

Is Canada Competitive? A Commercial Examination of Canadian Unconventional Plays*

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Abstract

The Montney and the Duvernay are two of Canada's most active unconventional plays. With remaining commercial values of US\$53 billion and US\$6 billion respectively, we expect these two areas to attract the majority of interest and new development in Canada going forward.

To develop these commercial values, we use real well data from development wells from a variety of operators in a true "bottom up" approach. Using boundaries that are set using geological and production trends, we separate the Montney and the Duvernay into fourteen and seven respective "sub-play" areas. Examining the most recent well production and completion data, we construct bespoke type curves for each sub-play in order to capture the differences between each area. These differences include but are not limited to IP rates, liquid and gas yield, decline curves, and well spacing assumptions. Using these bespoke models, we also examine active operators in each sub-play area to build a development forecast for each separate sub-play. Once this development forecast is built, we use this forecast to benchmark and compare a variety of different economic metrics as well as forecast the demand for externalities such as drilling or completion rigs, water, and proppant.

This presentation will use these metrics to perform in-depth comparisons between Canadian unconventional plays, including but not limited to the Montney and the Duvernay. We will examine differences between each respective play and show how these differences impact economics and ultimate competitiveness and commerciality of the play, both in a domestic and international context. Comparisons with notable US plays such as the Permian and Eagle Ford will also be discussed. Further, drilling and completions trends such as lateral length, proppant load, and number of hydraulic fracture stages will be compared over time between plays and operators. The conclusions from this work are meant to act as a guide as to which areas are most economic for development and to summarize relevant commercial activities for business intelligence or potential investment decisions.

Is Canada Competitive?

A commercial examination of Canadian unconventional plays

AAPG Annual Convention and Exhibition 2018





Agenda

- 1 Key points
- 2 Play overview
- 3 Economic comparisons (half cycle)
- 4 Land entry cost
- 5 Challenges
- 6 Summary
- 7 Q&A



Key questions

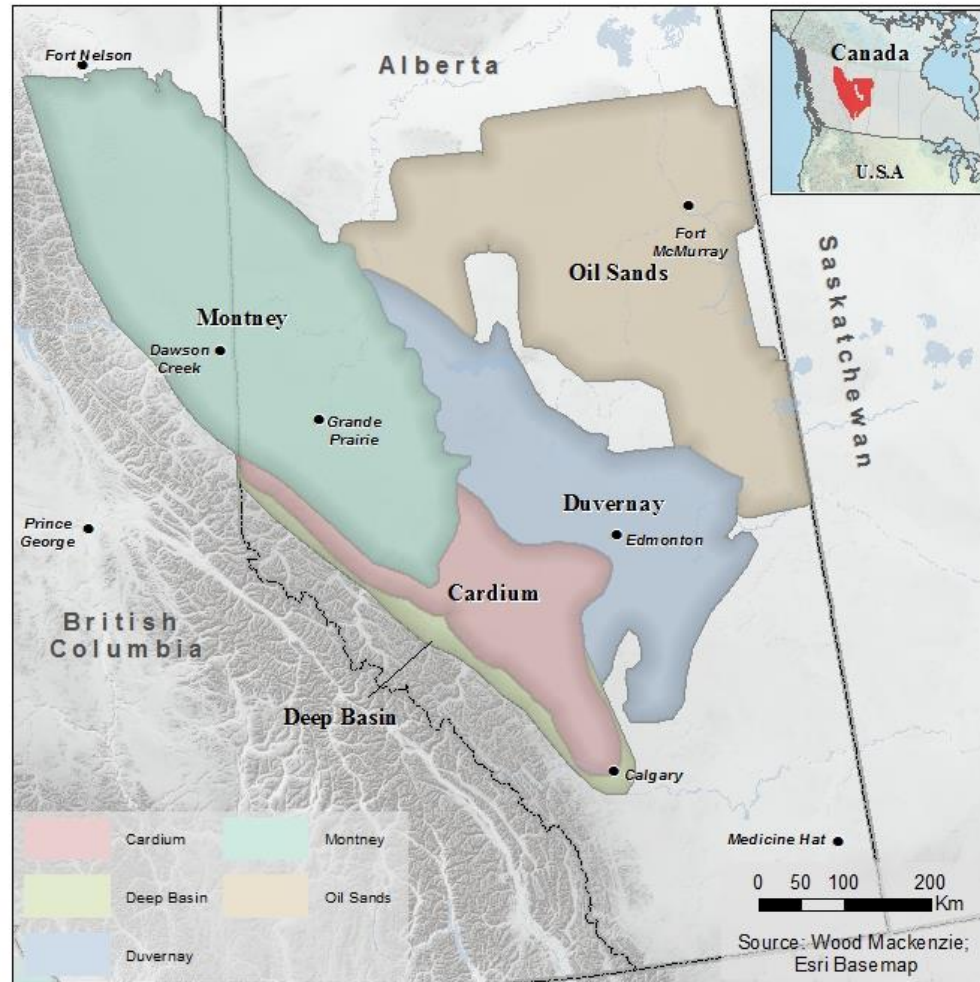
What is going on north of the border? Is it economic?

- What are the Montney and the Duvernay?
- What do the economics look like compared to major US plays?
- How do entry costs compare?
- What are some constraints?



Where are we talking about?

