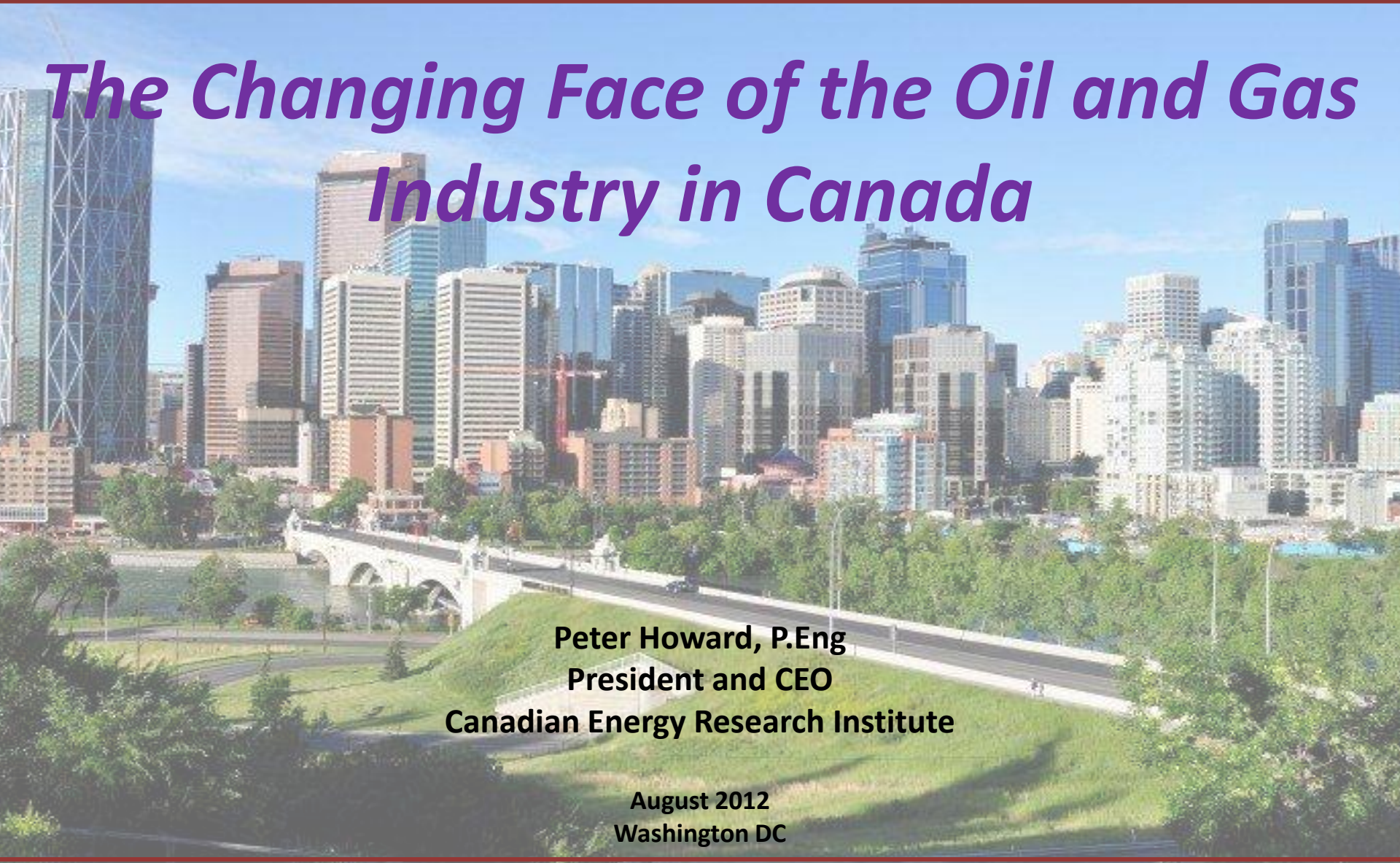
The Changing Face of the Oil and Gas Industry in Canada



Peter Howard, P.Eng
President and CEO
Canadian Energy Research Institute

August 2012
Washington DC

Agenda

- Who We Are and What We Do
- Let's Talk About Canadian Oil and Oil Sands
- Let's Talk About Pipelines
- But…
- Let's Talk About Western Canadian Natural Gas
- Be Careful What You Wish For!

Canadian Energy Research Institute

Overview

Founded in 1975, the Canadian Energy Research Institute (CERI) is an independent, non-profit research institute specializing in the analysis of energy economics and related environmental policy issues in the energy production, transportation, and consumption sectors. Our mission is to provide **relevant, independent, and objective economic research** in energy and related environmental issues. A central goal of CERI is to bring the insights of scientific research, economic analysis, and practical experience to the attention of **government policy-makers, business sector decision-makers, the media, and citizens in Canada and abroad.**

Core members of the Institute include the Canadian Government, the Government of the Province of Alberta, the University of Calgary, the Canadian Association of Petroleum Producers (CAPP) and the Small Explorers and Producers Association (SEPAC). In-kind support is also provided by the Energy Resources Conservation Board (ERCB).

All of CERI's research is publically available on our website at ***www·ceri·ca***

2011-2012 Reports Released

- Canadian Oil Sands Supply Costs and Development Projects (2011-2045) (March 2012)
- Canadian Energy: Pacific Access – Foreign Investment in the Oil Sands and British Columbia Shale Gas (March 2012)
- Canadian Energy: Pacific Access – Oil Spills and First Nations: Exploring Environmental Land Issues Surrounding the Northern Gateway Pipeline (February 2012)
- Canadian Energy: Pacific Access – Overview of Transportation Options (January 2012)
- Overview of Eastern and Atlantic Canada's Petroleum Industry and Economic Impacts of Offshore Atlantic Projects (November 2011)
- Applicability Abatement Potential for the Alberta Oil Sands Industry and Carbon Capture and Storage (CCS) Applicability to Coal-fired Electricity Generation and Oil Sands (October 2011)
- North American Natural Gas Market Dynamics: Global LNG – A Review (June 2011)
- Economic Impacts of Drilling, Completing and Operation of Gas Wells in Western Canada (June 2011)
- Economic Impacts of Drilling, Completing and Operating Conventional Oil Wells in Western Canada (June 2011)

2012 Reports Released (July/August 2012)

- Pacific Access Part I – Linking Oil Sands Supply to New and Existing Markets
- Pacific Access Part II – Asia-Directed Oil Pathways and Their Economic Impacts
- Pacific Access Part III – Economic Impacts of Exporting Horn River Natural Gas to Asia as LNG
- Natural Gas Liquids in North America: Overview and Outlook to 2035

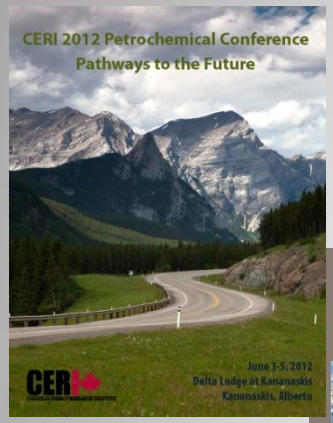
2012-2013 Current Work

- Potential Impact of Shale Gas Development in Quebec
- North American Natural Gas Demand Pathways (ICF/MARBEK, whatIf? Technologies)
- Energy Metrics Handbook
- Potential Transportation Options for Alberta Land-Locked Oil

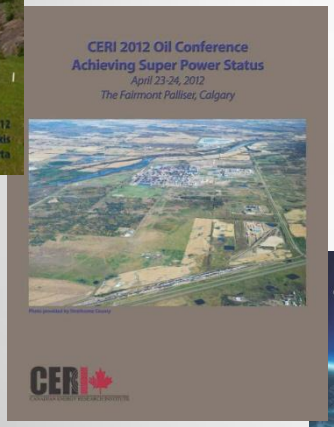
For a list of all CERI publications, please visit our website at **www.ceri.ca**

CERI Conferences

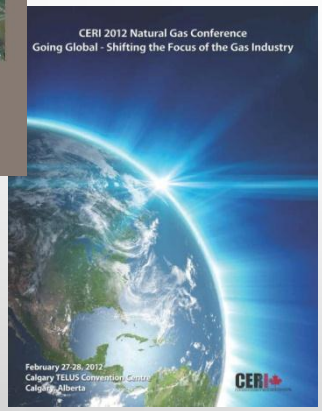
- CERI hosts three major conferences each year (Oil, Natural Gas and Petrochemicals) attended by over 100 delegates from across North America.



CERI 2012 Petrochemical Conference
"Pathways to the Future"
June 3-5, 2012



CERI 2012 Oil Conference
"Achieving Super Power Status"
April 23-24, 2012



CERI 2012 Natural Gas Conference
"Going Global – Shifting the Focus of the Natural Gas Industry"
February 27-28, 2012

Dates and venues for our 2013 conferences can be found on our website. For further information, contact our Conference Manager, Deanne Landry, at 403-220-2395 or dlandry@ceri.ca.

"Western Canada's Upstream Oil and Gas Industry"

Western Canada's Oil and Gas Industry

2009 Expenditures: **$41.4 billion**

Royalties

Wages

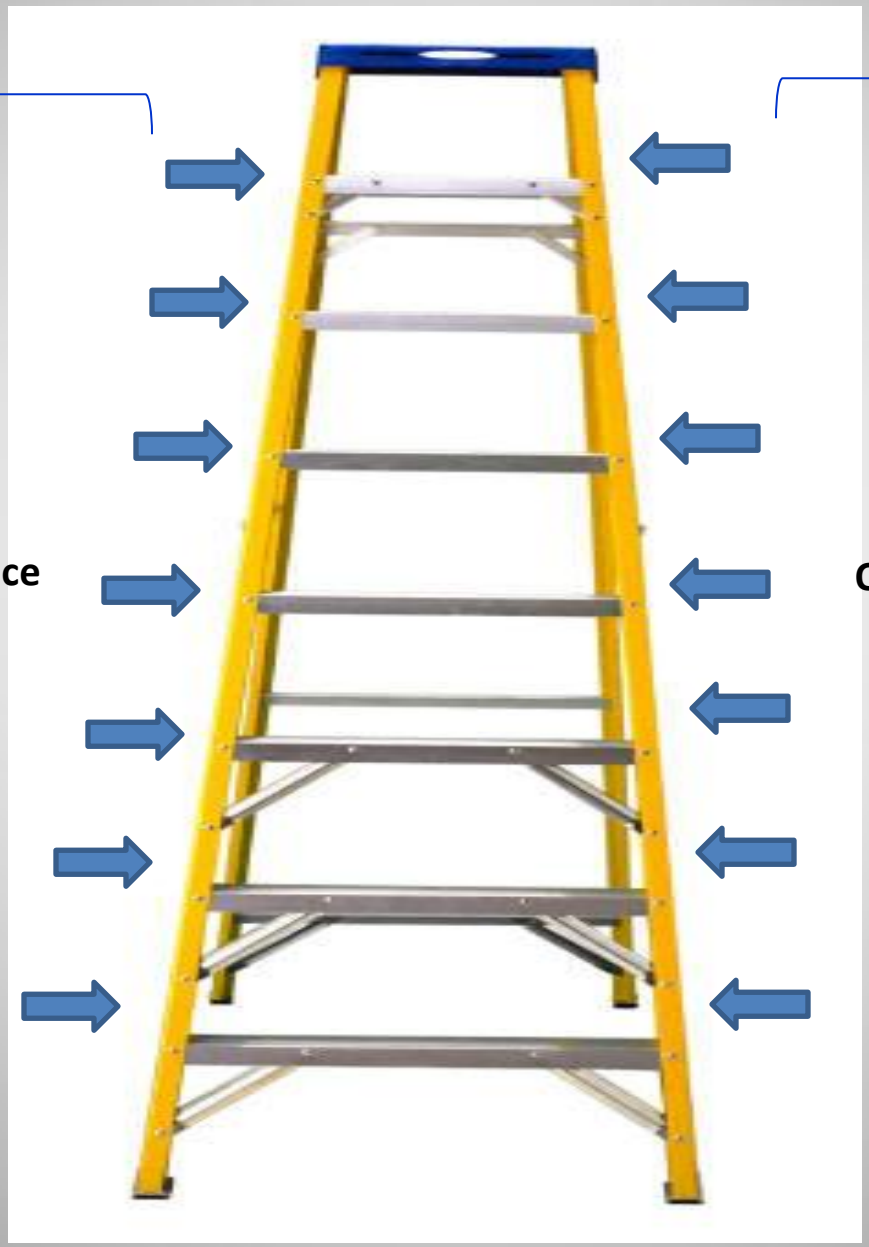
Production

Operation and Maintenance

Completion and Tie in

Conventional Drilling

Land Acquisition
Crown Land Sales



2009 Expenditures: **$25.1 billion**

Royalties

Wages

Production

Operation and Maintenance

Construction

Evaluation

Land Acquisition
Crown Land Sales

Oil and Gas Drilling

Oil Sands Developments

"Let's Talk About Canadian Oil and Oil Sands"

2011 Facts about Canadian Crude

Production:

• Western Canada (AB,BC,SK,NWT) Conventional LIGHT Crude	561,929 bbls/day
• Western Canada (AB,BC,SK,NWT) Upgraded Bitumen	846,112 bbls/day
• Western Canada (AB,BC,SK,NWT) Condensate (C5+)	128,498 bbls/day
• Western Canada (AB,BC,SK,NWT) Conventional HEAVY Crude	421,618 bbls/day
• Western Canada (AB,BC,SK,NWT) Non Upgraded Bitumen	758,919 bbls/day
• Eastern Canada (NF/LAB,ON) Conventional LIGHT Crude	271,778 bbls/day
• Total 2011 Production of Crude Oil and Equivalent	**2,988,854 bbls/day**

Exports:

