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# Canadian Shale Gas: Challenges and Canadian Natural Gas Deliverability 2010-2012

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Supply Analyst

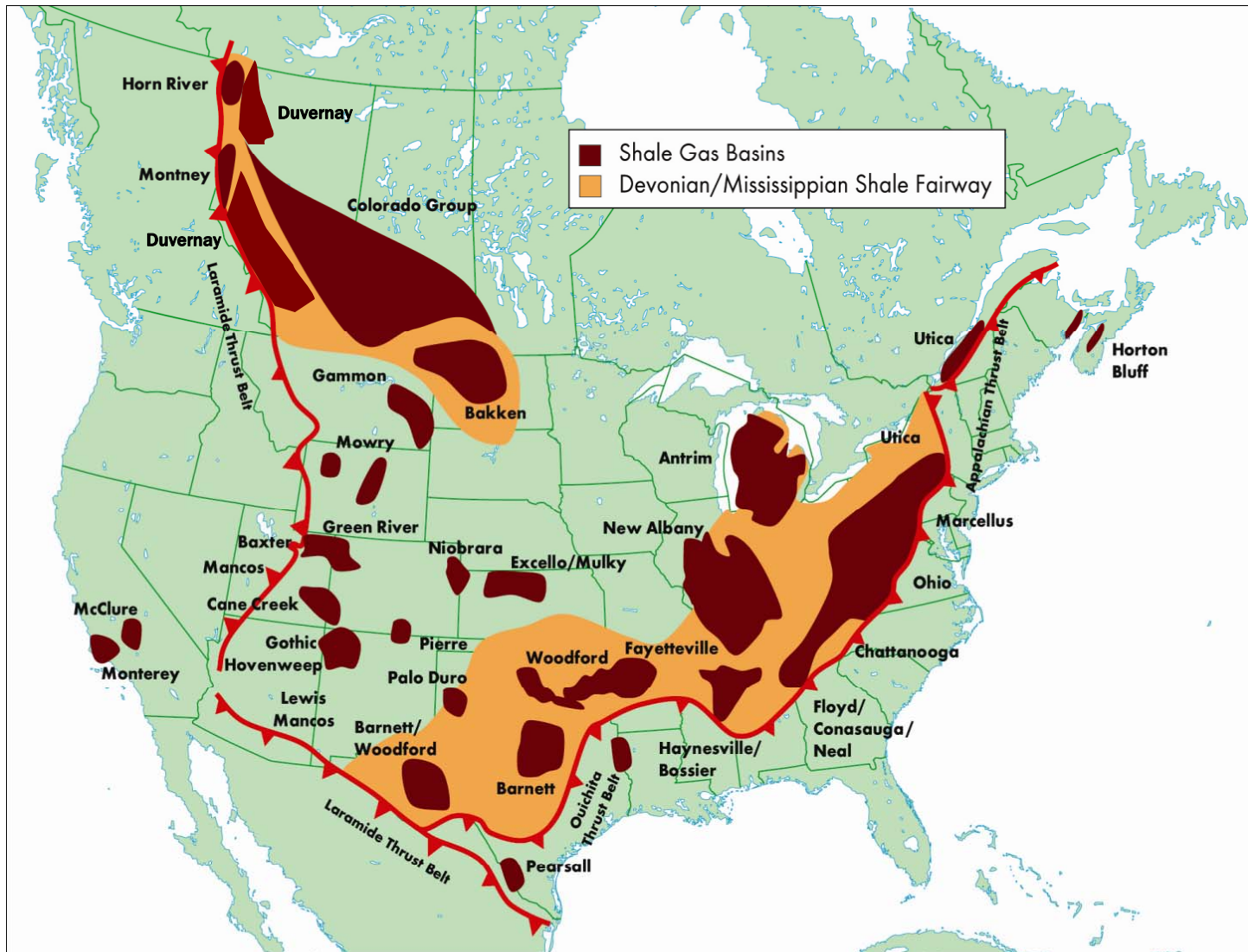
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March 31, 2010

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# North American Shale Plays