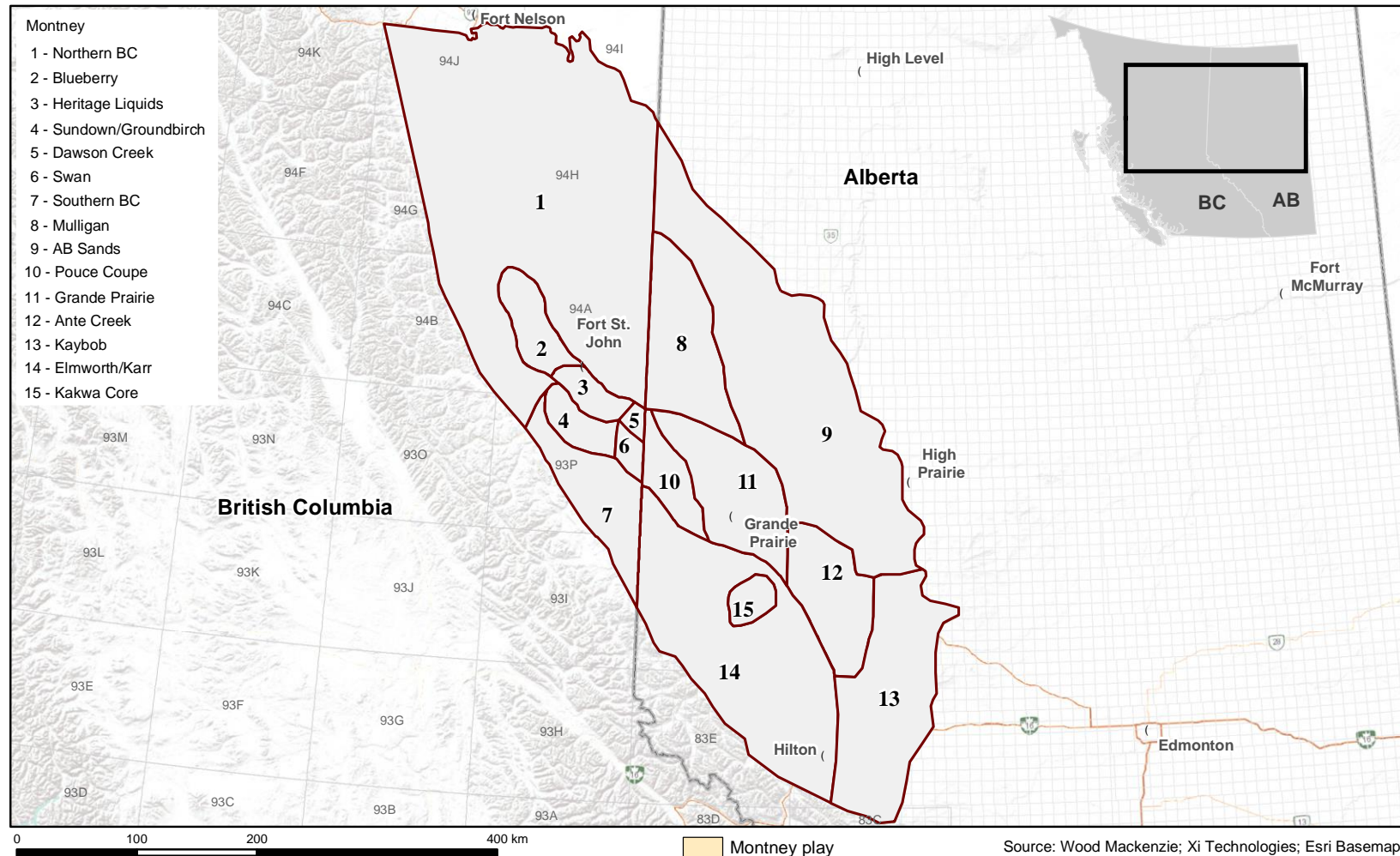
Canada has also seen an unconventional renaissance in traditional reservoirs. The Montney is widely considered the most prolific play in Canada





Where are we talking about?

We subdivide the Montney into 15 separate economic areas of interest

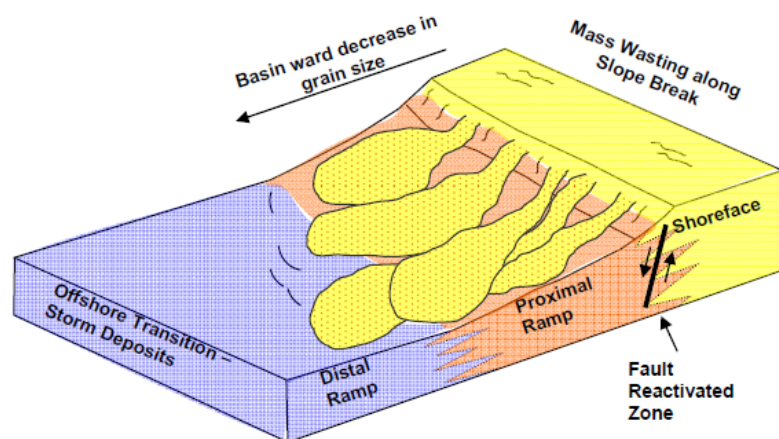




Montney offers mix of dry gas, liquids-rich gas and oil opportunities

Geology varies across play

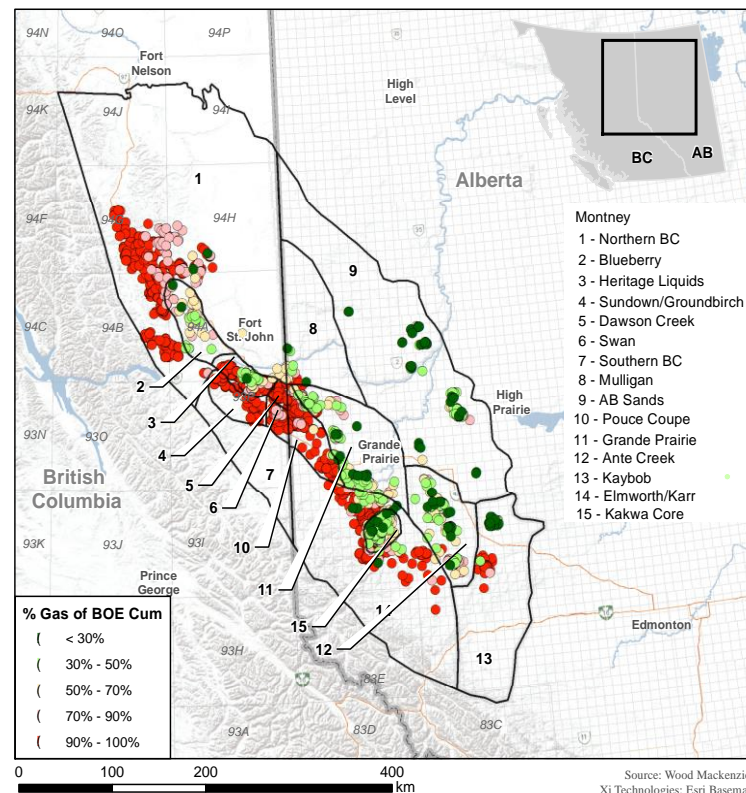
- Oil region (dark green) located in eastern area of the play, predominately in Alberta
 - » Shoreface
- Dry gas region (dark red) located in the western area of the play, predominately in British Columbia
 - » Distal ramp
- Liquids-rich gas area (light green and yellow) located in-between the dry gas and oil regions