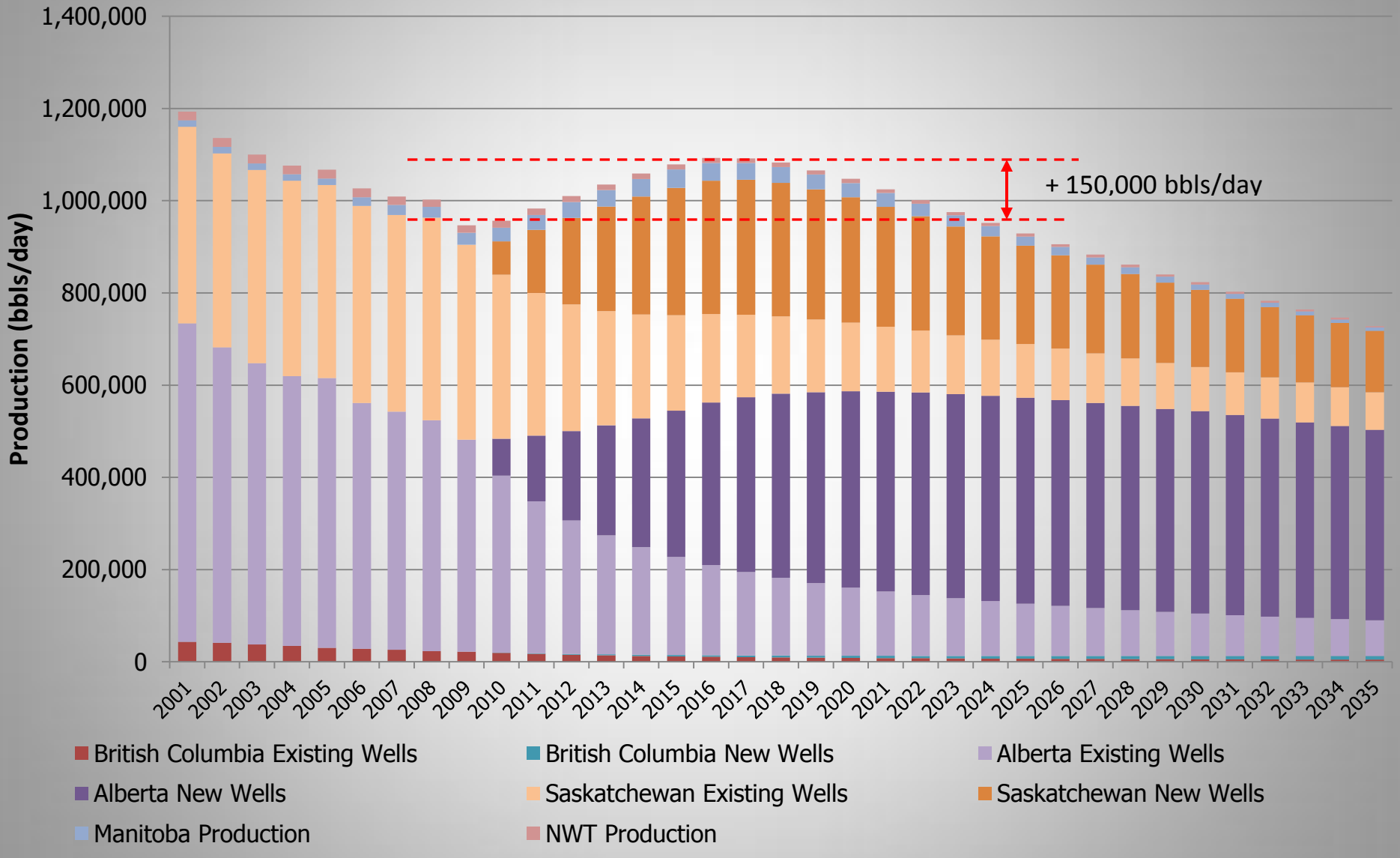
• PADD I (74% Light, 26% Heavy)	171,182 bbls/day
• PADD II (21% Light, 79% Heavy)	1,439,447 bbls/day
• PADD III (12% Light, 78% Heavy)	111,358 bbls/day
• PADD IV (17% Light, 83% Heavy)	213,709 bbls/day
• PADD V (61% Light, 39% Heavy)	167,295 bbls/day
• Non-US (67% Light, 33% Heavy)	35,261 bbls/day
• Total US (28% Light, 82% Heavy)	**2,138,260 bbls/day**

Imports:

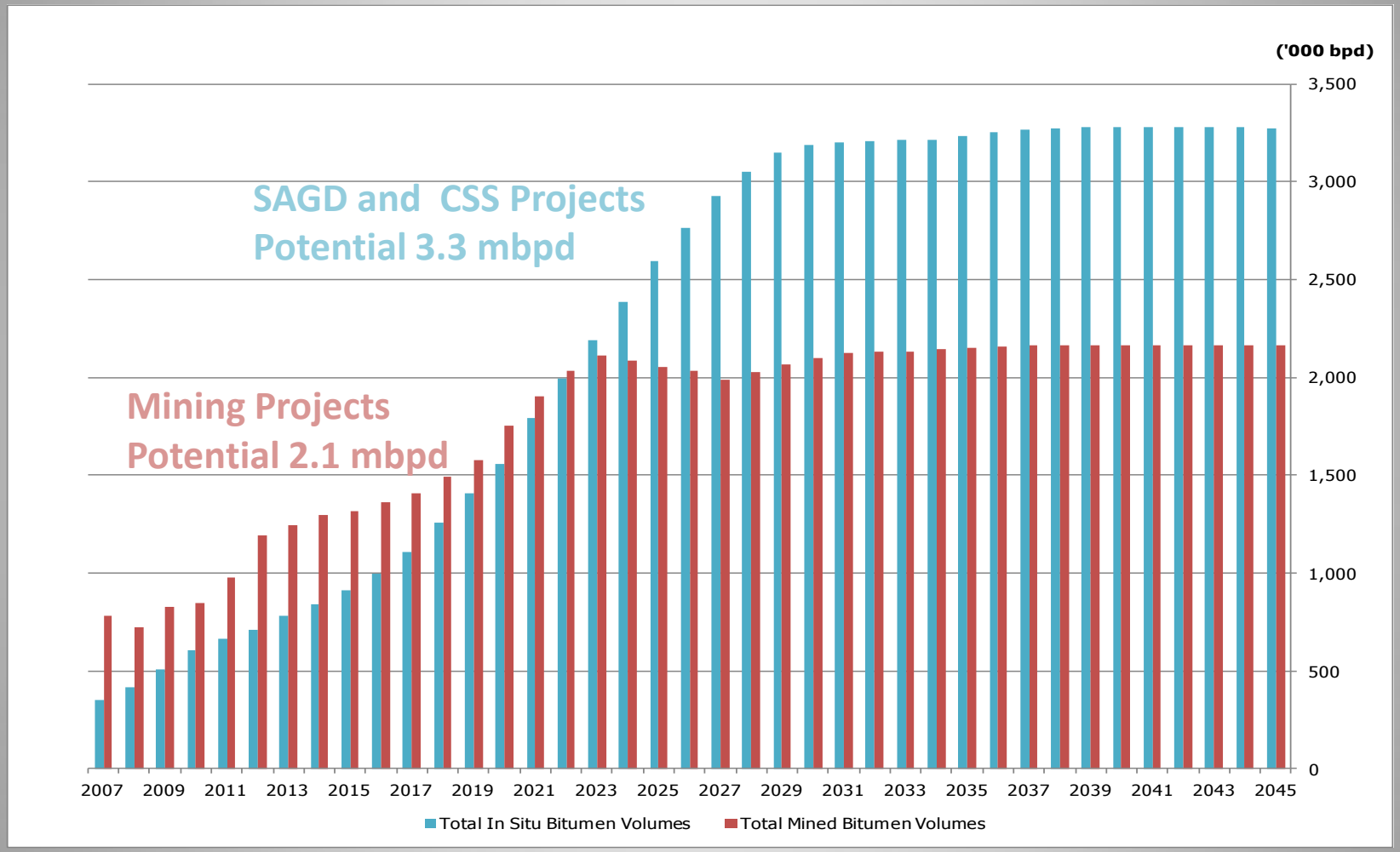
		% of Capacity
• Atlantic Canada Conventional Crude	333,990 bbls/day	(80%)
• Quebec Conventional Crude	298,775 bbls/day	(84%)
• Ontario Conventional Crude	52,836 bbls/day	(15%)
• Total Canadian Imports	**685,560 bbls/day**	

WCSB Conventional Oil Production Forecast

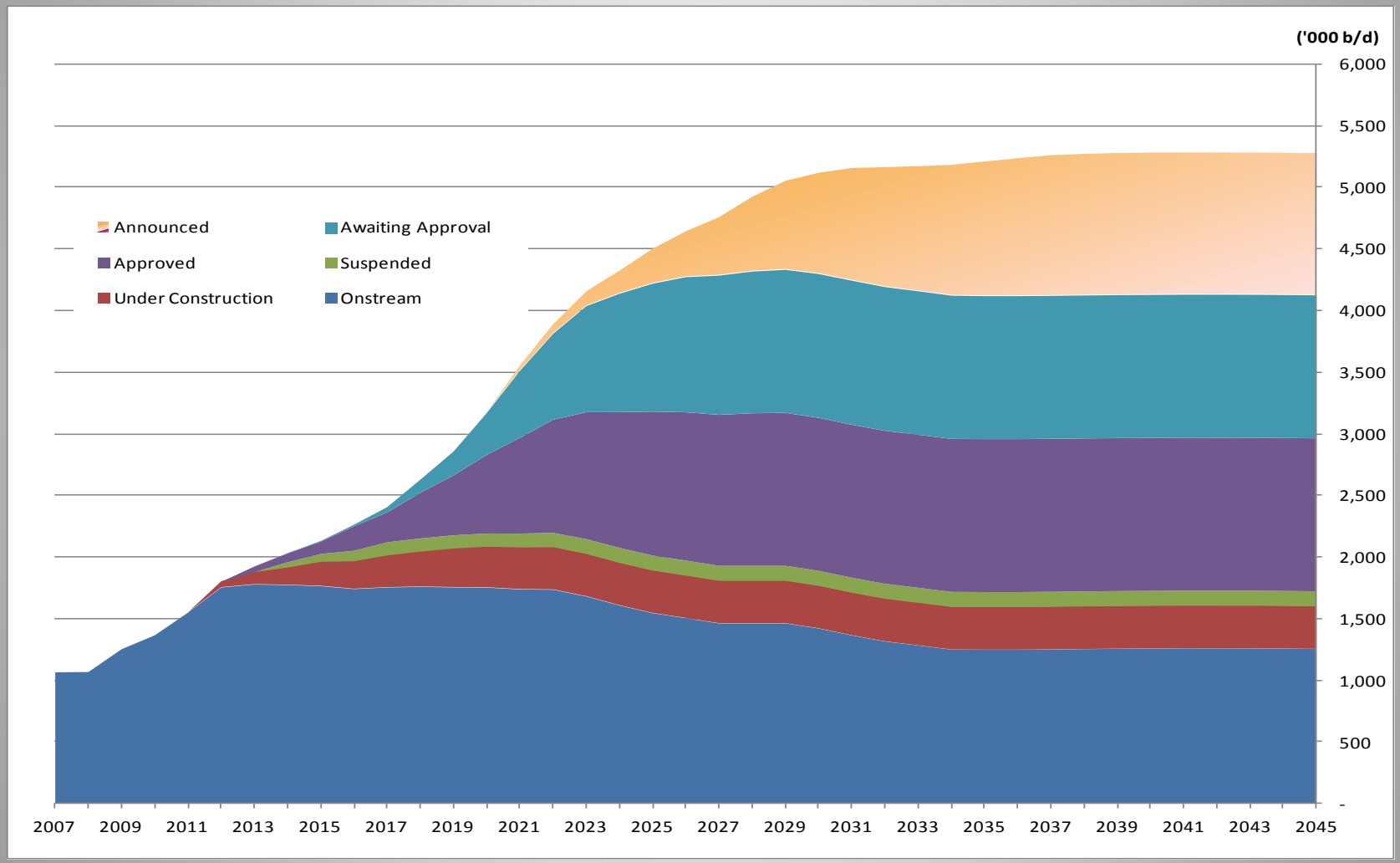
Realistic Scenario (2010-2035)



