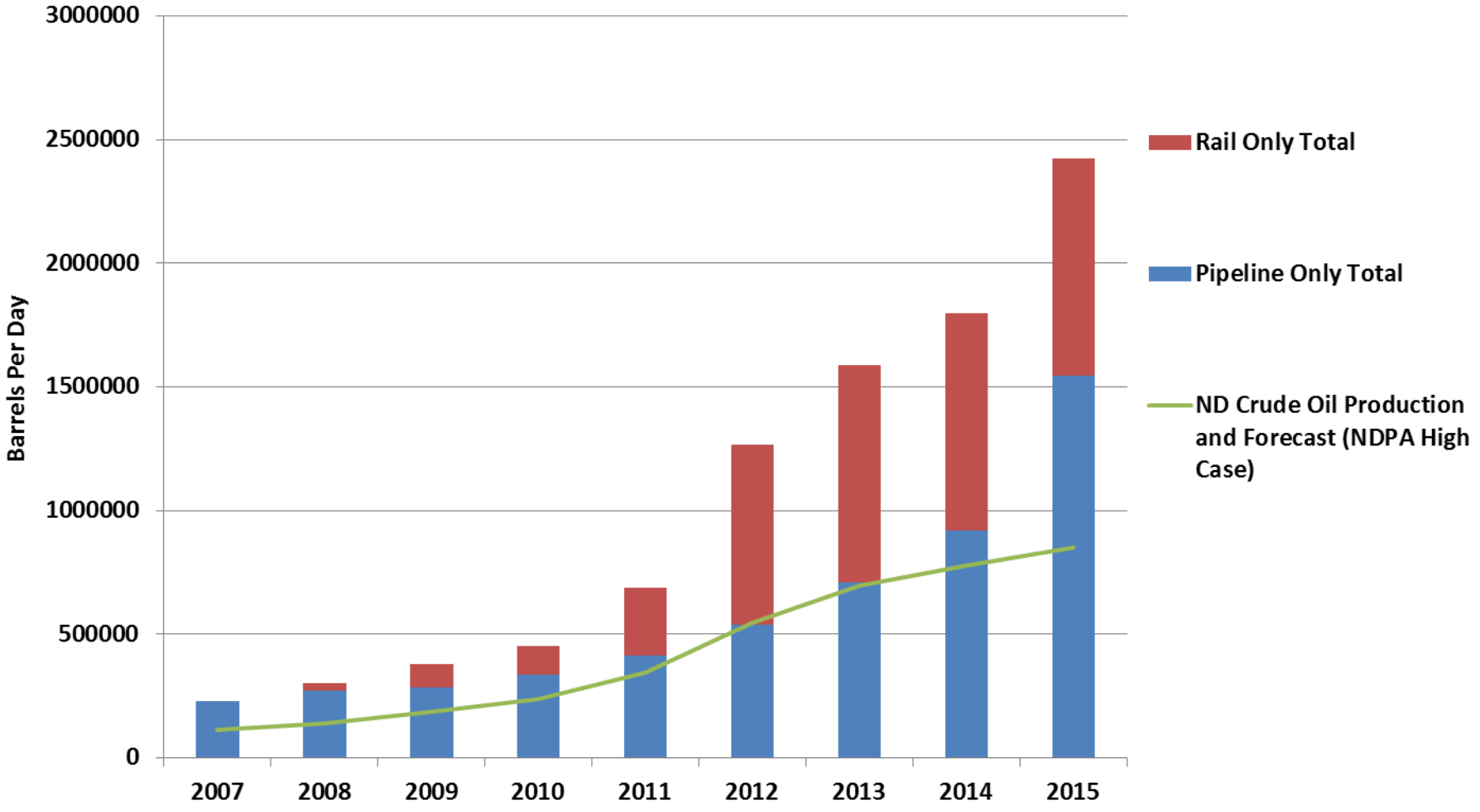
Williston Basin Pipeline and Rail Take-Away Capacity