Source: Encana
Source: Wood Mackenzie Key Play Service

Gas-Oil ratio

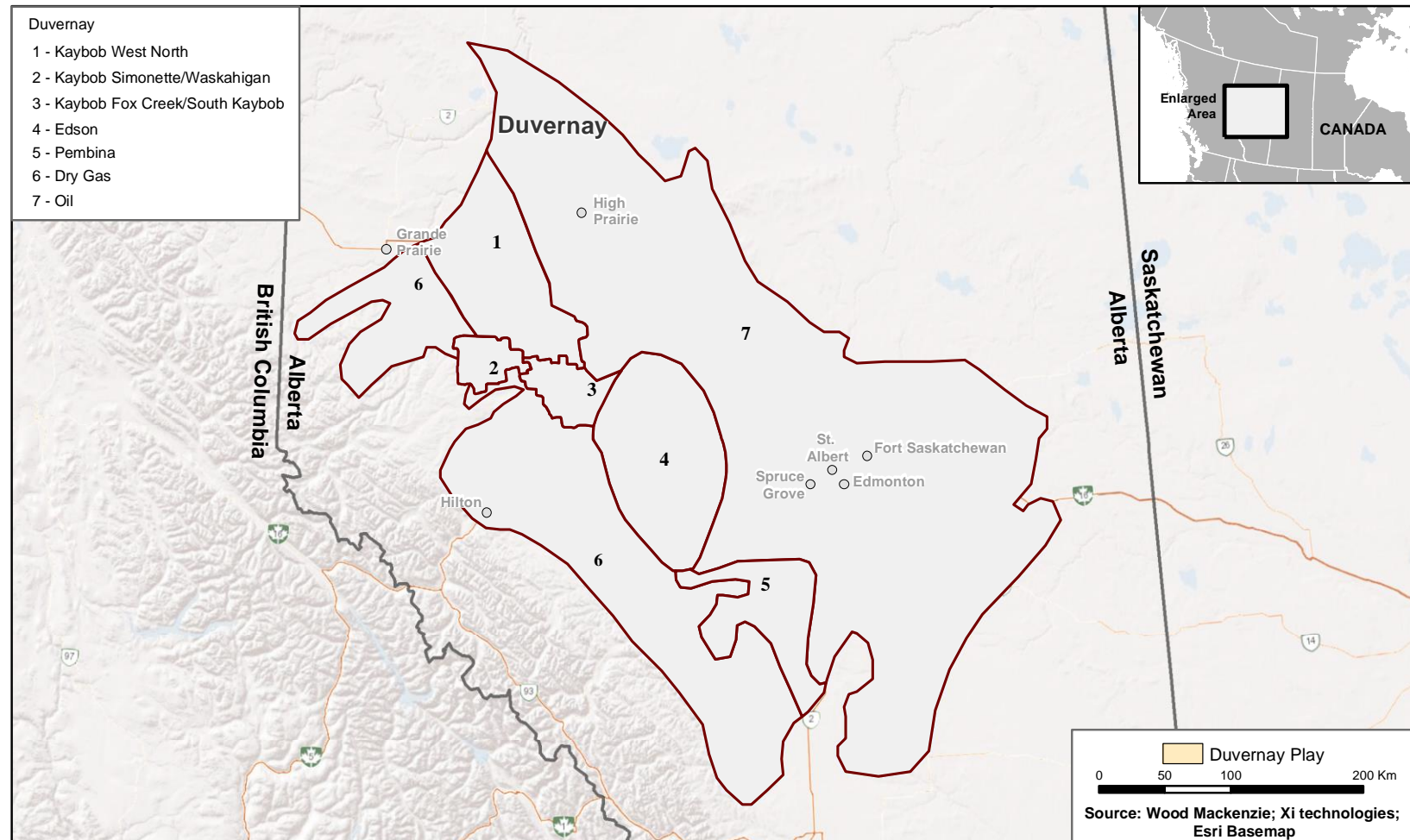
- Map includes wells drilled from 2015-2017
- Color based on boe cumulative gas-oil ratio





Where are we talking about?

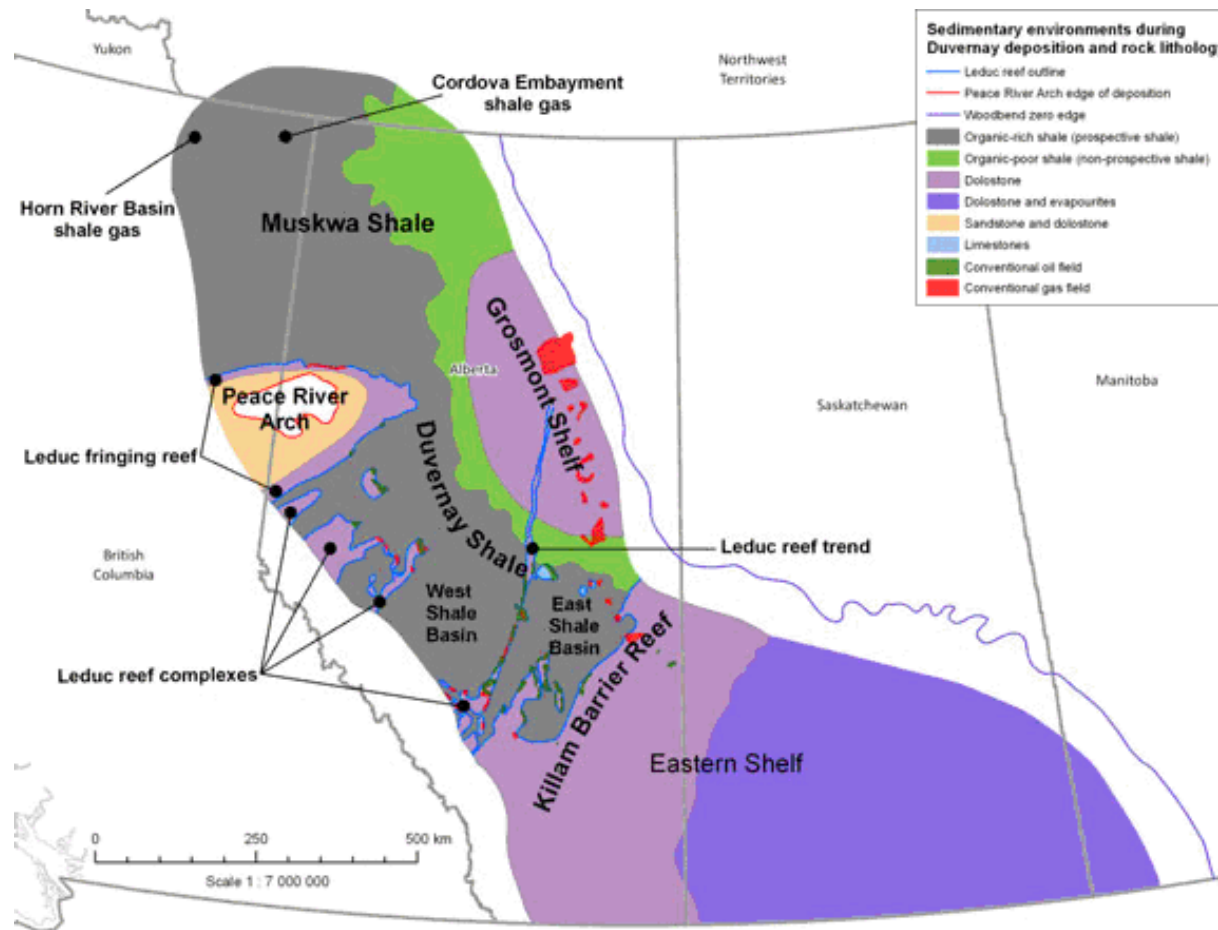
We subdivide the Duvernay into seven economic areas of interest





Duvernay Geology

Duvernay geology is stratigraphically very complex, compared to structural complexity for the Montney