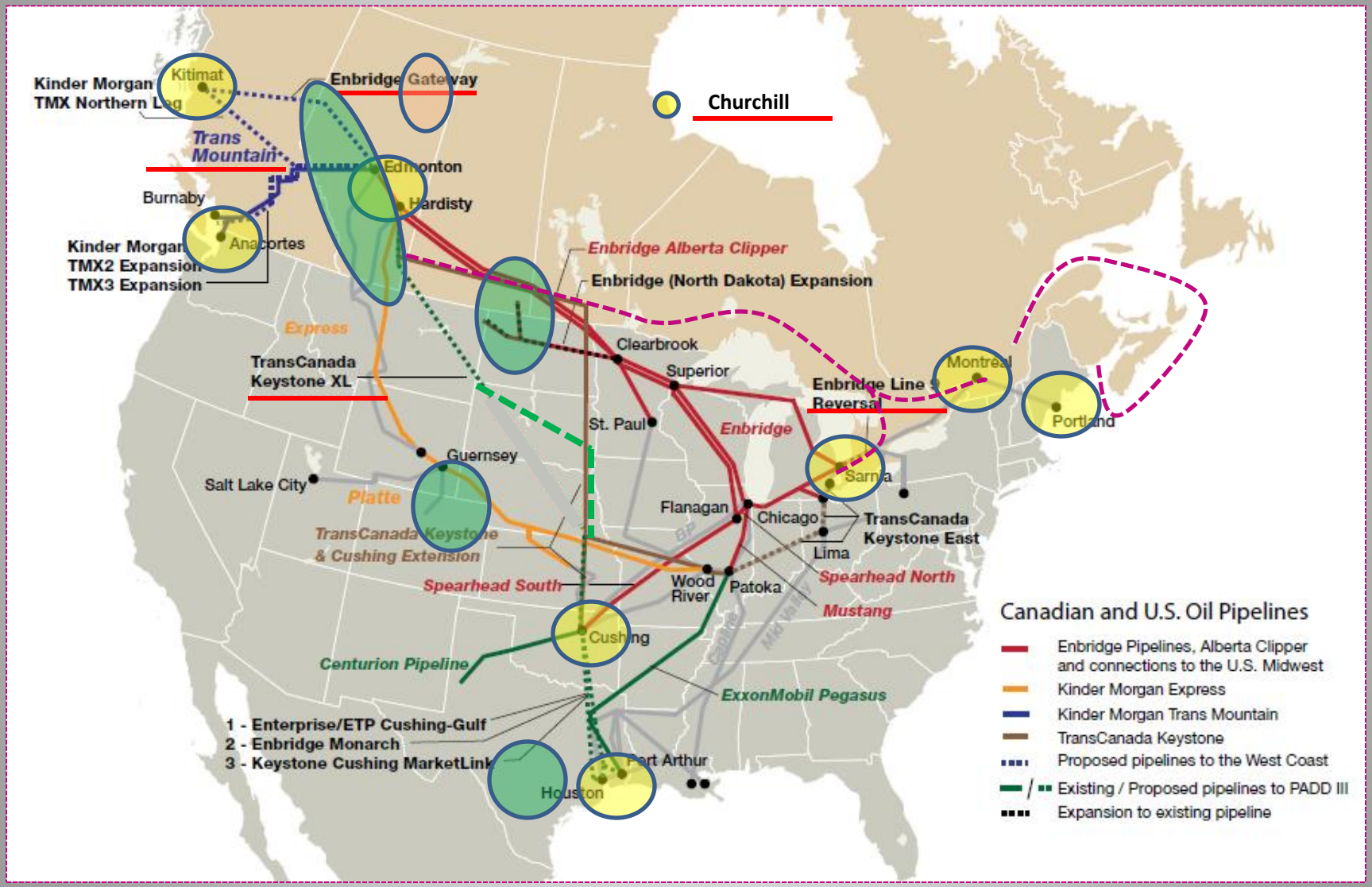
Western Canadian Oil Sands Potential



Western Canadian Oil Sands Potential



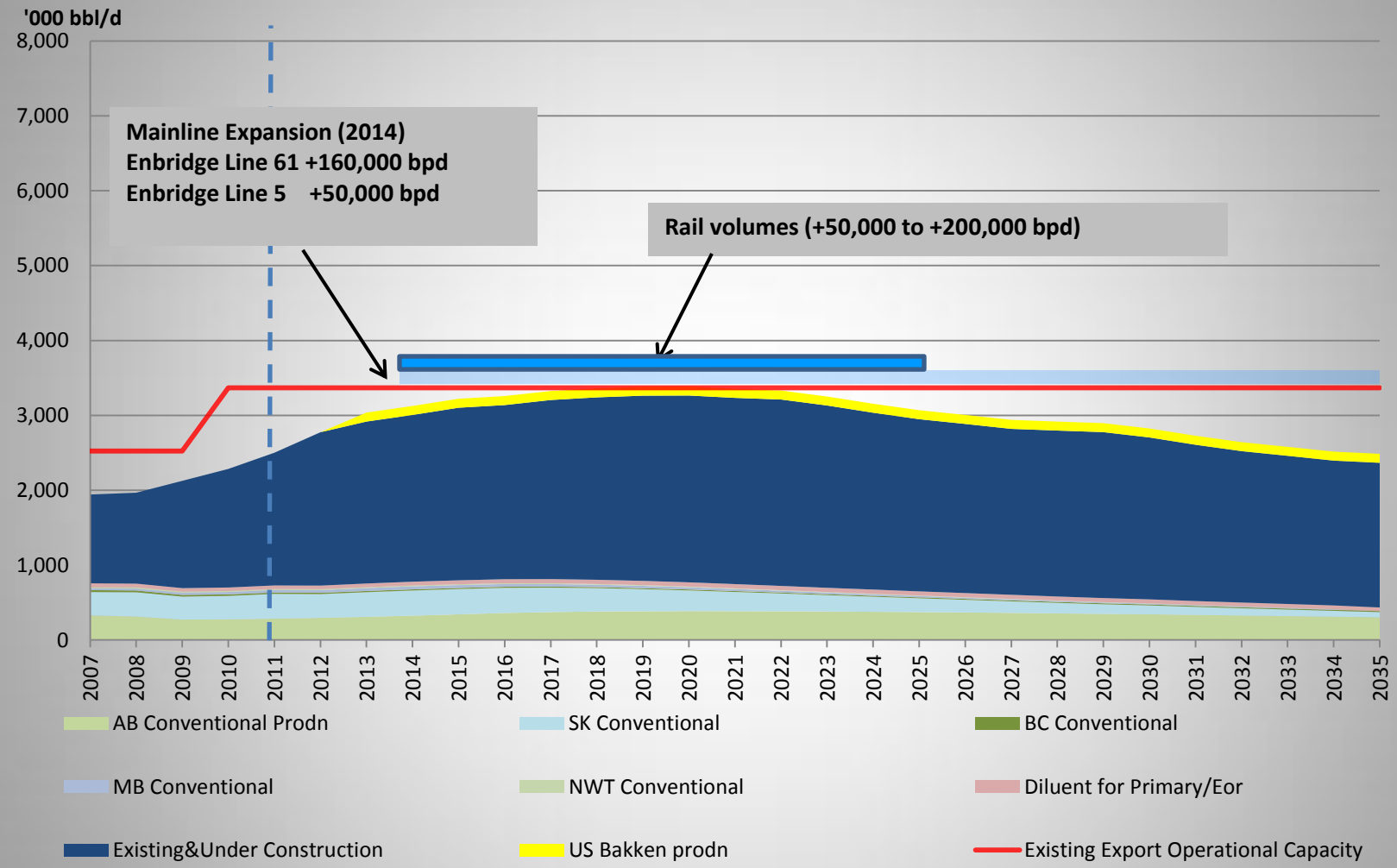
Options for Canadian Crude By Pipeline



Source: Canadian Association of Petroleum Producers, *Crude Oil Forecast, Markets & Pipelines*, June 2011

Economic Impacts of Alberta's Oil Sands

"No Expansion" Scenario

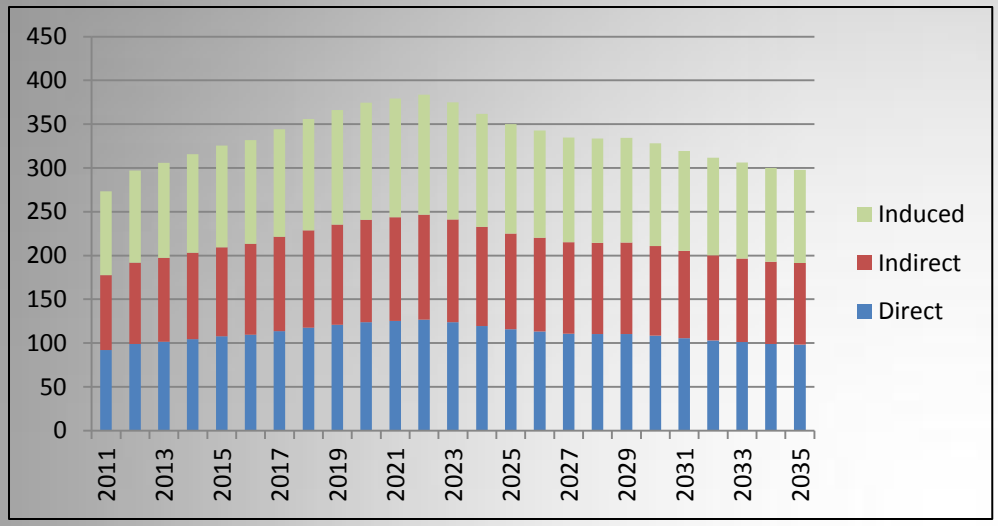


Note(s): 1) Operational Capacity is 95% of total design capacity. 2) Conventional crude volumes are net production volumes available for export (i.e., net of domestic demand). 3) Oil Sands volumes comprise of net bitumen SCO available for export and diluent volumes required to move bitumen as per pipeline specifications.

February 2, 2012

Economic Impacts of Alberta's Oil Sands

"No Expansion" Scenario



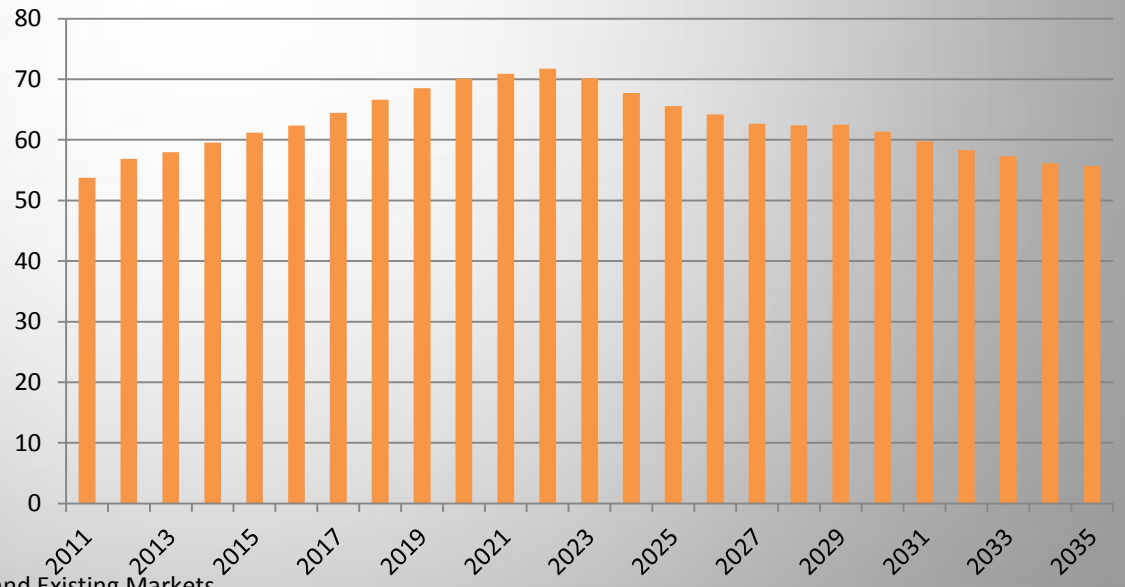
Canada

Direct employment 90,000 (2011) growing to 125,000 jobs (2022)

Total Direct, Indirect, Induced employment 270,000 (2011) to 370,000 (2022)

United States

Total Indirect and Induced employment 54,000 (2011) growing to 71,000 jobs (2022)

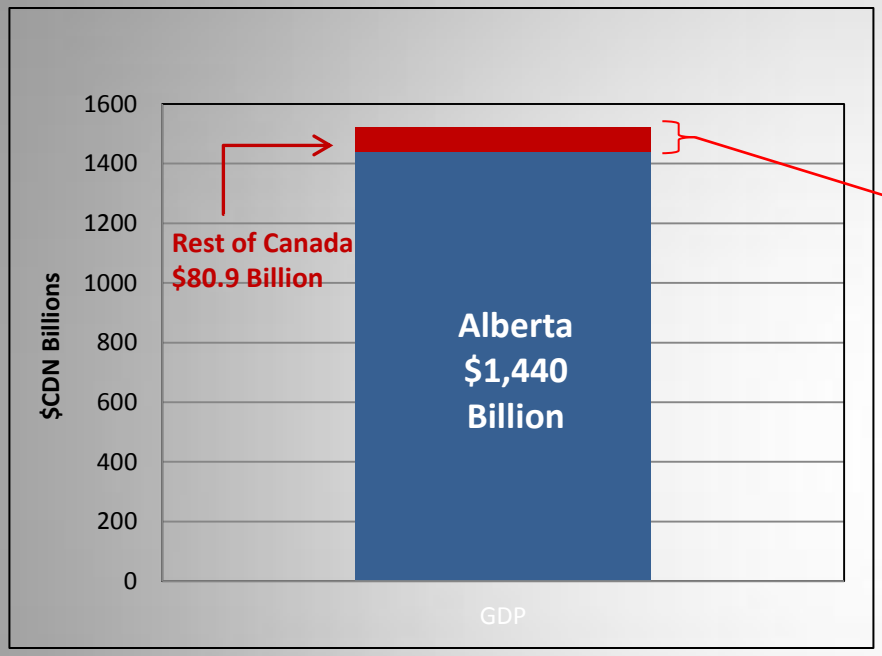


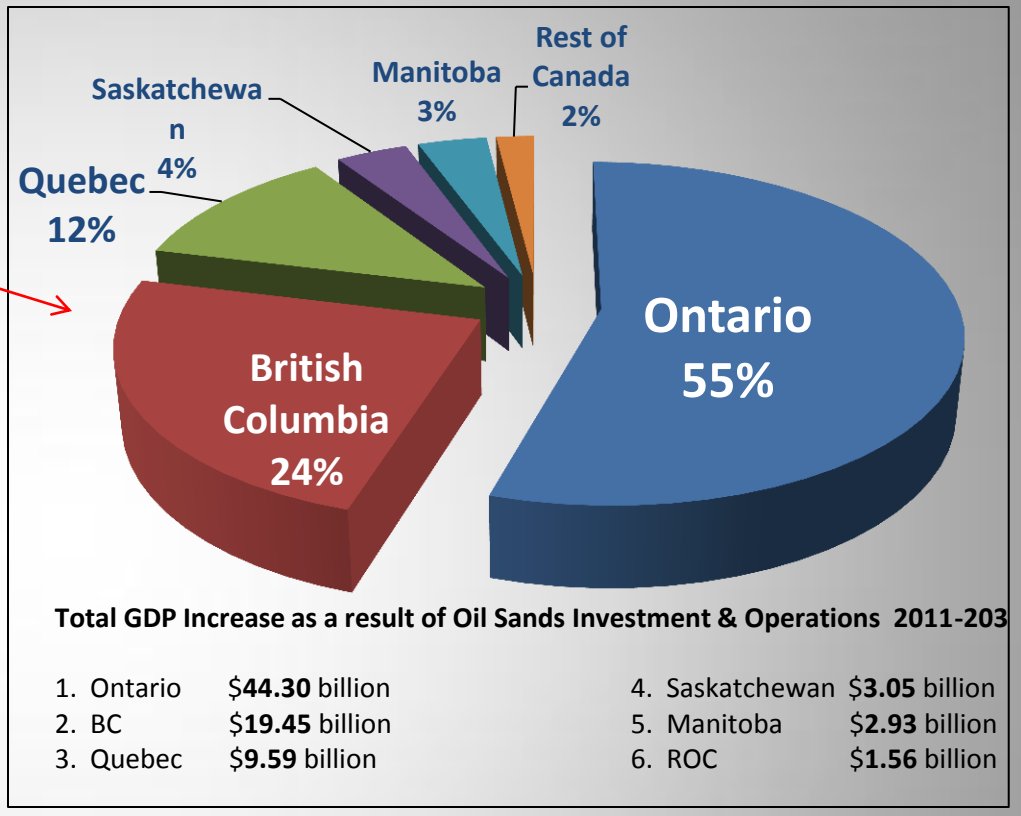
Source: CERI, Pacific Access: Part I Linking Oil Sands Supply to New and Existing Markets

Economic Impacts of Alberta's Oil Sands

"No Expansion" Scenario

Canadian GDP Impacts





Total GDP Increase as a result of Oil Sands Investment & Operations 2011-203

1. Ontario **$44.30** billion
2. BC **$19.45** billion
3. Quebec **$9.59** billion
4. Saskatchewan **$3.05** billion
5. Manitoba **$2.93** billion
6. ROC **$1.56** billion

United States Impacts by PADD

2011-2035	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
PADD I	38,742	19,604	447
PADD II	50,550	24,983	580
PADD III	19,844	7,814	195
PADD IV	8,028	3,740	88
PADD V	24,474	11,412	258
Total US	141,638	67,554	1,568

Source: CERI, Pacific Access: Part I Linking Oil Sands Supply to New and Existing Markets