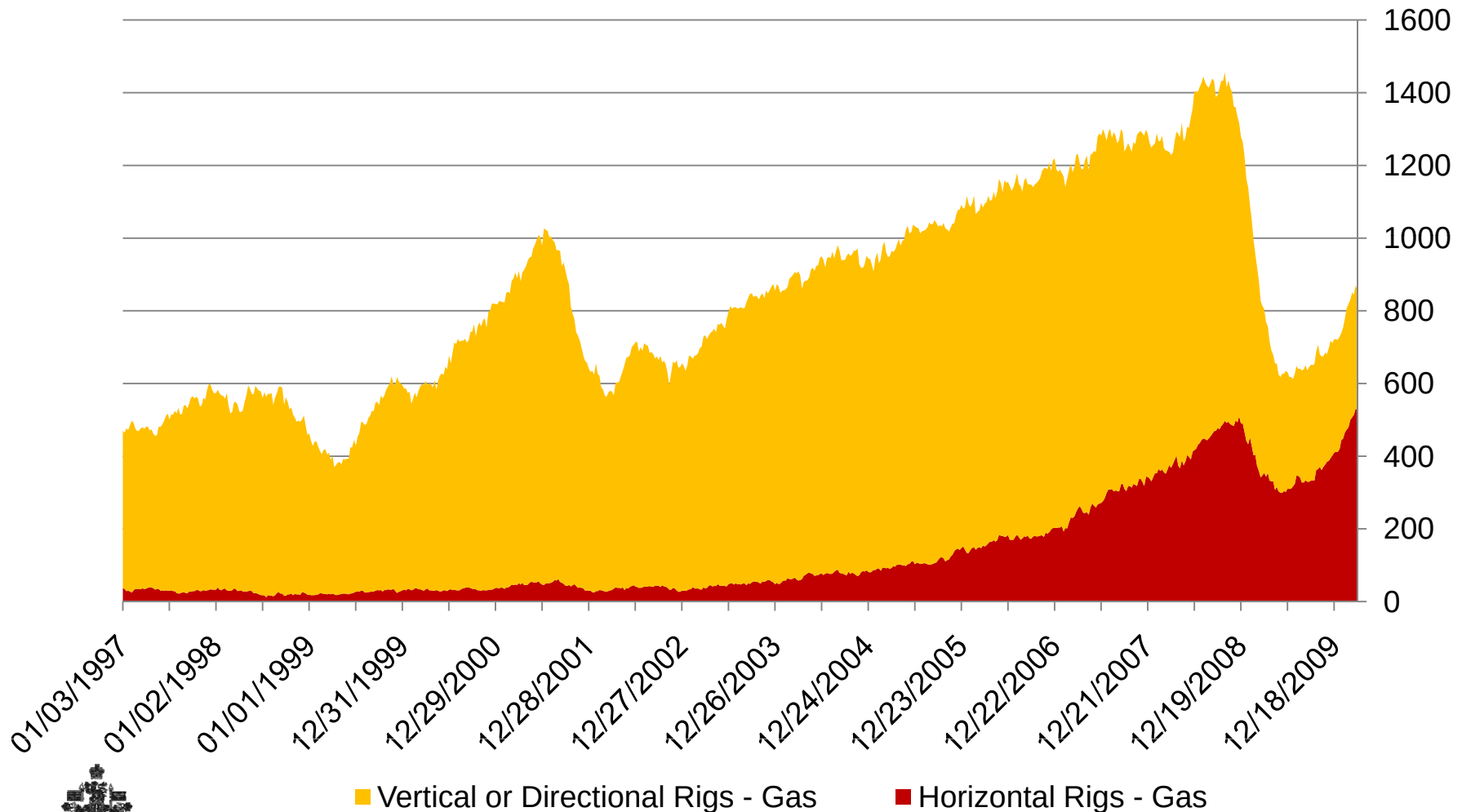


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# U.S. Lower-48 Rig Activity



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■ Vertical or Directional Rigs - Gas

■ Horizontal Rigs - Gas

Source: Smith **Canada**



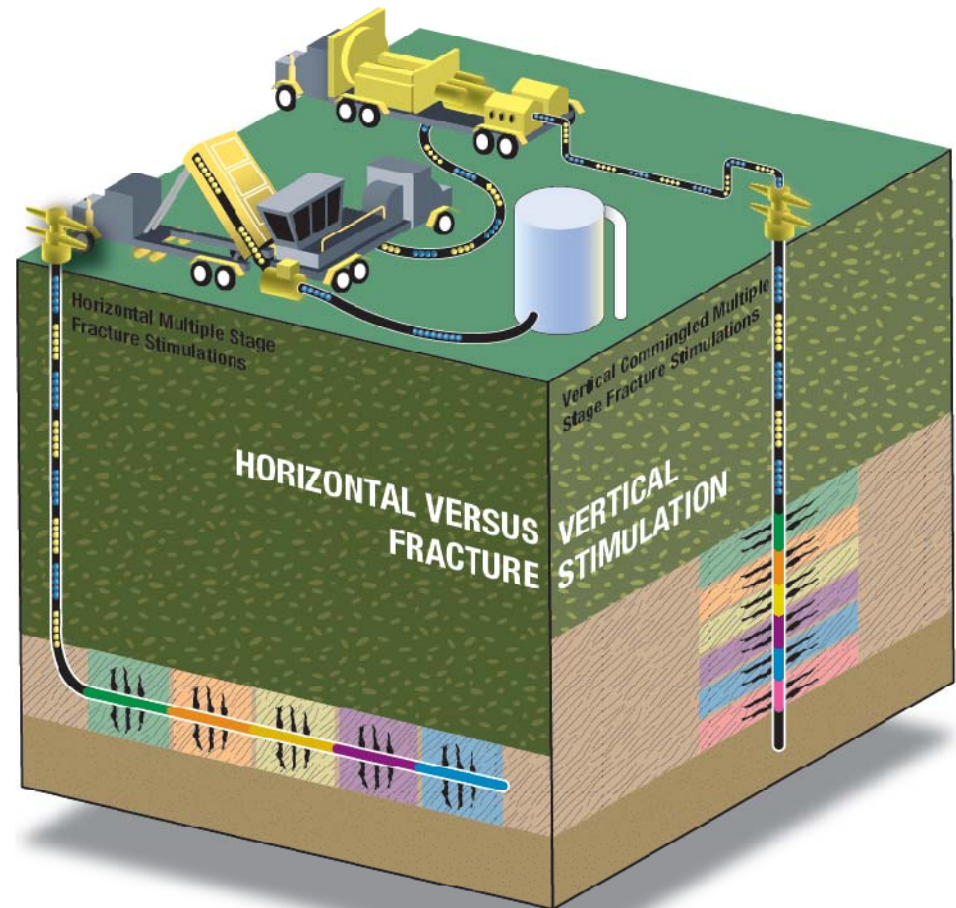
# Shale Gas Basics

- Major components:
  - clay, silt, silica, calcite/dolomite, organic matter
- One shale is not necessarily like another:

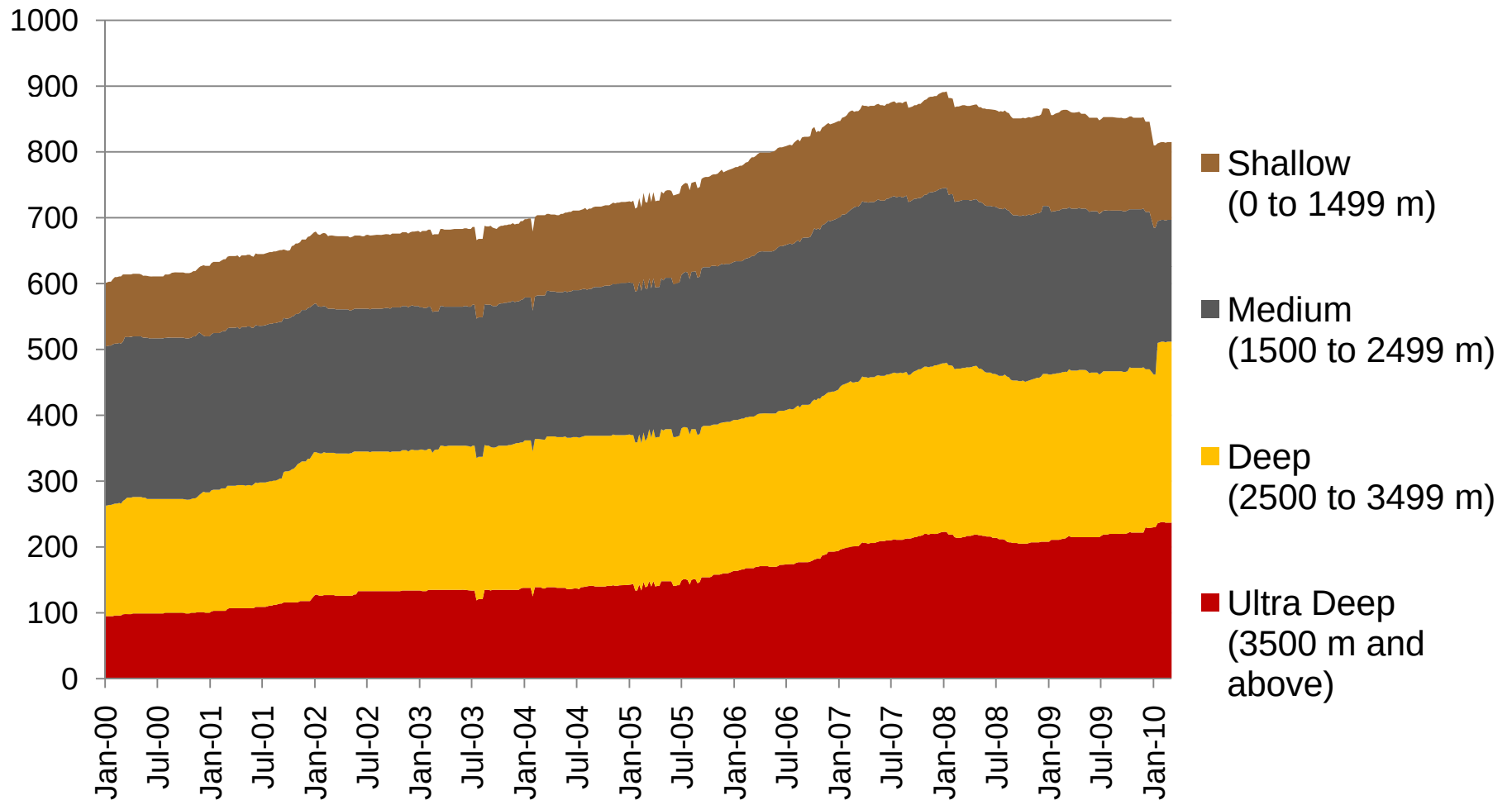


# Horizontal Drilling and Multi-stage Hydraulic Fracturing

- Drilling: gone from months to weeks
- Fracturing:
  - Frac fluid
  - Proppant
  - Service rigs



# Available Canadian Rigs by Depth Rating



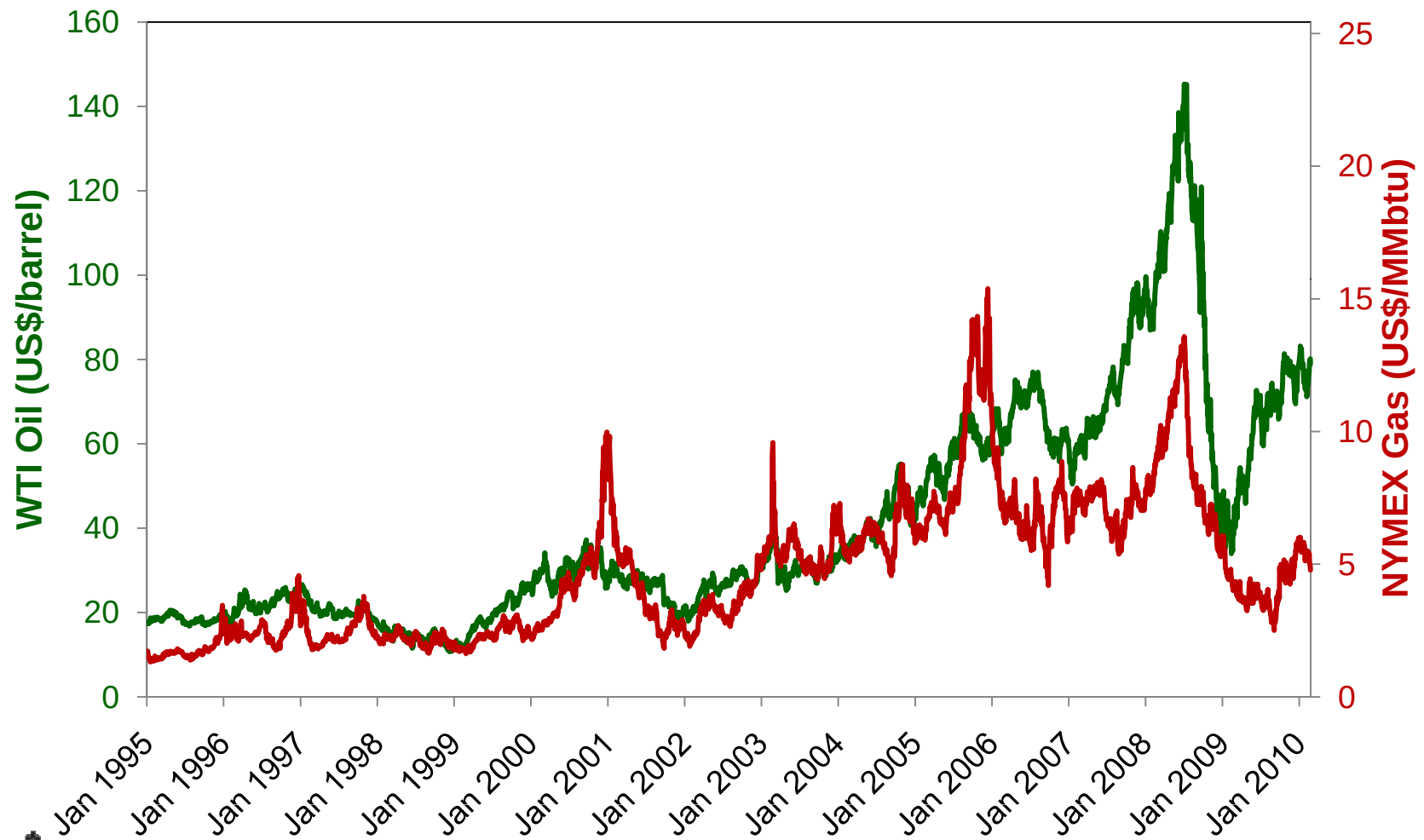
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Source: Nickle's rig data