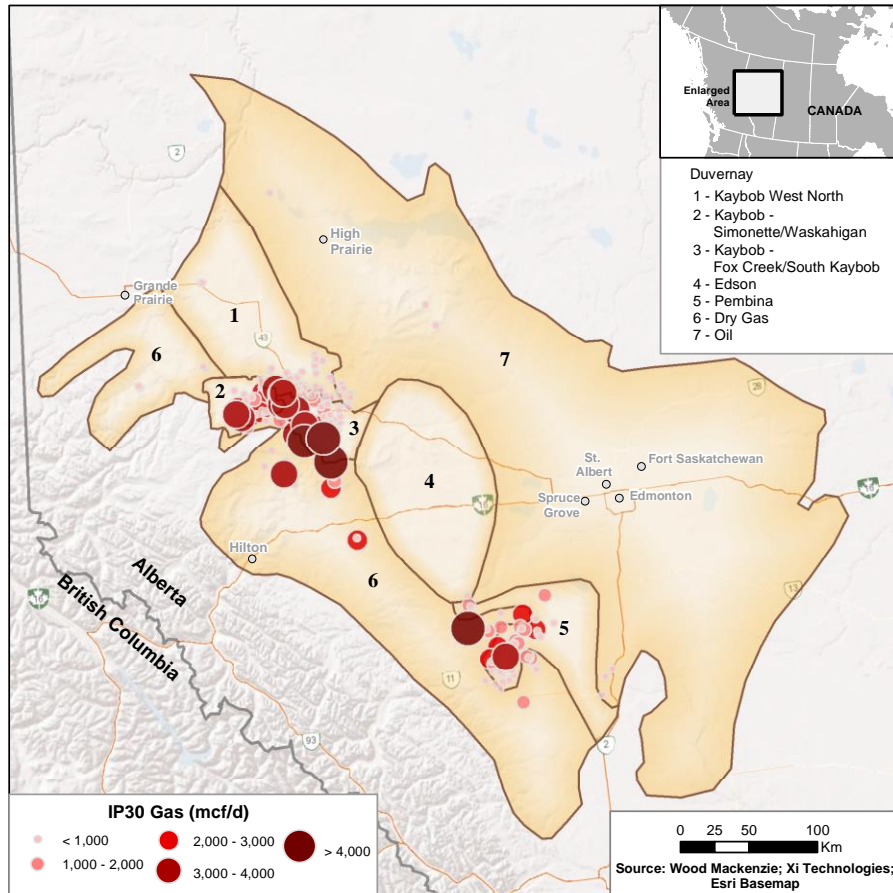




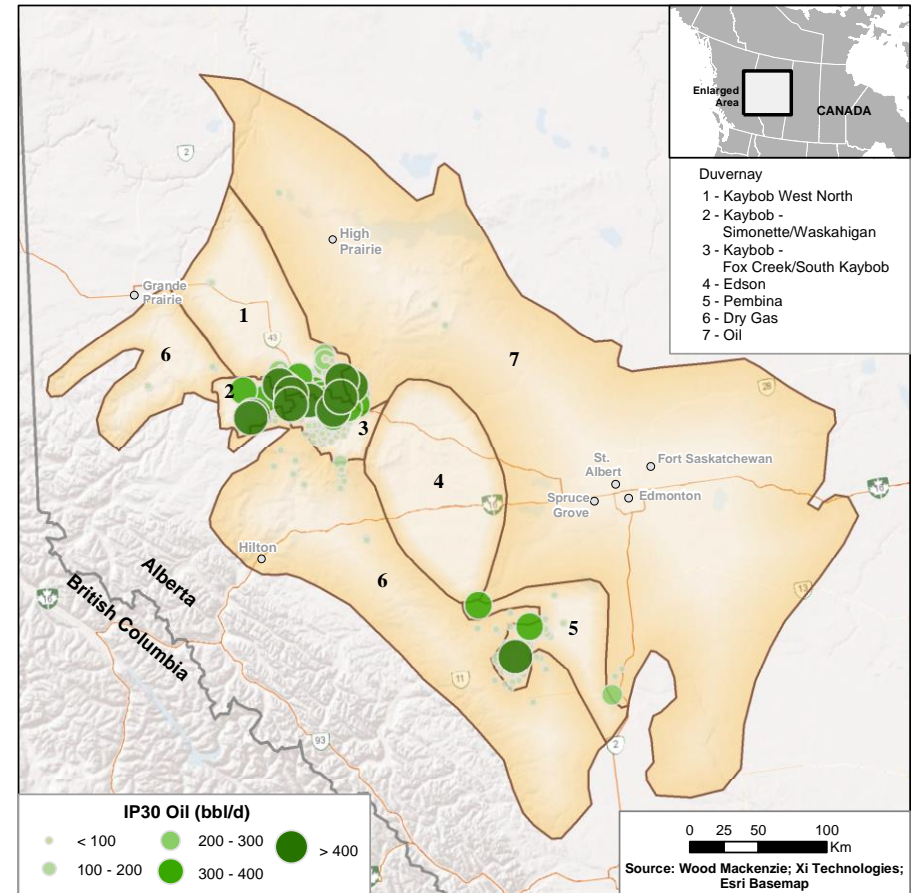
Duvernay production trends

The deep, expensive nature of the play is offset by high condensate and NGL rates

Duvernay IP30 gas rates (mmcf/d)



Duvernay IP30 wellhead liquids rates (bbl/d)