Economic Impacts of Alberta's Oil Sands

"No Expansion" Scenario

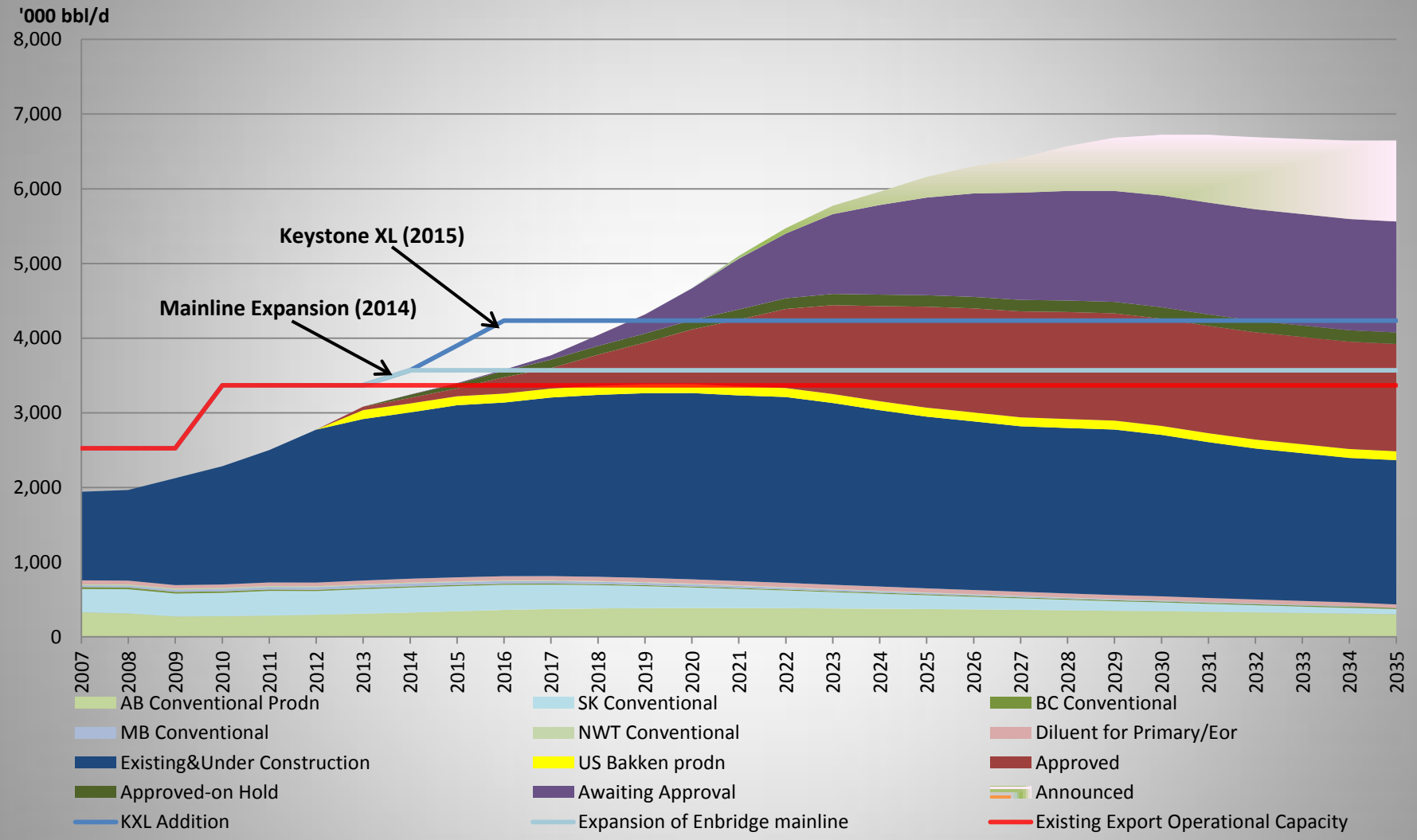
United States Impacts by State

	$CAD Million		Thousand Person Years
	GDP	Compensation of Employees	Employment
Alabama	1,291	647	19
Alaska	521	113	3
Arizona	1,729	849	22
Arkansas	754	355	11
California	15,091	7,012	151
Colorado	3,305	1,563	35
Connecticut	1,703	839	15
Delaware	474	176	4
District of Columbia	475	292	4
Florida	5,139	2,498	69
Georgia	2,827	1,471	38
Hawaii	395	181	5
Idaho	378	193	6
Illinois	17,303	8,442	173
Indiana	2,446	1,216	30
Iowa	1,072	471	14
Kansas	2,008	977	24
Kentucky	1,216	599	18
Louisiana	3,493	1,115	27
Maine	340	178	6
Maryland	1,740	895	21
Massachusetts	2,567	1,463	28
Michigan	4,468	2,371	54
Minnesota	2,046	1,063	26
Mississippi	761	367	12
Missouri	1,728	918	25
Montana	3,176	1,504	32
Nebraska	593	280	9
Nevada	903	433	12
New Hampshire	430	238	6
New Jersey	3,545	1,801	35
New Mexico	610	214	7
New York	7,713	3,902	71
North Carolina	3,121	1,389	37
North Dakota	209	89	3
Ohio	6,662	3,358	77
Oklahoma	1,368	556	16
Oregon	1,382	650	18
Pennsylvania	4,058	2,097	50
Rhode Island	337	165	4
South Carolina	1,120	602	18
South Dakota	252	98	4
Tennessee	1,870	957	27
Texas	12,935	5,116	119
Utah	787	382	11
Vermont	173	90	3
Virginia	2,577	1,313	31
Washington	4,451	2,174	48
West Virginia	401	195	6
Wisconsin	7,308	3,590	79
Wyoming	382	98	3
Total US	**141,638**	**67,554**	**1,568**

Source: CERI, Pacific Access: Part I Linking Oil Sands Supply to New and Existing Markets (Appendix A)

“Let’s Talk About Pipelines”

Alberta Oil Sands Projects Coupled with WCSB Conventional Oil
Inclusion of the Keystone XL Pipeline



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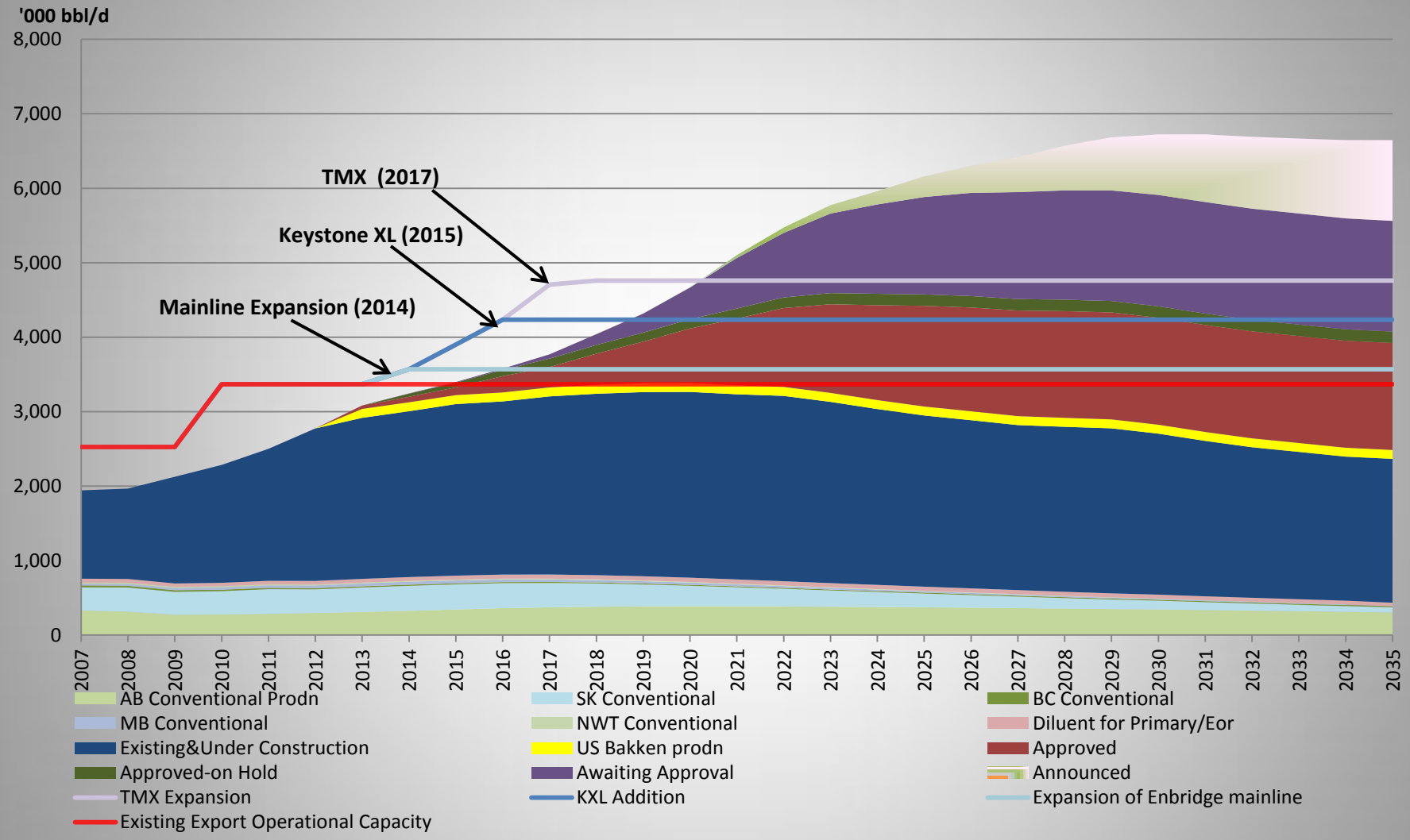
August 23, 2012

Alberta Oil Sands Projects Coupled with WCSB Conventional Oil
Inclusion of TMX Expansion



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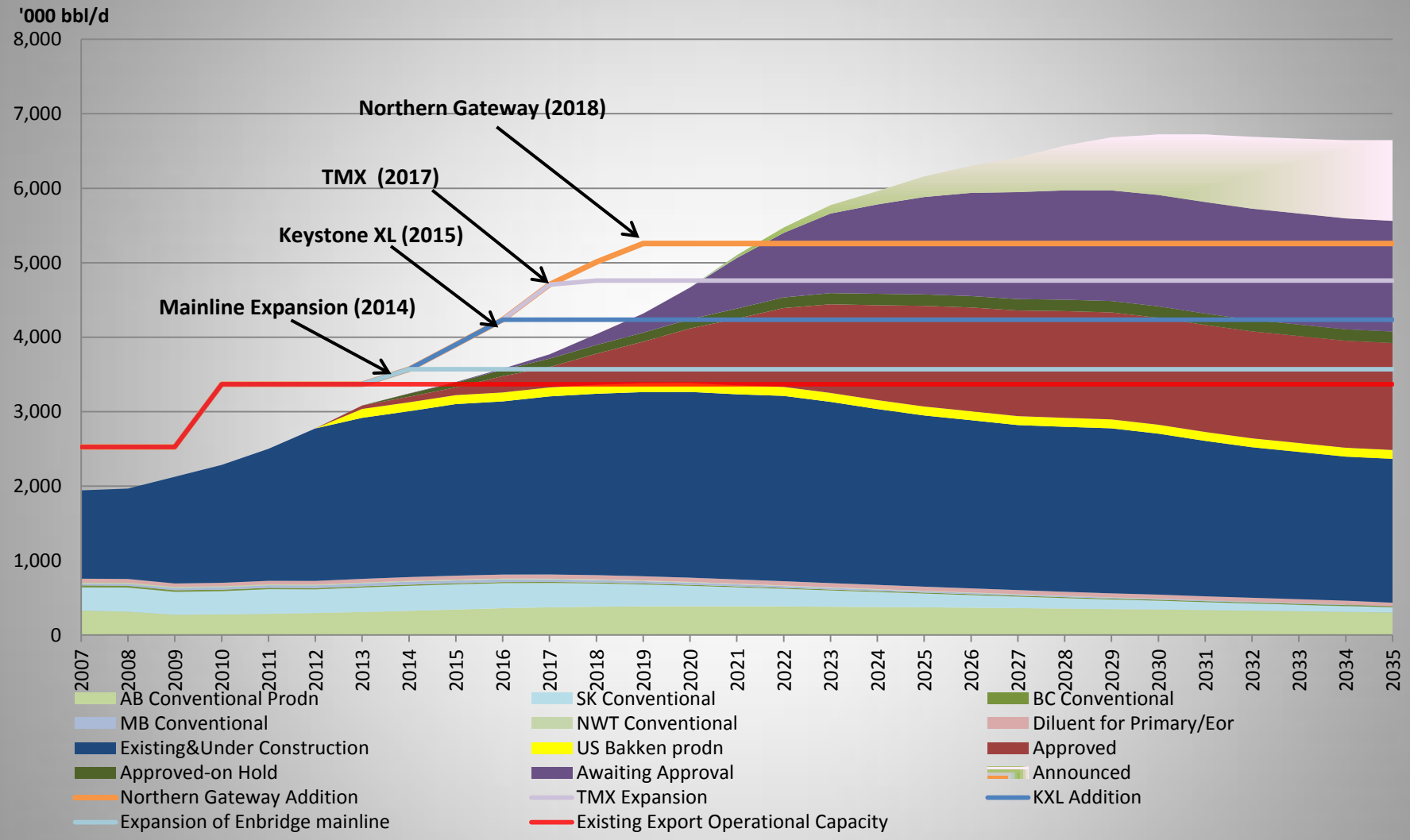
August 23, 2012

Alberta Oil Sands Projects Coupled with WCSB Conventional Oil
Inclusion of Northern Gateway