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# Natural Gas and Oil Prices

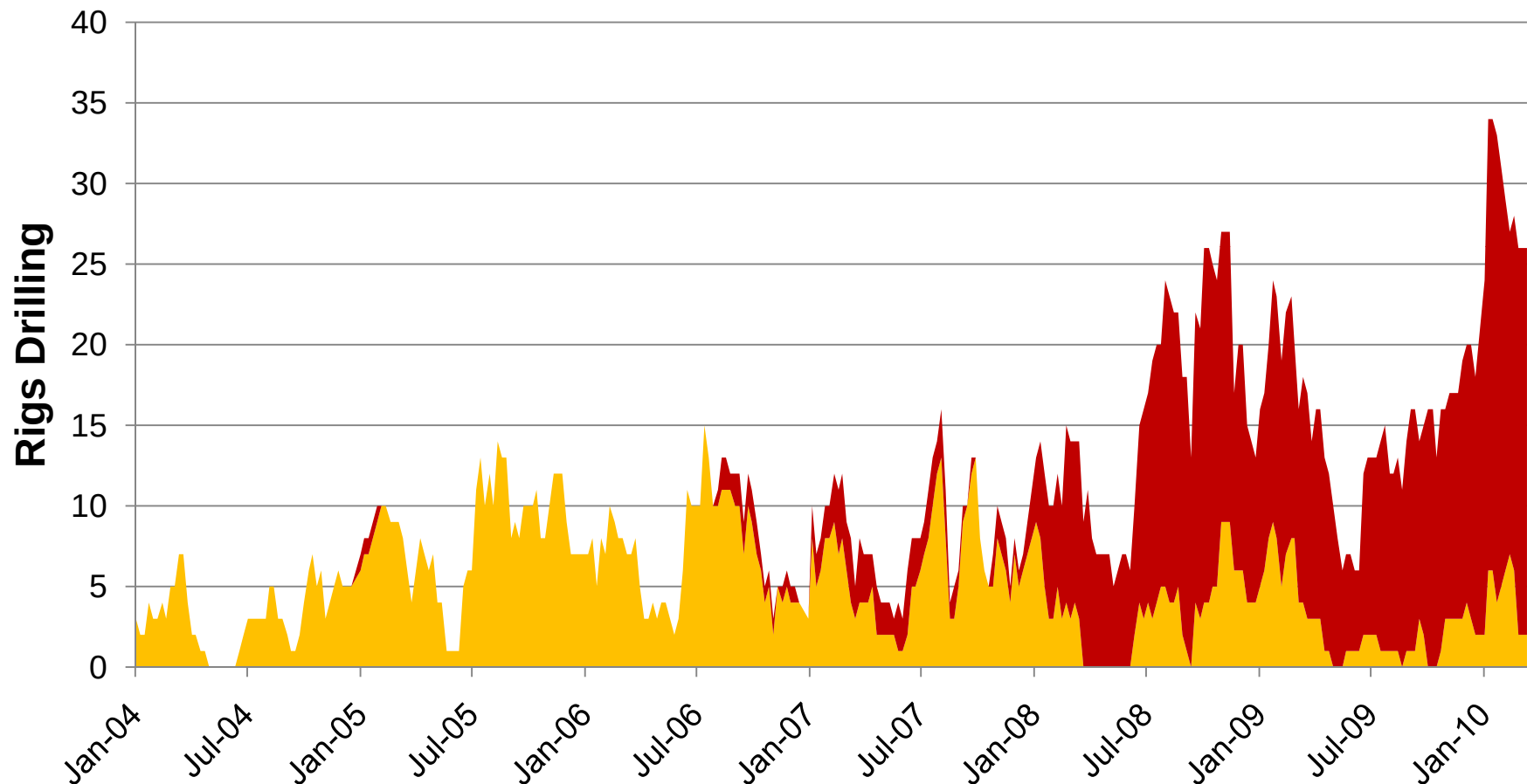


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# B.C. Montney Shale Fairway Rig Activity