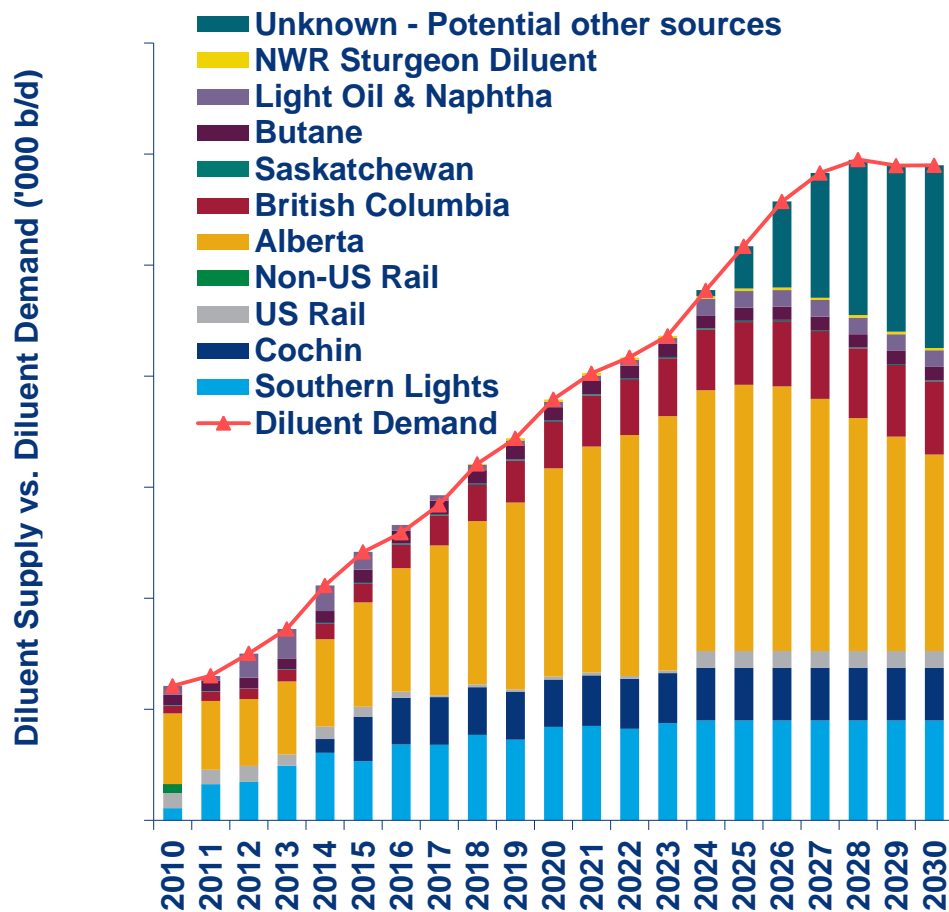




Condensate demand

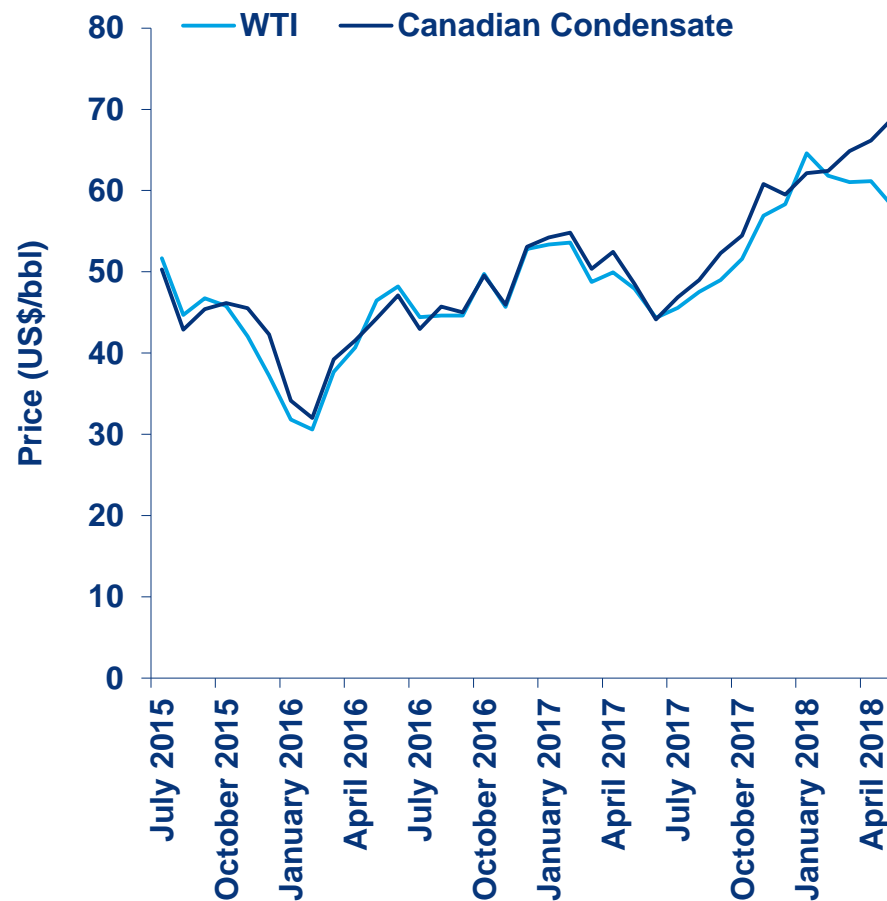
The oil sands has high demand for condensate to use as diluent, improving economics for Canadian liquids producers

WCSB Diluent Supply and Demand



Source: Wood Mackenzie, AER, BCOGC, NEB, EIA

WTI and Canadian Condensate prices



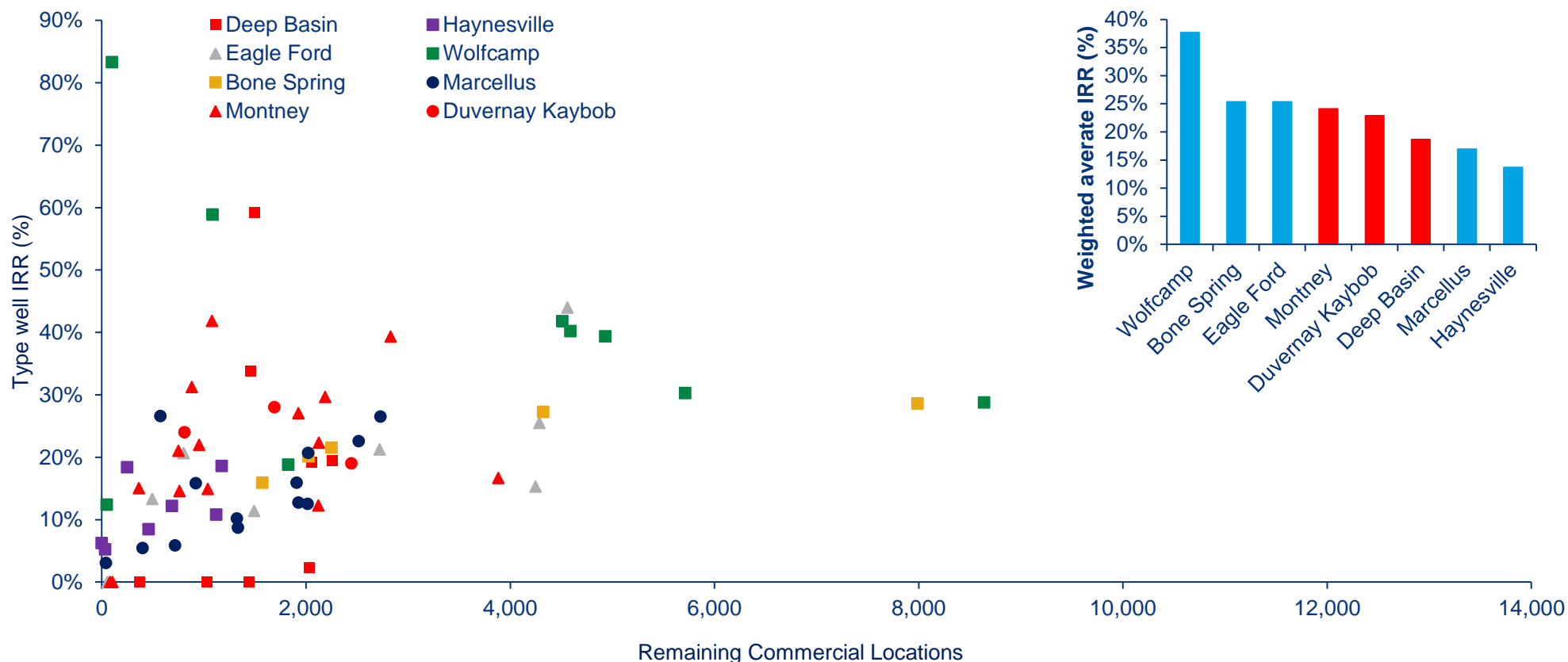
Source: Argus



Half cycle IRR comparisons

On a half cycle basis, Canadian unconventional plays are competitive with US “all-stars,” especially in gas-weighted areas