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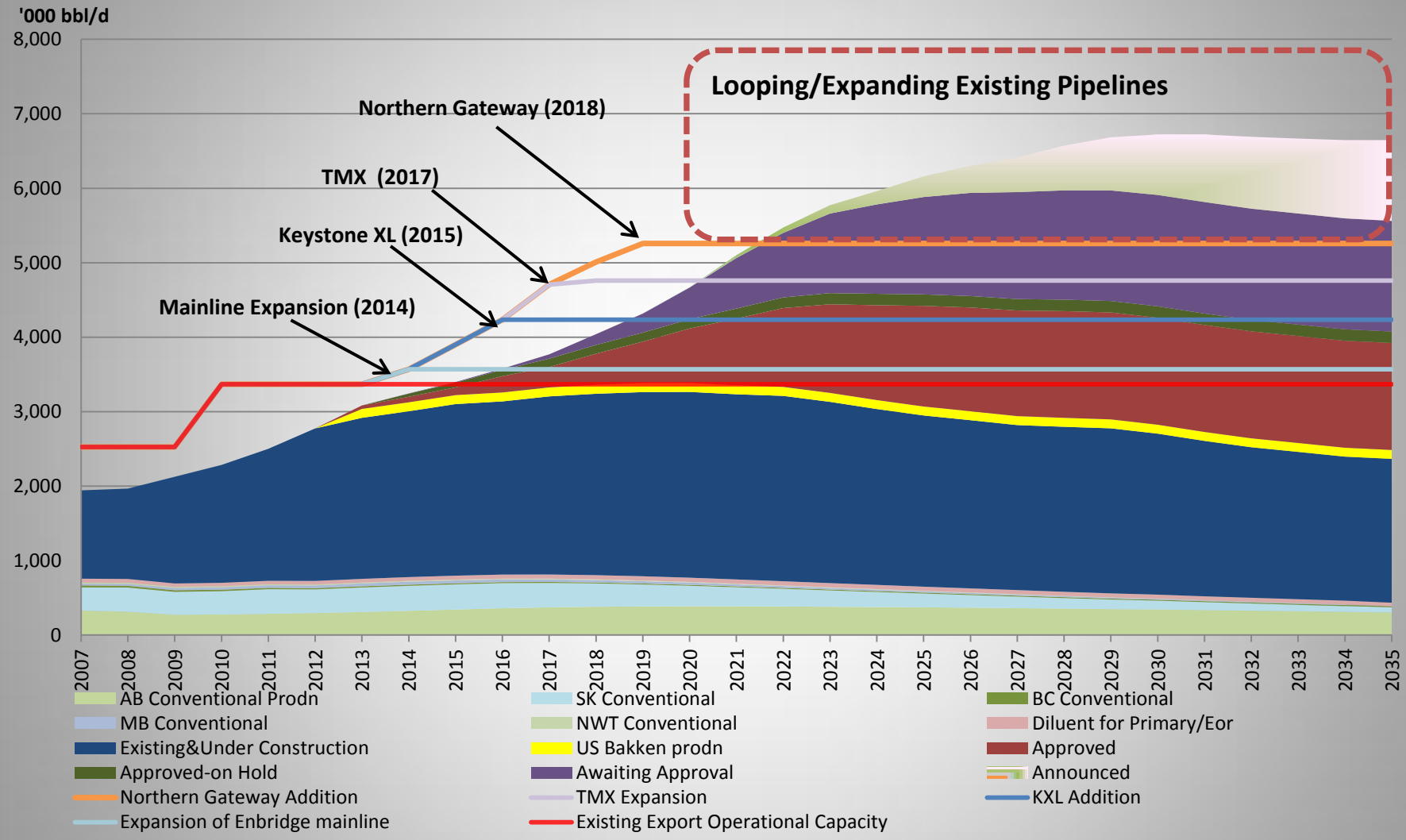
August 23, 2012

Alberta Oil Sands Projects Coupled with WCSB Conventional Oil Full Potential



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August 23, 2012

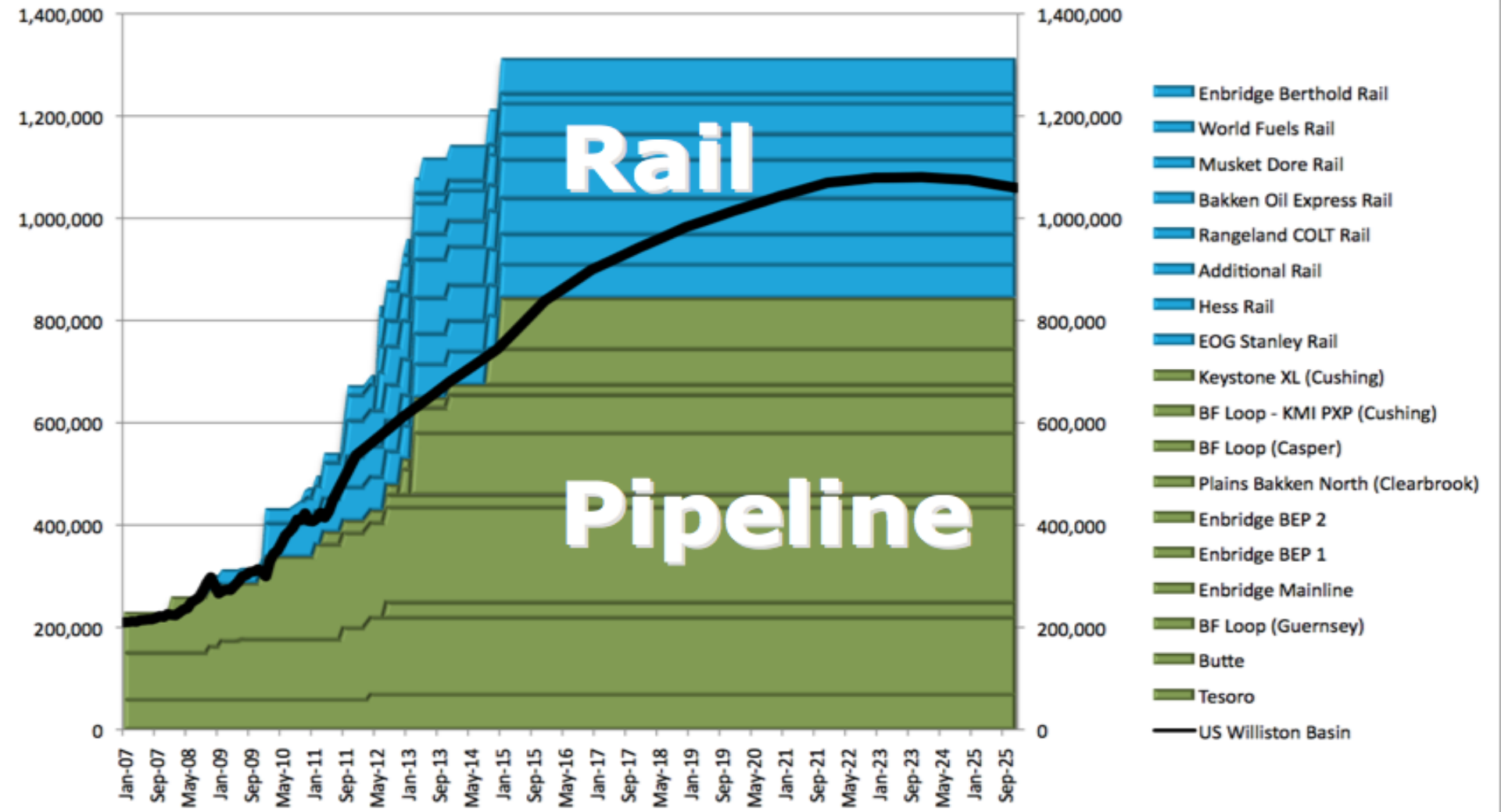
“BUT”

What are the Problems for WCSB OIL?

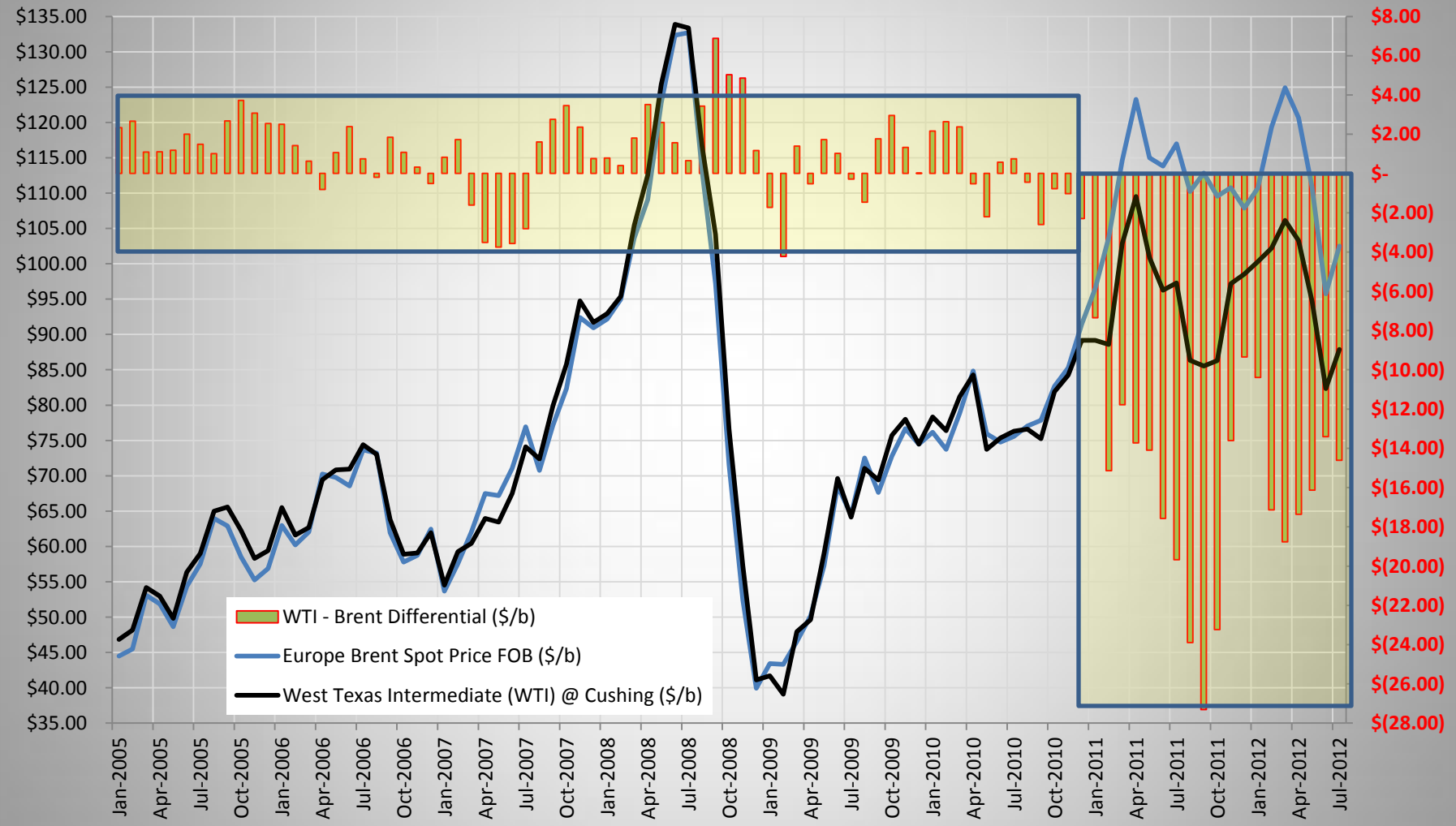
1. Canadian exports currently feed one market (flat demand and increasing domestic supply).
2. Western Canadian oil/oil sands are land-locked and need transportation options in order to grow either new barrels to the US or Asia.
3. Alberta needs oil hydrocarbon growth in the face of a tanking gas market (Growth = GDP, Employment, Taxes, Royalties).
4. The Cushing Oklahoma bottleneck is affecting PADD II and Canadian market prices "negatively".
5. Tightening Canadian pipeline capacity will
   - Affect Edmonton/Hardisty basis differential ($$$ left on the table)
   - Potentially slow development of the Oil Sands
   - Potentially slow development of Conventional Oil
6. Oil on Oil Competition for pipeline space and access to refineries
   - Competition with Alberta/Saskatchewan conventional oil developments
   - Competition with North Dakota Bakken oil developments
   - Competition with US Shales (Niobrara, Eagle Ford, etc.)

Competition from the US Bakken
Oil Production Forecast and Transportation

PIPELINE VERSUS RAIL



Differential Problem WTI-Brent



Problem WTI-Brent Differential

Q3 2011

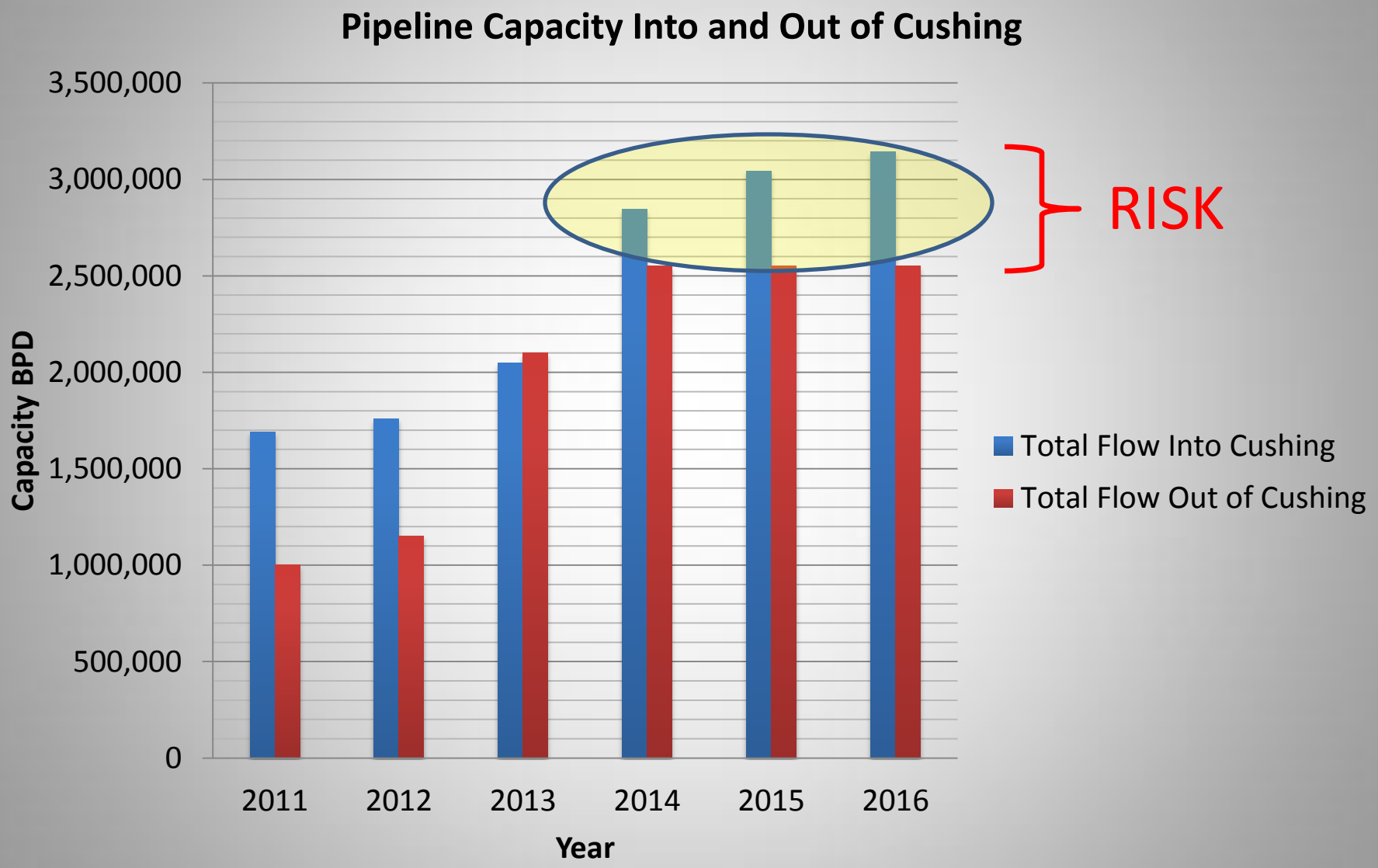
- WTI discount averaged $23 to Brent
- Canadian Crude (Conventional, SCO, Bitumen) Exports
  - 1,477,000 bbls/day to PADD II
  - 105,000 bbls/day to PADD III
  - 216,000 bbls/day to PADD IV
  - 157,000 bbls/day to PADD V