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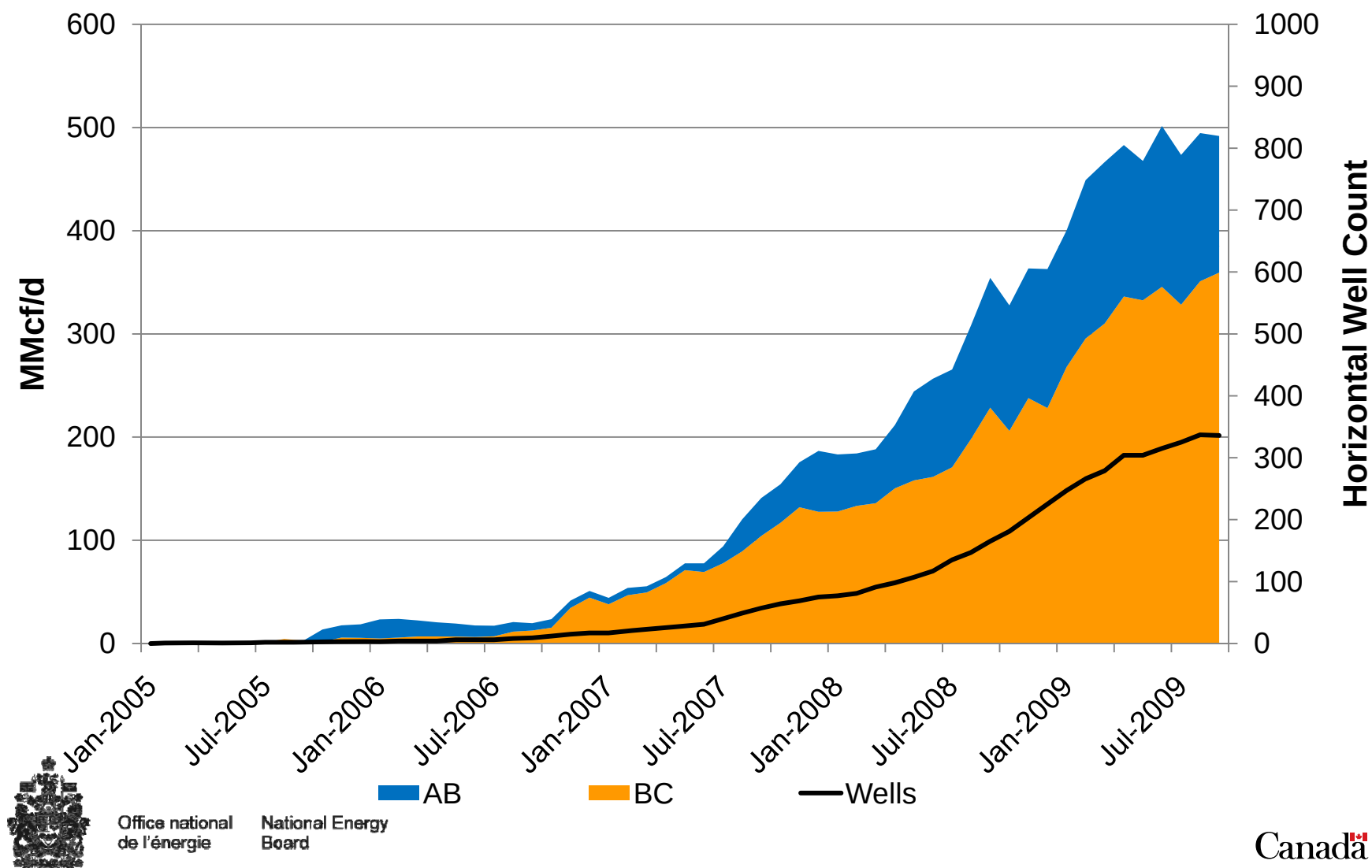
■ Horizontal

■ Vertical or Directional

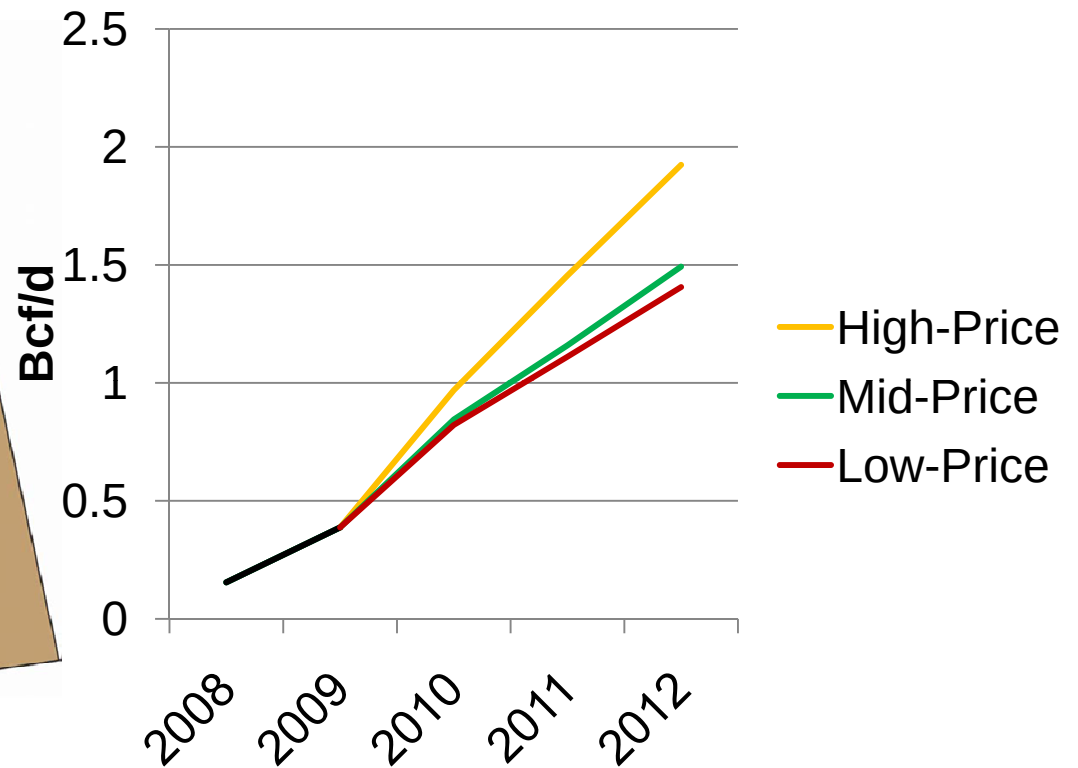
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# Montney “Shale” Historical Raw Production