Half cycle IRR of Canadian and US sub-plays



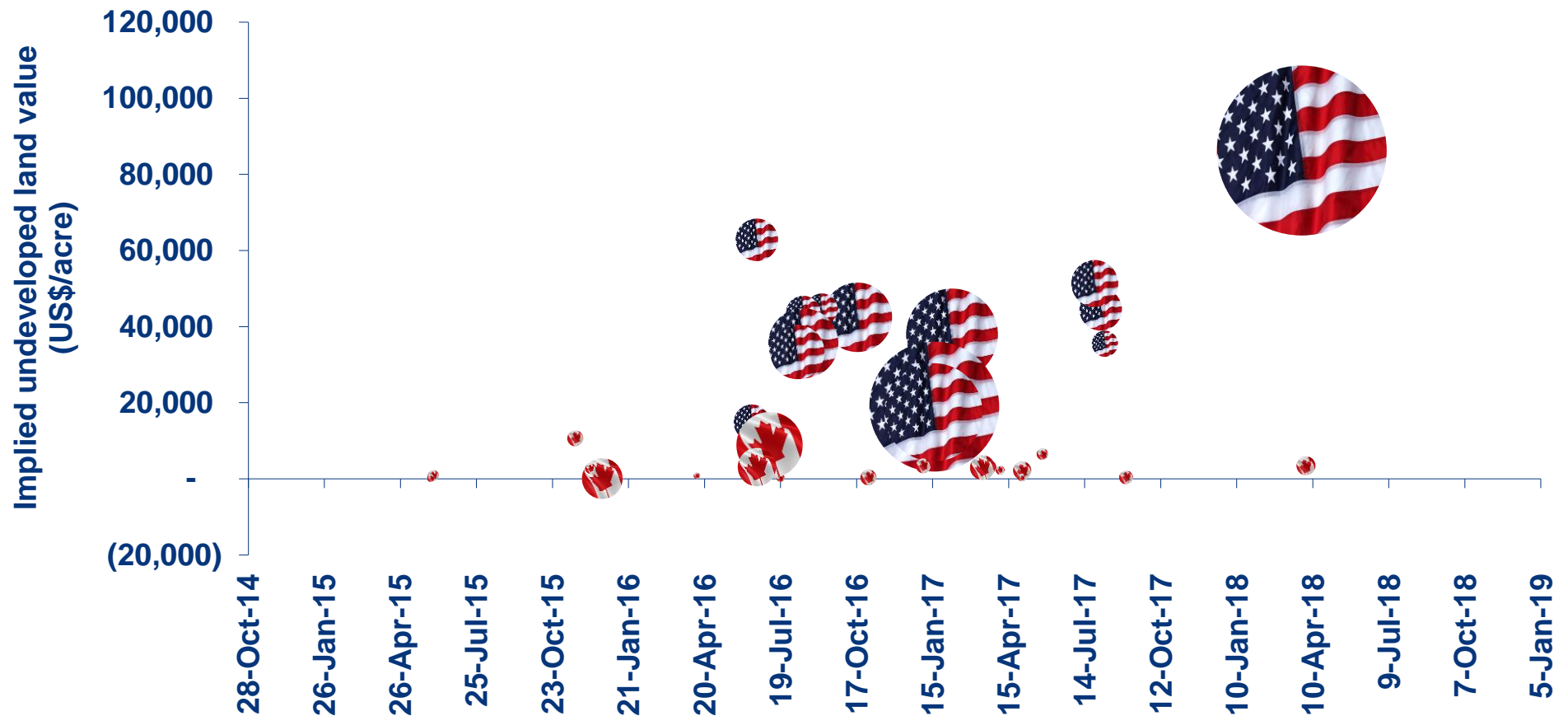
Source: Wood Mackenzie North America Company and Play Analysts Tool (NACPAT).



Implied undeveloped land cost

Looking at M& A from 2015 onwards shows a distinct premium paid for US acreage

M&A implied land cost 2015-present



Source: Wood Mackenzie M&A Service

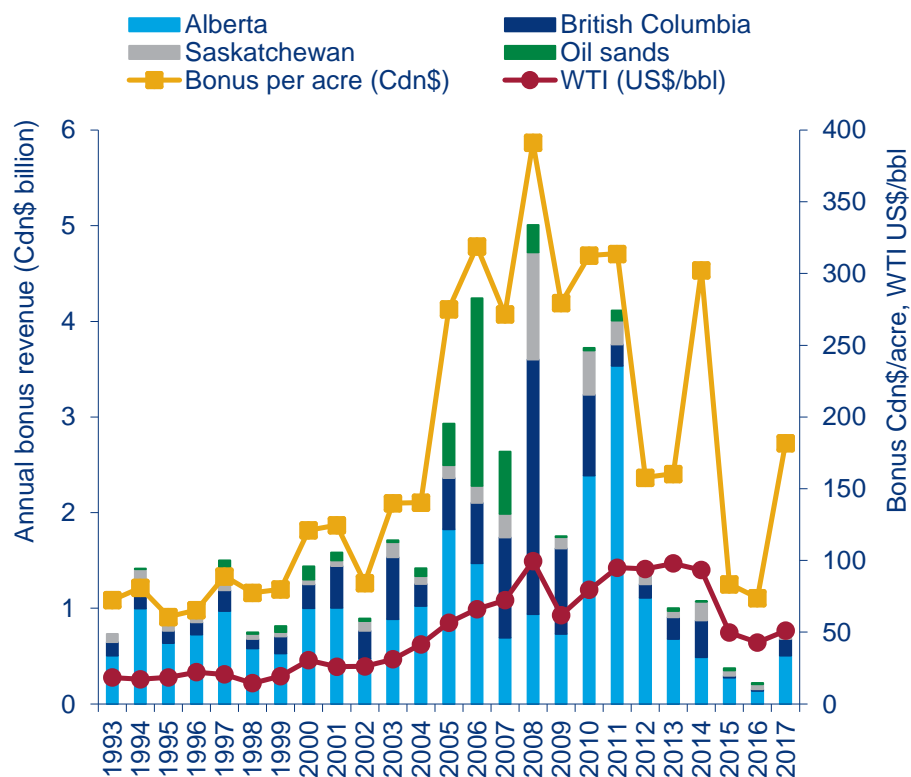
Undeveloped land value for M&A deals calculated by applying a US\$30,000 per flowing bbl and US\$3 per flowing mcf value to existing production



Canadian land sales

Low entry costs combined with lease roll-over make for favourable entry conditions