Simple Math: 2,152,000 bbls/day times $15/bbl
= $32 million per day (discounted Value)

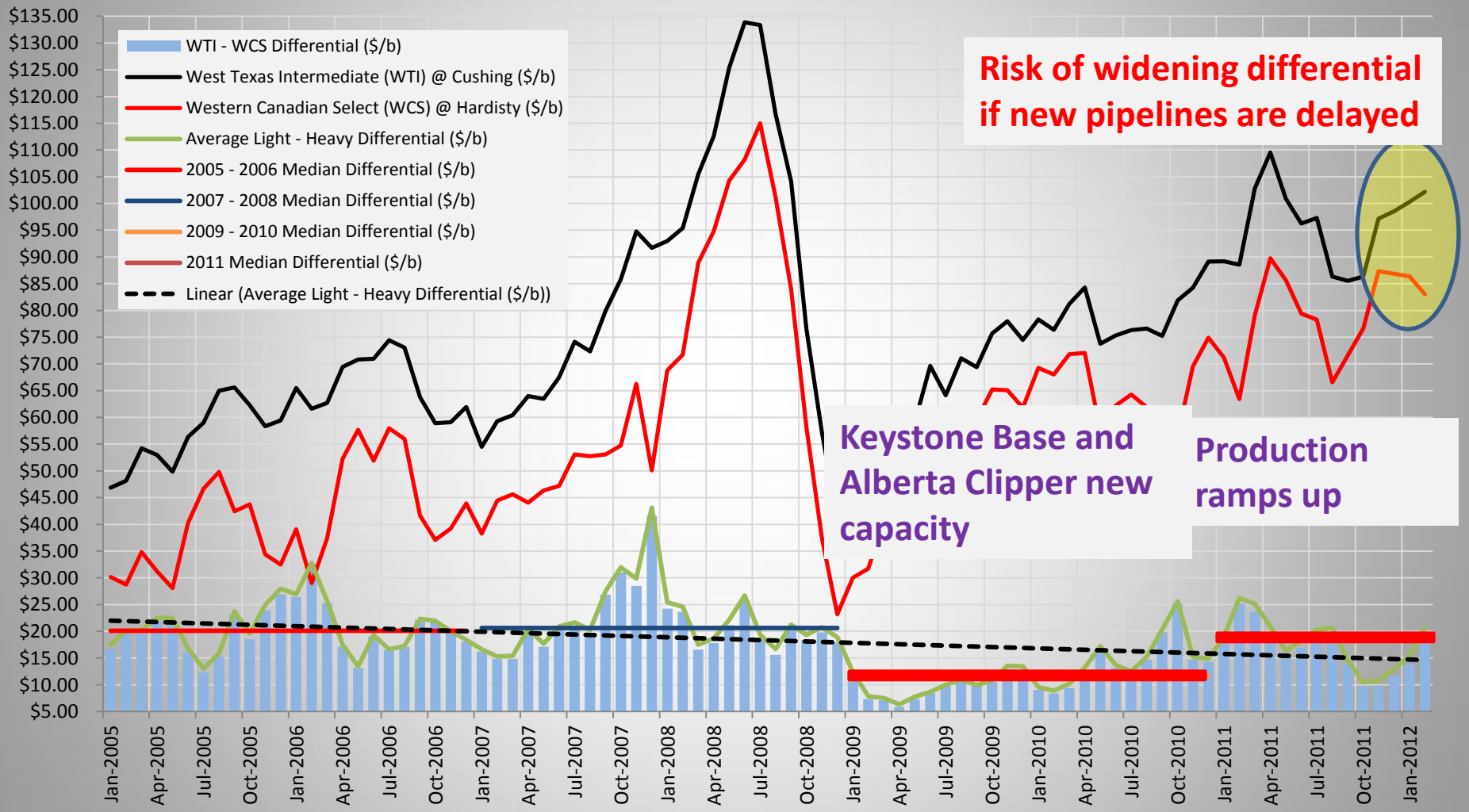
2012-2013 **"The Pipeline Solution"**

- Enterprise/ETP (Cushing to Houston) 400,000 b/d Q4 2012
- Enbridge/Wrangler (Cushing to Houston) (light crude) 2013
- Enbridge Monarch (Cushing to Houston) 350,000 b/d Q4 2013
- Houston to El Paso reversal (bypass Cushing) 200,000 b/d Q2 2013
- TCPL Keystone Market Link (Cushing to Houston) 150,000 b/d Q2 2013

Future Problem WTI-Brent Differential



Western Canada WTI-WCS Differential



"Canada has Energy"

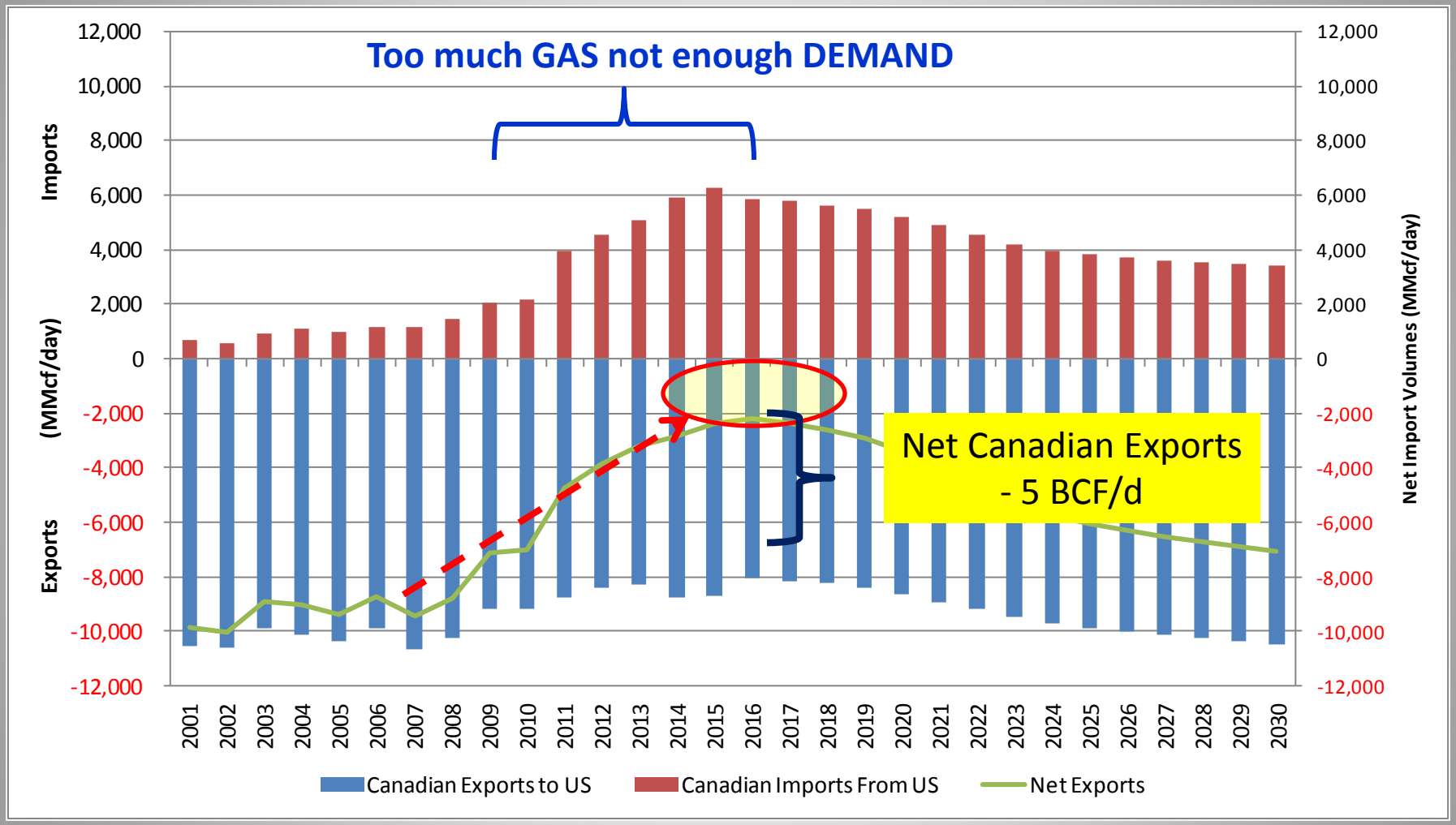
"North South East or West"

"If the Market Wants the Energy, Canada Needs the Pipes"

"Let's Talk About Western Canadian Natural Gas"

United States Gas Pipeline Import/Export Forecast

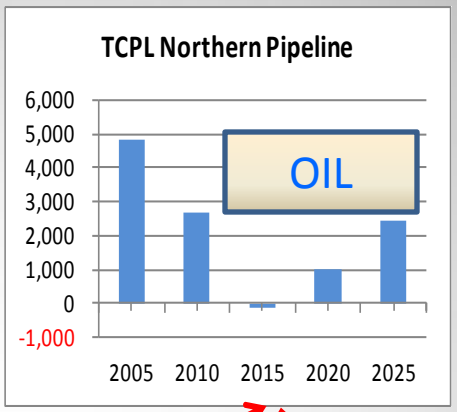
CERI "Realistic" Case (Feb. 2012)



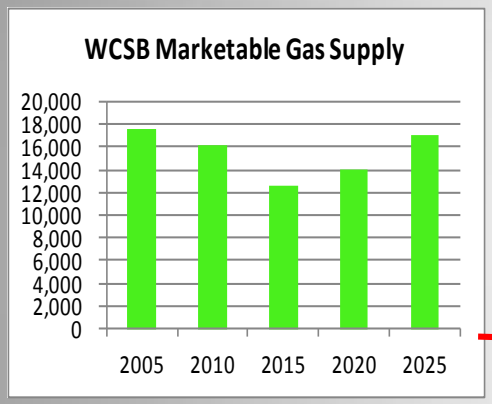
"Where is the Problem?"

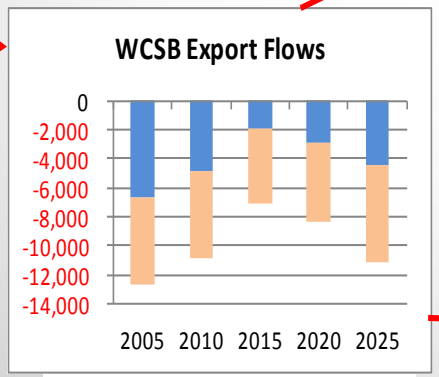
Ontario/Quebec Import/Export Forecast

CERI "Realistic" Case



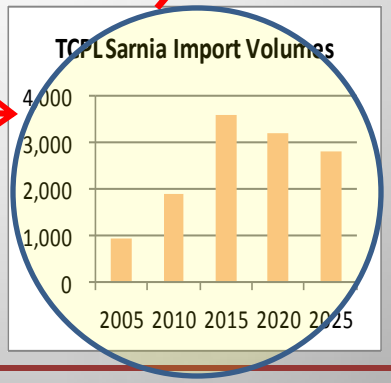
Potential for Stranded Gas Pipeline Assets Conversion to Oil Service

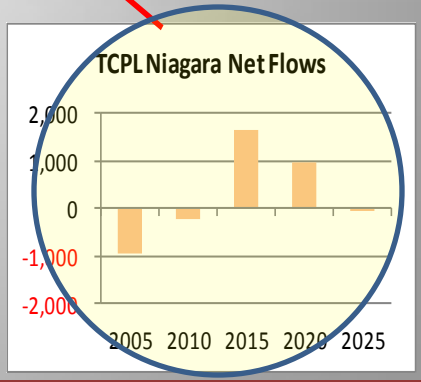




Marcellus Gas into Niagara
Marcellus Gas connect to Iroquois to New York

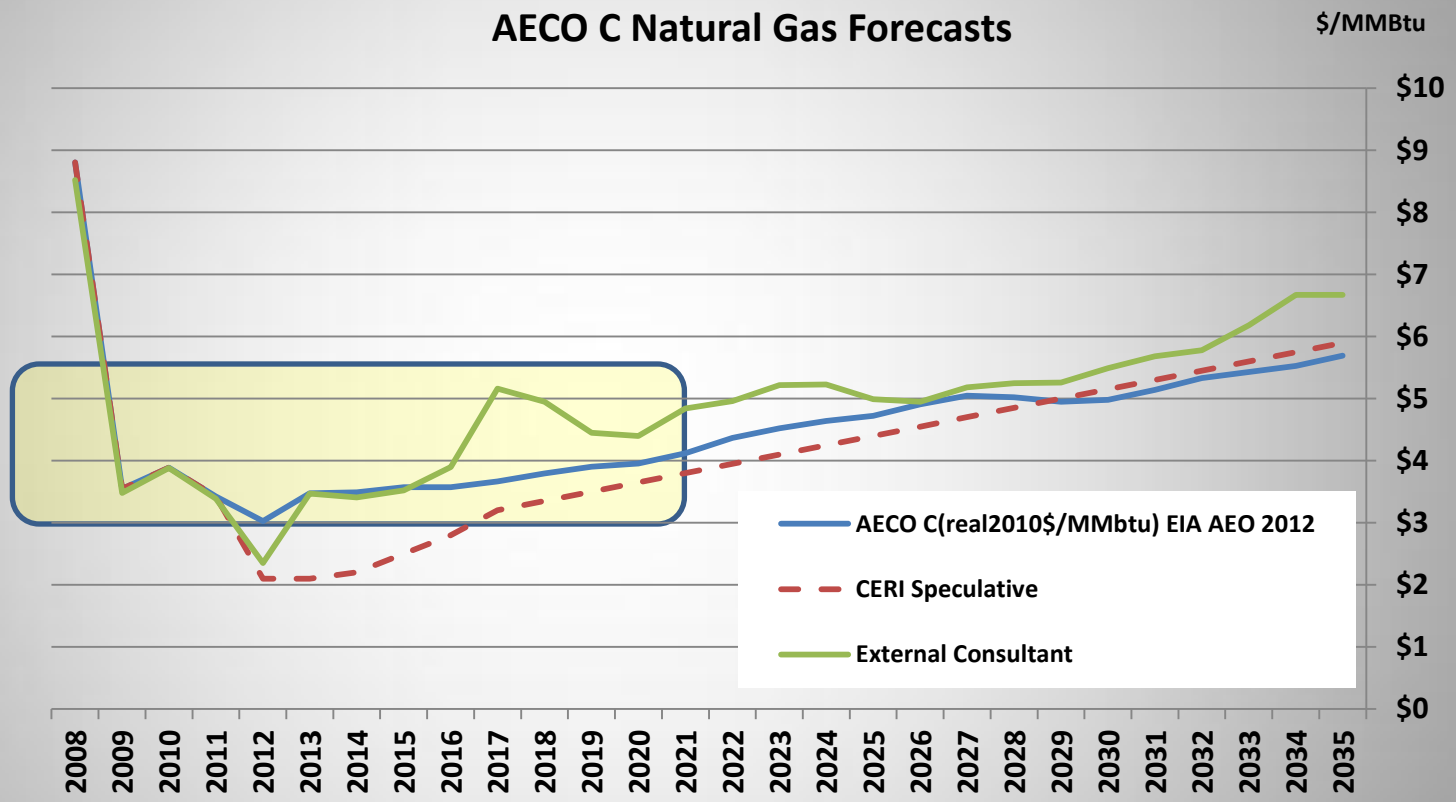
Mid Continent Gas
Rockies Gas
Connect to Sarnia