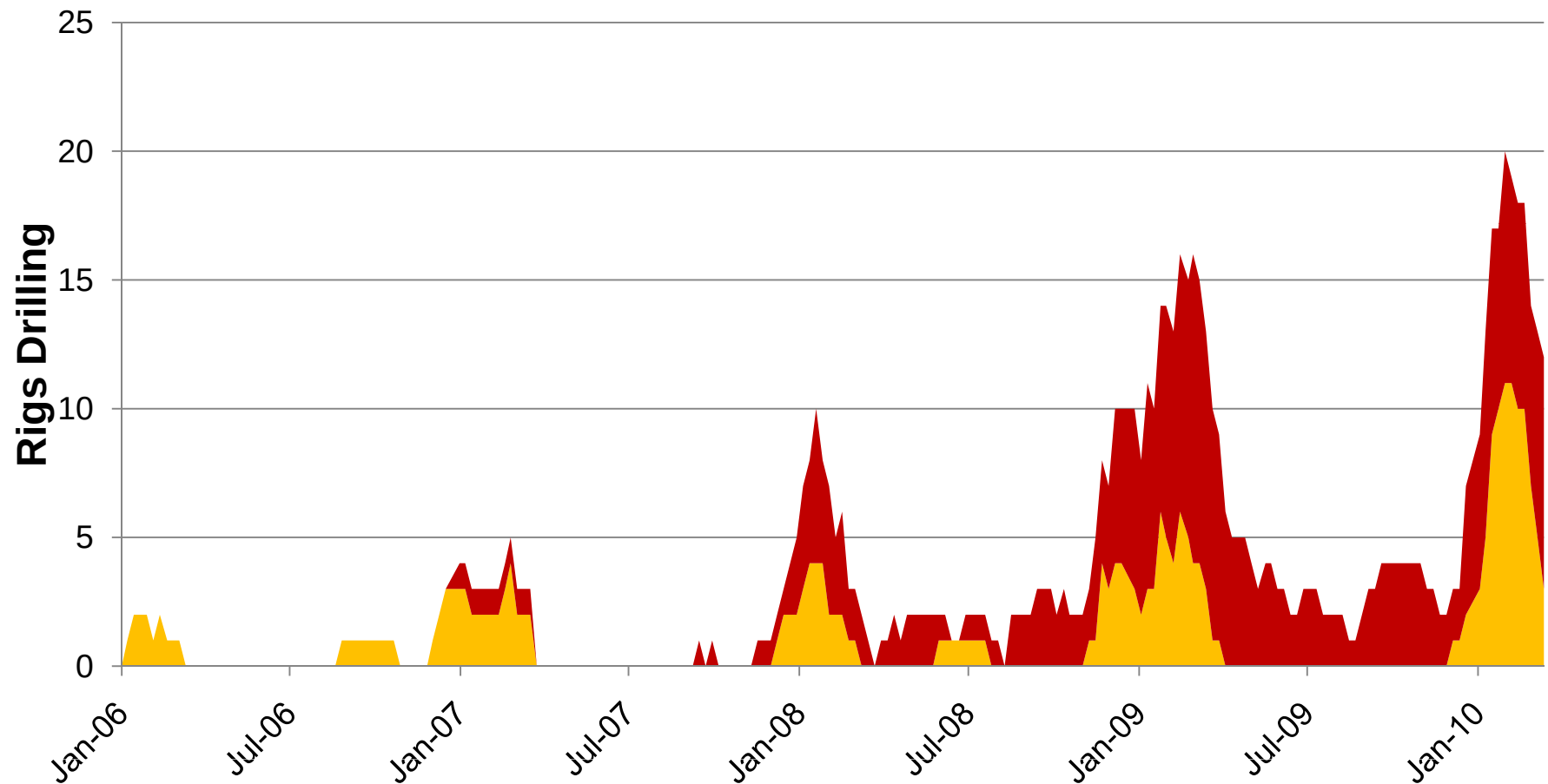


# Montney Deliverability



| Price         | 2009 | low  |      |      | mid  |      |      | high |      |      |
|---------------|------|------|------|------|------|------|------|------|------|------|
|               |      | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 |
| US\$/MMbtu    | 3.70 | 4.25 | 4.75 | 5.25 | 5.50 | 6.00 | 6.75 | 6.50 | 7.00 | 7.75 |
| Wells drilled | 150  | 190  | 235  | 255  | 210  | 250  | 290  | 320  | 360  | 400  |