Canadian land sale trends



Source: Provincial Governments, Wood Mackenzie

2017 top Canadian lease values

Bonus Cdn\$/acre	Potential target	Operators in the area
\$6,099	Montney	Encana, Murphy
\$5,623	Montney	ARC Resources, Crew
\$5,531	Mannville	Husky, CNRL
\$5,410	Montney	Shell, Crew
\$5,063	Frobisher-Alida	Crescent Point
\$5,009	Manville	Canadian Natural Resources
\$3,984	Montney	Progress Energy, ConocoPhillips
\$3,942	Montney	Encana, ARC Resources
\$3,364	Deep Basin Charlie Lake	Tourmaline, CNRL, Harvest
\$3,287	Montney/Deep Basin	Paramount, CNRL
\$3,284	Mannville	CNRL
\$3,244	Montney/Deep Basin	Paramount, Shell
\$3,224	Montney	Crew
\$3,117	Montney	Crew, CNRL, Progress
\$3,117	Montney	Crew, CNRL, Progress
\$2,976	Manville	CNRL, Husky
\$2,881	Manville	CNRL
\$2,766	Coal bed	Ember Resources
\$2,764	Torquay	Crescent Point, TORC
\$2,733	Mannville	Ember Resources

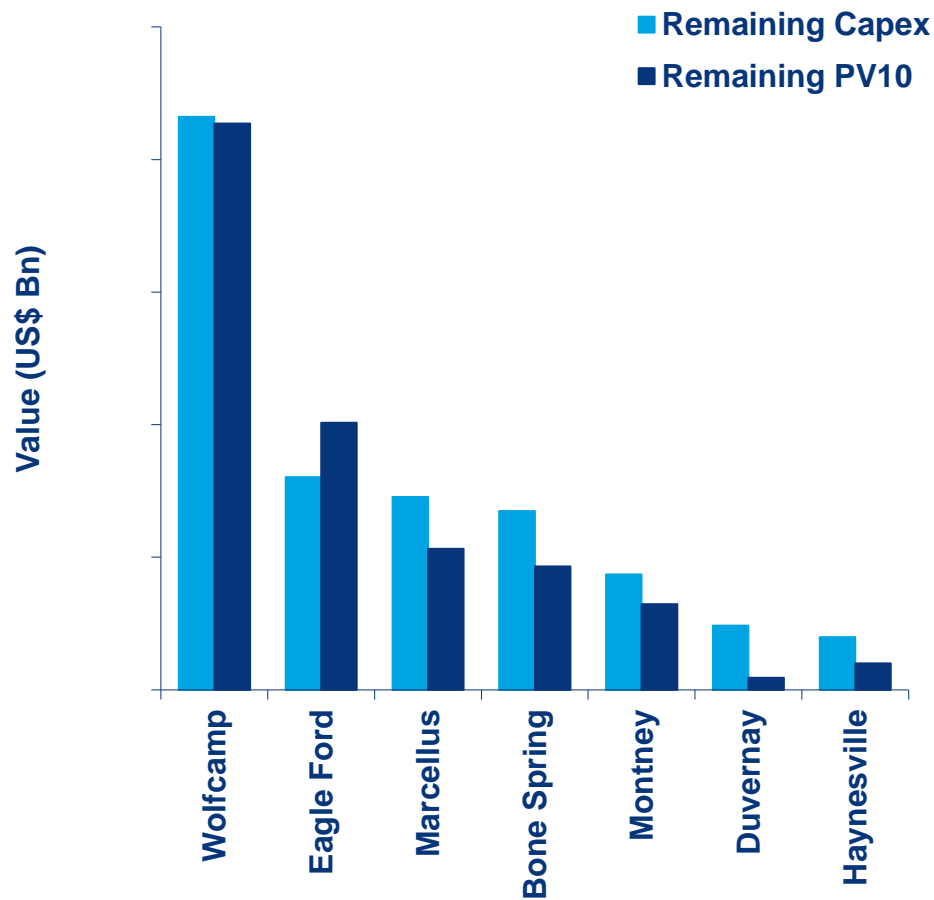
Source: Wood Mackenzie 2017 Western Canada Leasing



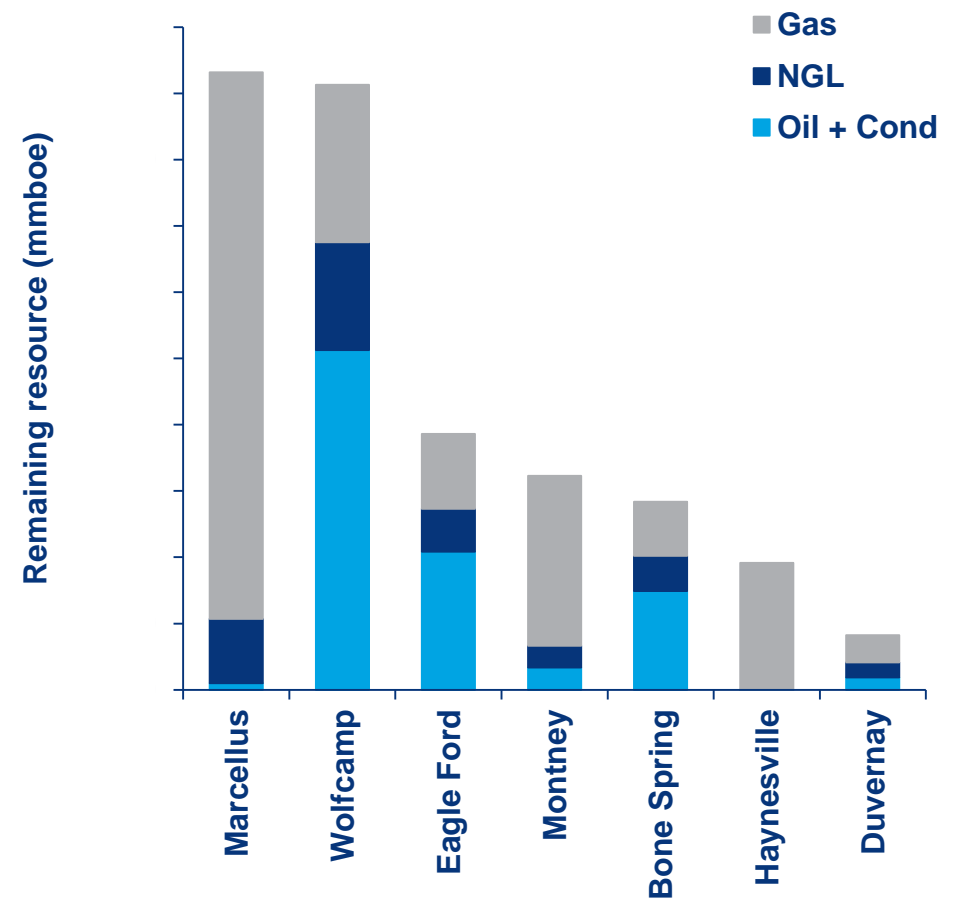
Scale is lacking

On a remaining value and reserves basis, the Montney and the Duvernay pale in comparison to US heavyweights