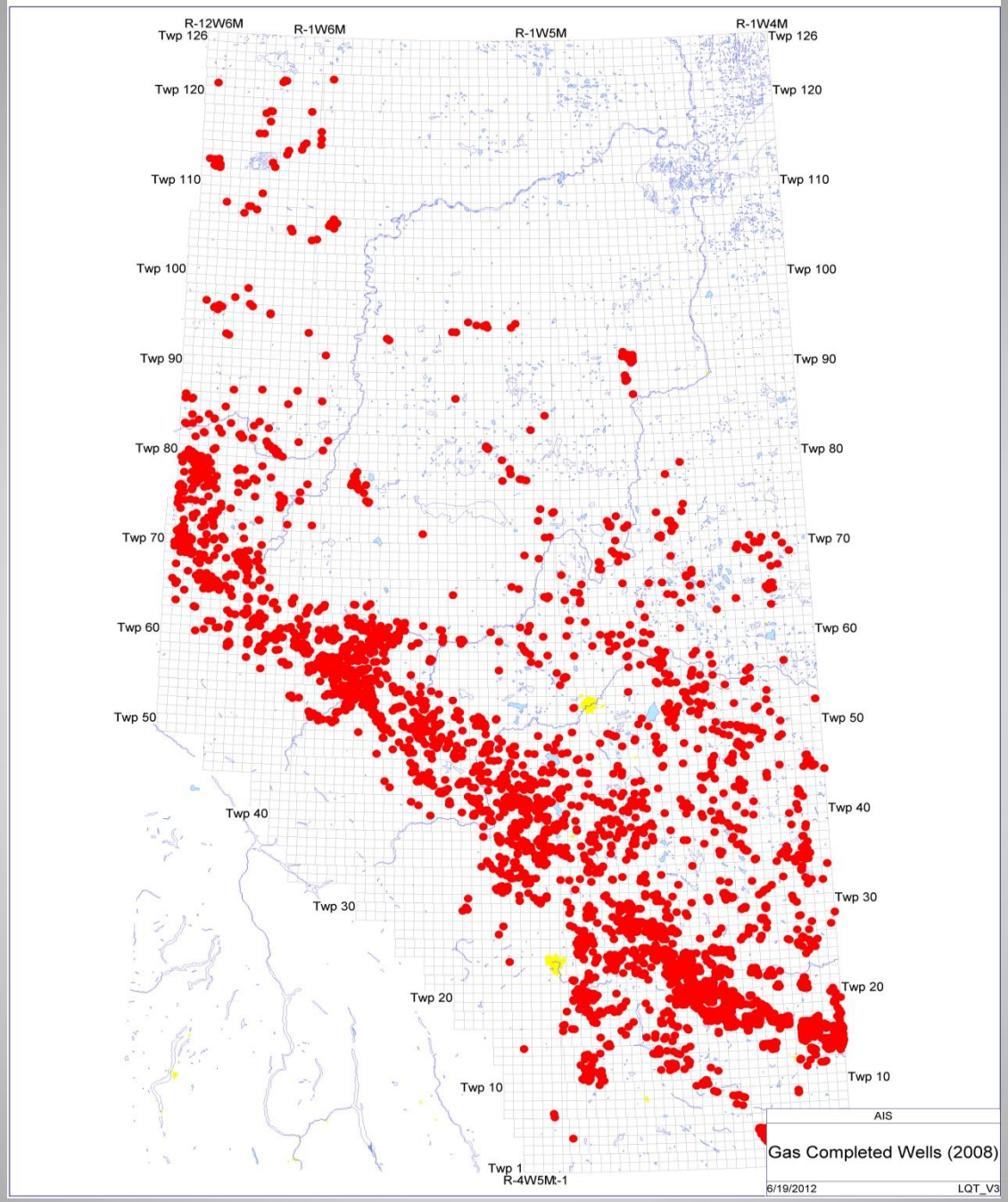




AECO C Gas Price Forecast

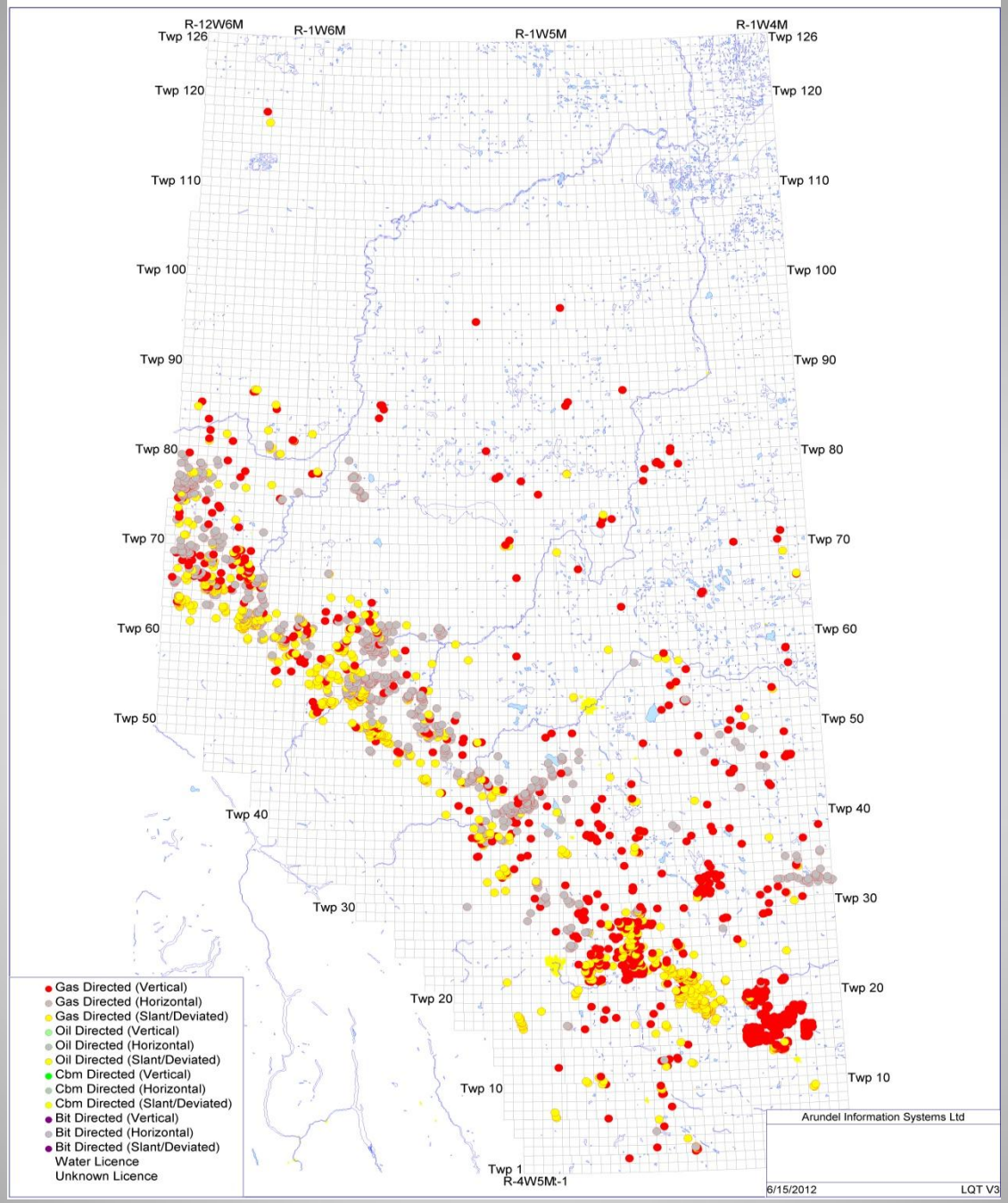
Average WCSB Well Supply Cost Range ($3-$5.75/mcf)