# Horn River Basin Rig Activity



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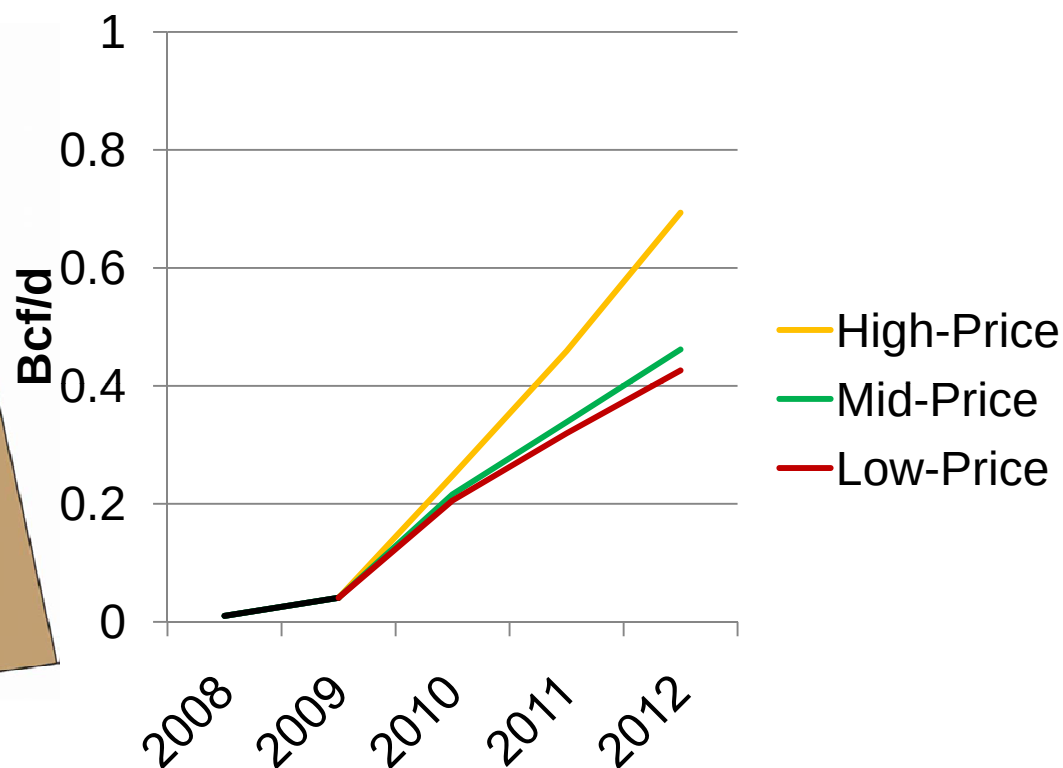
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■ Horizontal

■ Vertical or Directional

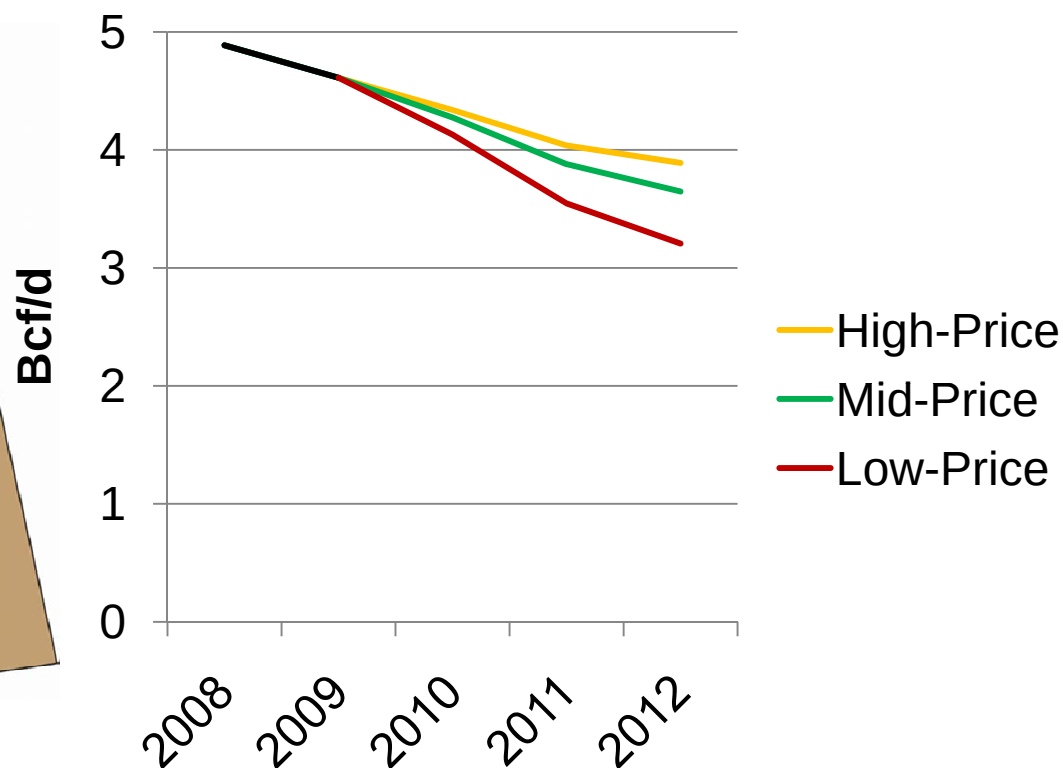
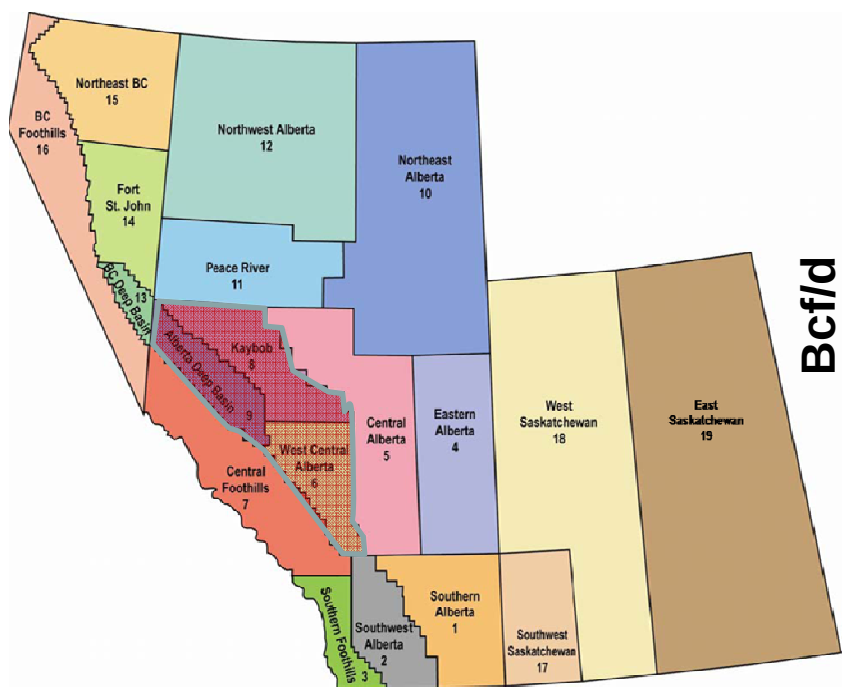
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# Horn River Basin Deliverability