Remaining PV10 and Capex



Remaining risked commercial resource

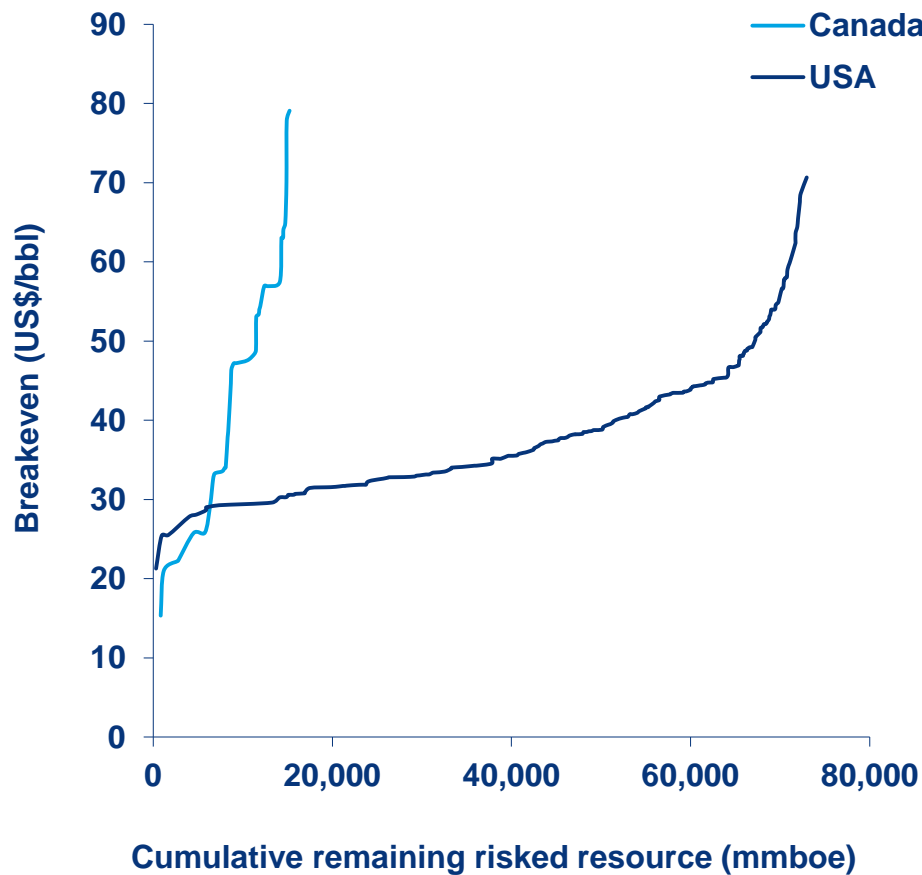




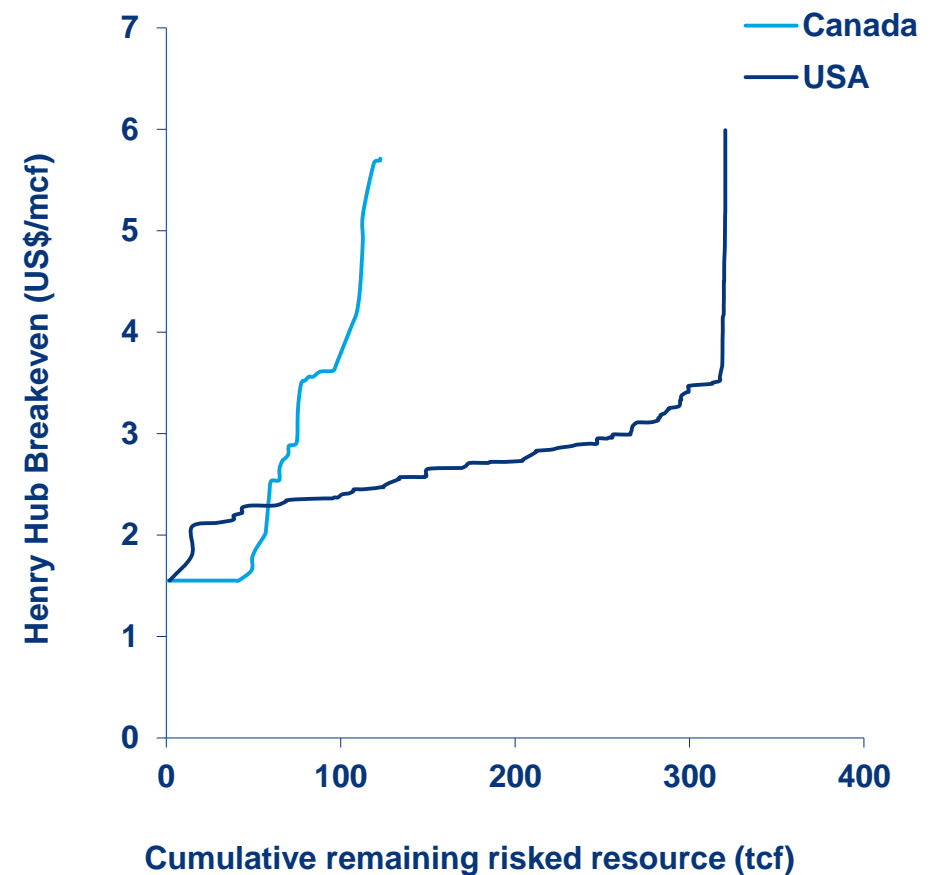
...but economics aren't

On a company breakeven basis, Canada is actually more competitive at the bottom of the cost curve

Company WTI breakeven



Company Henry Hub breakeven





Development difficulties

The market is constrained

- Liquids pricing is strongly correlated to oil sands growth and demand
 - » Technological efforts focussed on moving away from diluent. Growth is currently constrained by infrastructure and economics
- AECO price
 - » The WCSB gas market is incredibly constrained, resulting in wide gas price differentials
- Strict and evolving regulatory structure
- Challenging, heterogeneous geology



Key takeaways

Canada is competitive, but some challenges remain

- What are the Montney and the Duvernay?
 - » The Montney is Canada's most prolific play. A plethora of private and public operators are developing the liquids-rich gas with favourable economics
 - » The Duvernay is much more early stage and more liquids weighted. Well capitalised majors are leaders, while new development areas have seen smaller private and public companies begin to develop
- What do the economics look like compared to major US plays?
 - » Canadian economics are favourable compared to their US counterparts
 - » Scale is a large differentiator and largely explains investment trends
- How do entry costs compare?
 - » Entry costs in Canada are an order of magnitude lower than the US, with multiple leases beginning to return back to the crown to be re-auctioned in the next few years
- What are some constraints?
 - » Infrastructure constraints are key barriers to development both on the gas and liquids side



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Biography

Stephen joined Wood Mackenzie in April 2016. He is responsible for providing financial asset valuation and objective commercial analysis on company and play activity in Canada, with a focus on the oil sands and unconventional developments. He has been frequently quoted in national publications, including the National Post and Bloomberg, for his insight on Canadian energy issues and has appeared on Bloomberg TV Canada as a subject matter expert.

Prior to joining Wood Mackenzie, Stephen worked as a subsurface engineer for a major Canadian oil sands producer, gaining comprehensive experience in production and reservoir engineering in the oil sands. Further, he also worked extensively in technology development, driving ideas from concept to commercial application.

Stephen has a degree in Mechanical Engineering with distinction from the University of Alberta and is a registered professional engineer with APEGA, the Association of Professional Engineers and Geoscientists of Alberta. He is also a CFA Level III candidate.

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