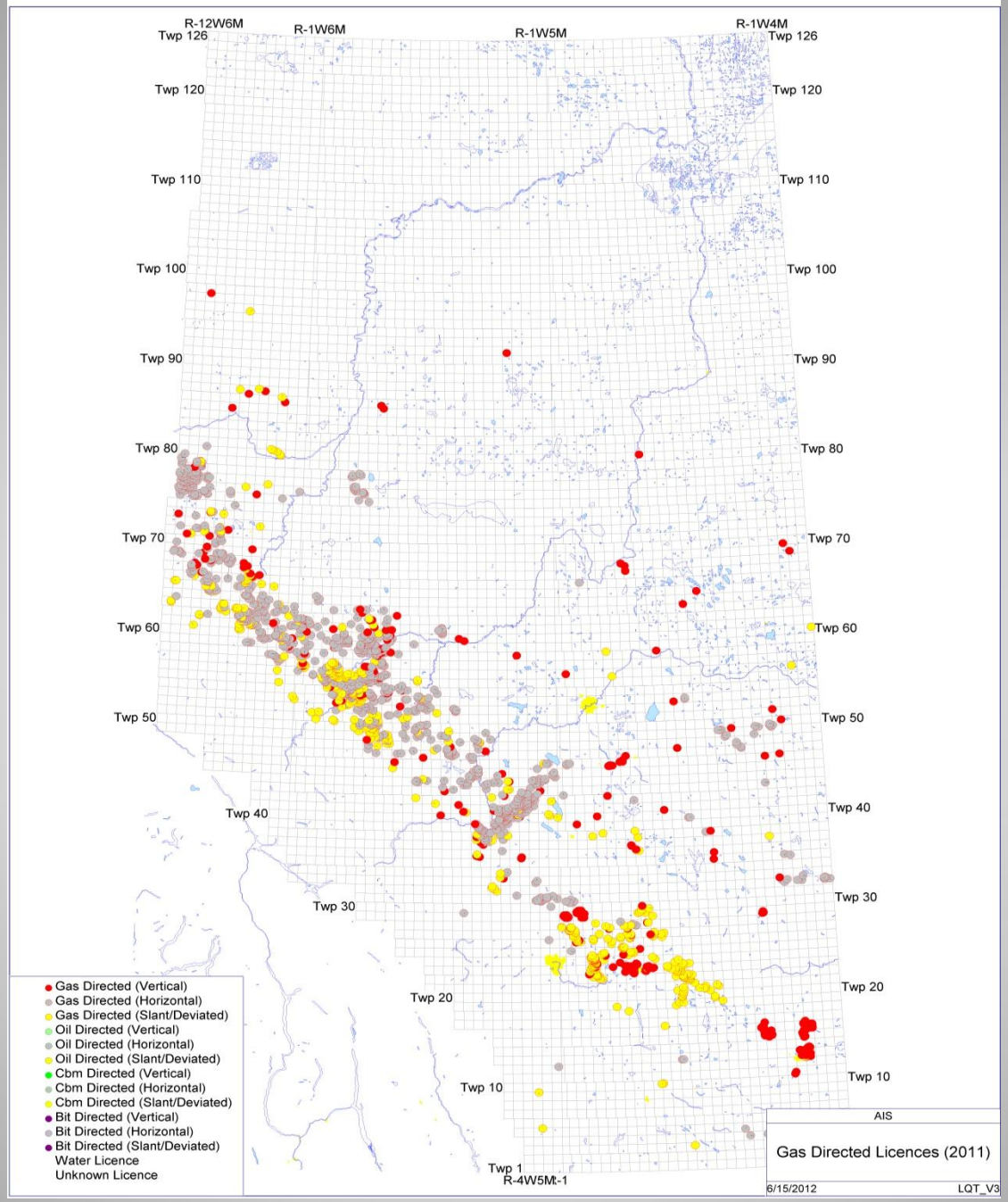


2008 Gas Wells Completed

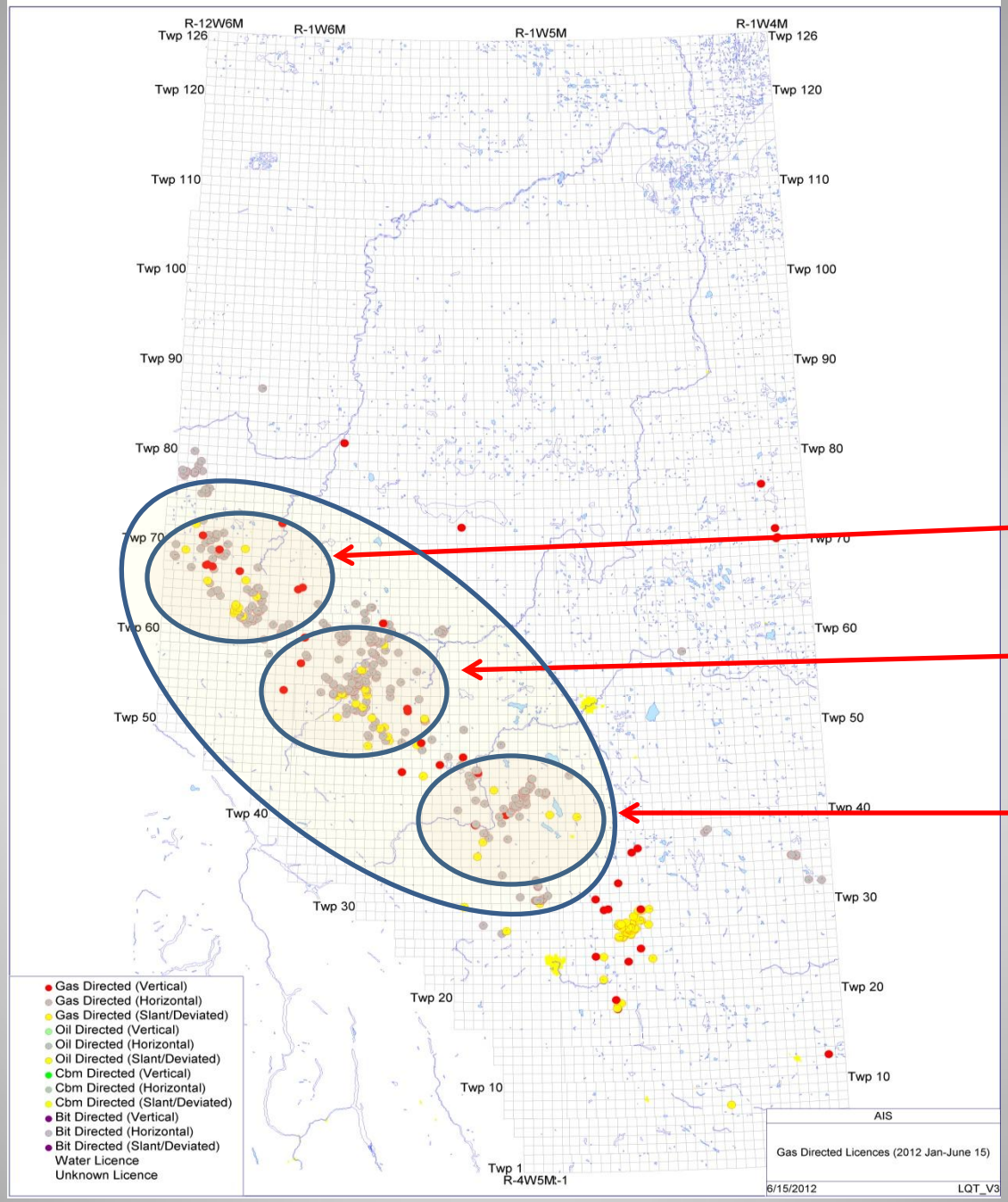
2010 Gas Directed Licences



2011 Gas Directed Licences



2012 Gas Directed Licences (Jan.-June)



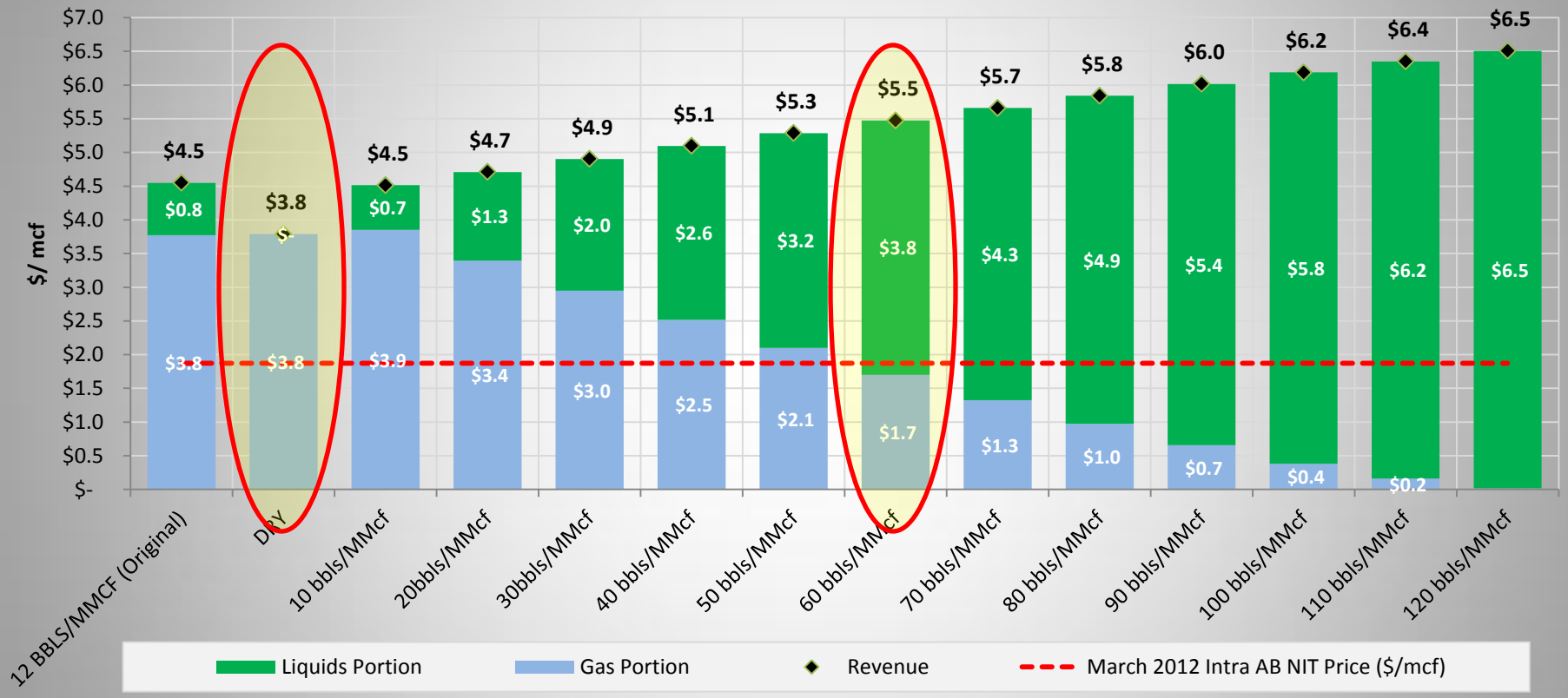
Montney (34)
Falher (17)
Duvernay (11)

Cardium (24)
Bluesky (17)
Notikewin (10)

Glaucontic (49)
Viking (16)
Lower Mannville (10)

Western Canada What Makes the Gas World Work

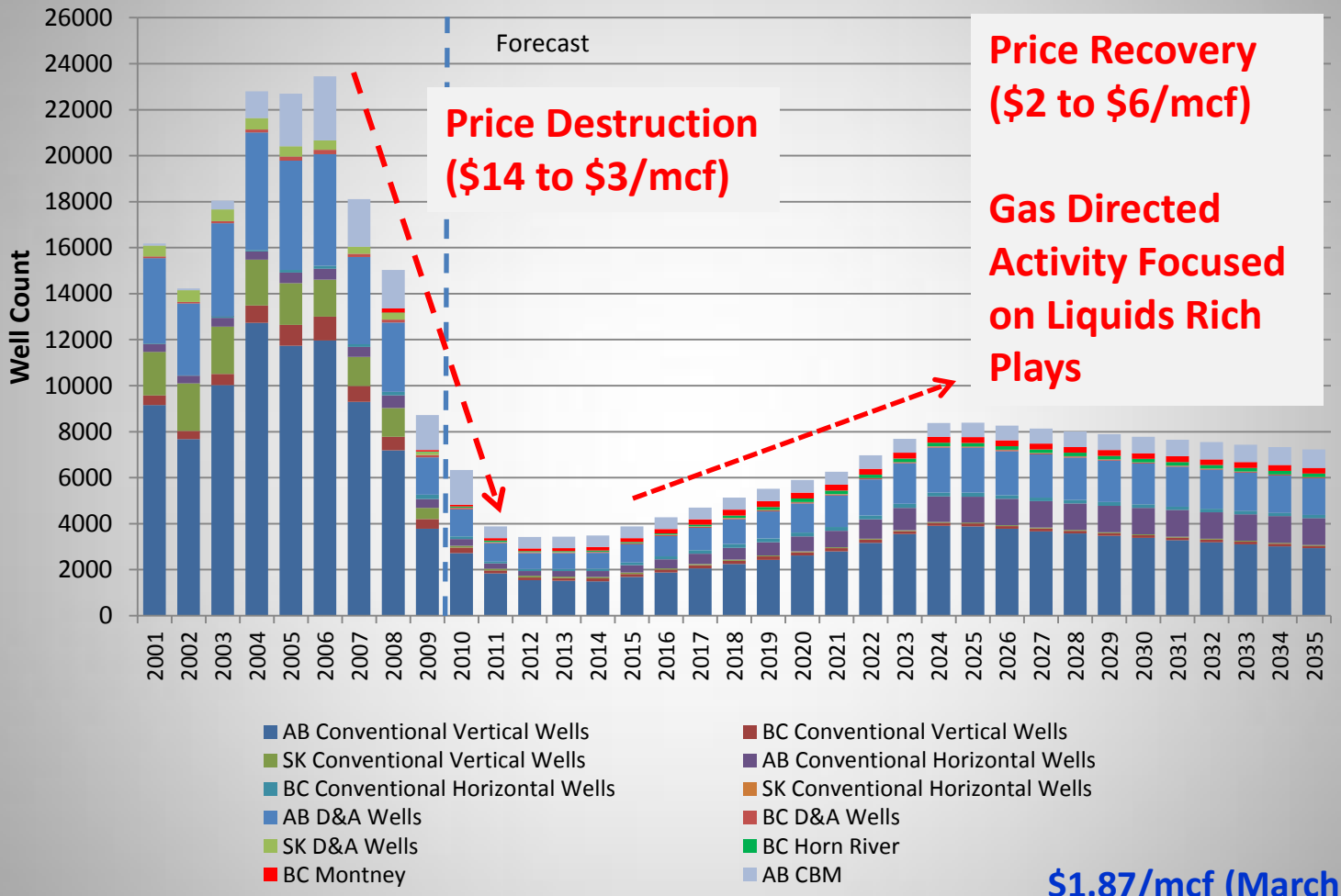
BC Montney Supply Cost example



With a Gas Price of $1.87/mcf a well needs a minimum of 60 bbls/mmcf (Liquids) to be economic

Western Canada Gas Well Development Forecast

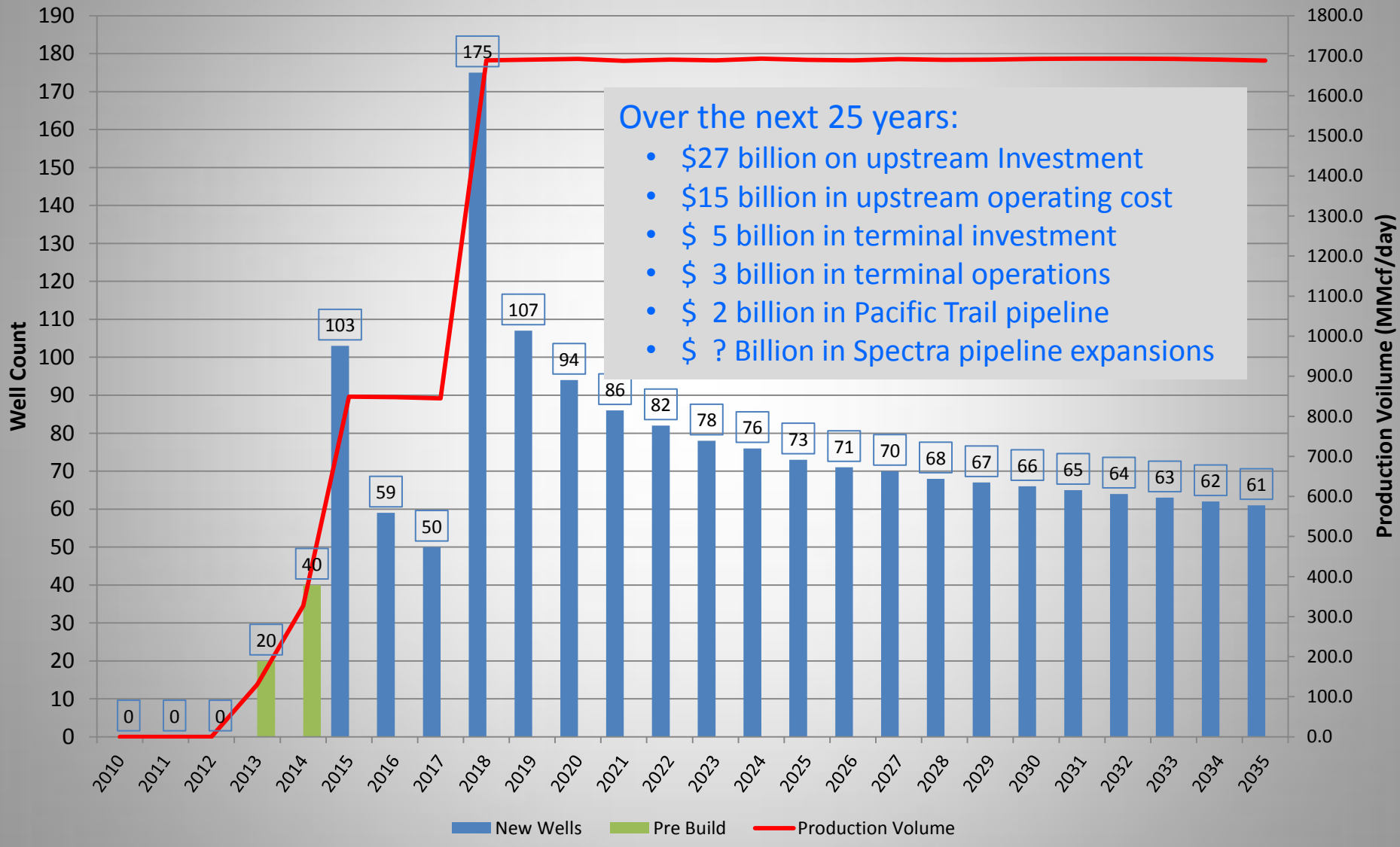
Realistic Scenario: Future Forecast



$1.87/mcf (March 2012)

Summer 2012: Gas Prices are forecasted to drop below $2XXX/mcf (Henry Hub)

Horn River to Kitimat LNG Potential (2013-2035)



Over the next 25 years:

- $27 billion on upstream Investment
- $15 billion in upstream operating cost
- $ 5 billion in terminal investment
- $ 3 billion in terminal operations
- $ 2 billion in Pacific Trail pipeline
- $? Billion in Spectra pipeline expansions

Be Careful What You Wish For!

"The Shale Gas Revolution!"

"The Conventional Oil Rebirth!"

"The Shale Oil Tsunami!"

*"The Great NGL Surge"**

**Bentek Energy LLC*

Canadian Energy Research Institute

Thank you for your time

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