Source: North Dakota Pipeline Authority, Included Planned Projects

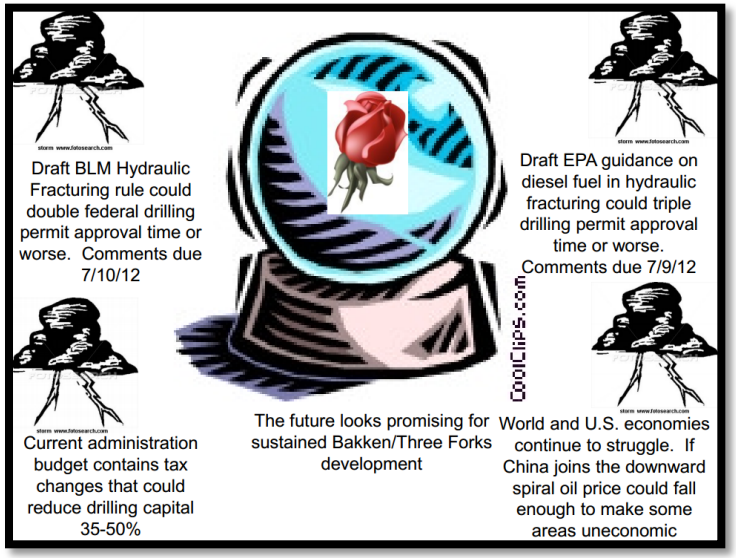
Value of Rail vs. Pipeline

- Volume flexibility (ups and downs in production)
- access new and high value markets (St.James LLS prices)
- Neat Barrels
- Competitive for every incremental barrel (a lot of new barrels coming on)
- Long-term stability, reliability
- low cost transport to traditional and liquid markets
- Competes with rail and local refineries for incremental barrels

Source: Hess , Presentation Bakken Product Markets and Take-Away Denver Jan 31-Feb 1 2012

Major Regulatory Issues and Hurdles

- Oil prices
- Environmental Concerns
- Excessive Regulation
- Regs on Federal Land-Fracking
- Infrastructure Delays
- Lack of prudent policy making, not fully grasping the positive benefits and understanding of the bigger picture



Source: North Dakota Industrial Commission presentation May 2012 Lynn Helms

- Infrastructure
- Manpower
- Housing
- Gas gathering and processing
- Oil transportation
- Federal regulation
- Global Environmental Group interest

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Conclusions

- US and Canadian production surging
- Pipelines are being built, but right now their exists tightness—need Gateway, XL, and Costal options for US and Canadian crude
- Rail is a serious option for US producers distanced from refining centers
- Rail could be an alternative shipping method for oil sands producers as they look to diversify their options and secure stable prices—markets exist where pipeline doesn't (especially with XL delay and Gateway uncertainty)
- Blended bitumen needs to get to the Gulf and potentially PADD V
- Bakken light sweet needs to get to East Coast PADD I….only so much light sweet can be sent to Cushing and down into Gulf

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What does all this mean?

- This is a petroleum renaissance. The U.S. is the largest producer of gas in the world and quickly becoming one of the lowest cost energy producers in the world
- Potential to substantially decrease crude imports into U.S., with significant benefits to our import bill and billions in economic benefits to the U.S. economy
- Potential to become a natural gas exporter (already significant petroleum products exporter)
- Need for prudent policy making so the infrastructure can keep up with the production and the full value can be captured = crude and Nat gas need to get to refineries so that they can be processed
- Major new pipeline infrastructure will deliver sustained and large scale benefits-Keystone decision has created uncertainty on whether those benefits will be realized.
- U.S. is now poised for major economic renaissance from the both oil sands and unconventional natural gas and liquids. Net present value of $1 to $2 trillion if appropriate policies put into place.
- Paradigm shift and large scale economic benefits are possible, but not without new approach to government regulations (and permitting) of both midstream and downstream facilities --- refinery expansions and modifications, natural gas processing, petrochemicals, LNG.
- U.S. now poised to be a major export platform for value added oil and gas processing. Major expansion of domestic manufacturing -- transformation of national economy now in the cards.
- U.S. is fast becoming the low cost petrochemical export platform. Wild card risk remains government policy.