| Price         | 2009 | low  |      |      | mid  |      |      | high |      |      |
|---------------|------|------|------|------|------|------|------|------|------|------|
|               |      | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 |
| US\$/MMbtu    | 3.70 | 4.25 | 4.75 | 5.25 | 5.50 | 6.00 | 6.75 | 6.50 | 7.00 | 7.75 |
| Wells drilled | 30   | 65   | 75   | 85   | 70   | 80   | 95   | 85   | 125  | 160  |

# Deep Basin, Kaybob & West-Central Alberta



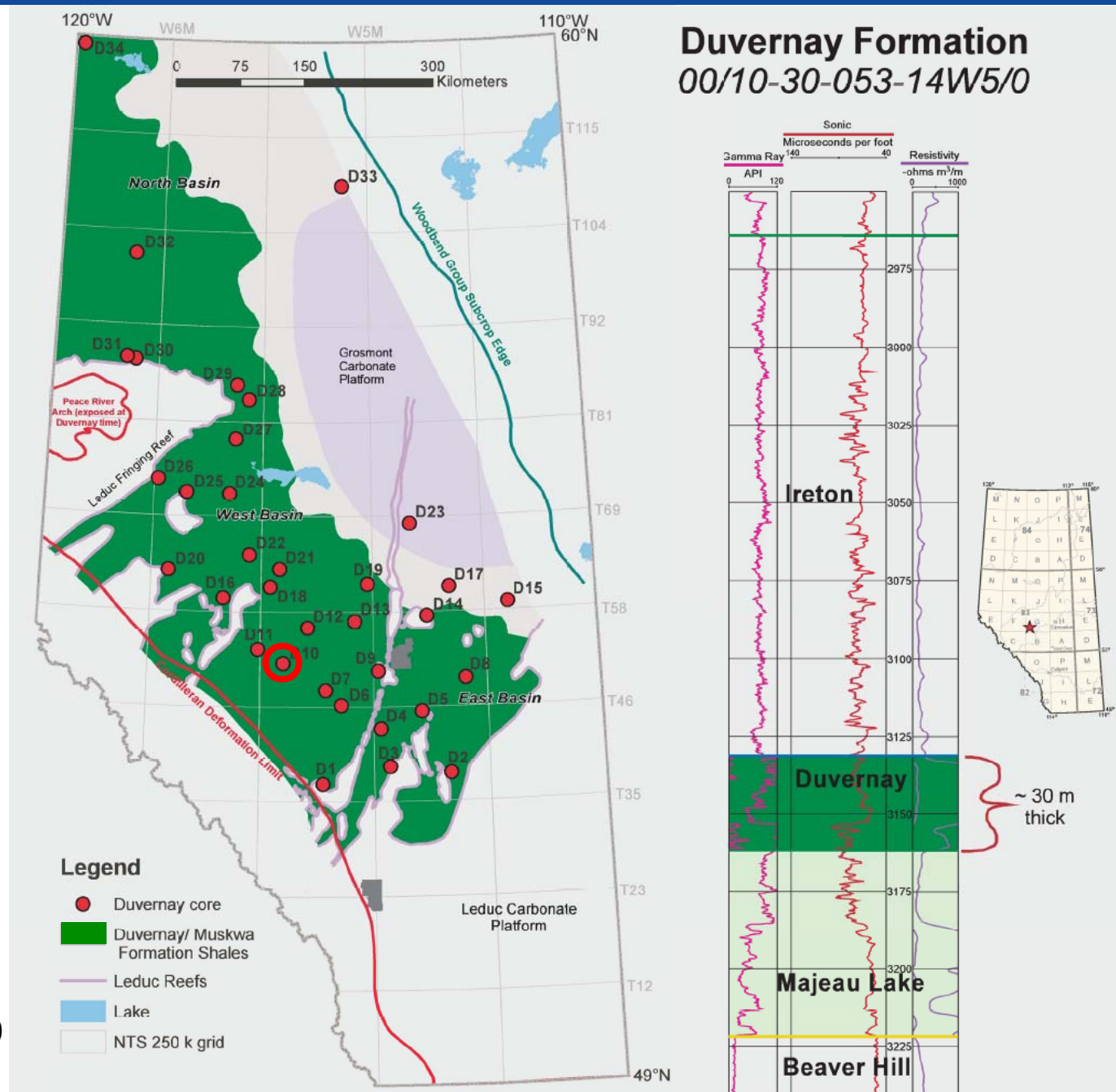
| Price         | 2009 | low  |      |      | mid  |      |      | high |      |      |
|---------------|------|------|------|------|------|------|------|------|------|------|
|               |      | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 | 2010 | 2011 | 2012 |
| US\$/MMbtu    | 3.70 | 4.25 | 4.75 | 5.25 | 5.50 | 6.00 | 6.75 | 6.50 | 7.00 | 7.75 |
| Wells drilled |      | 617  | 544  | 573  | 965  | 981  | 1009 | 1064 | 1123 | 1177 |



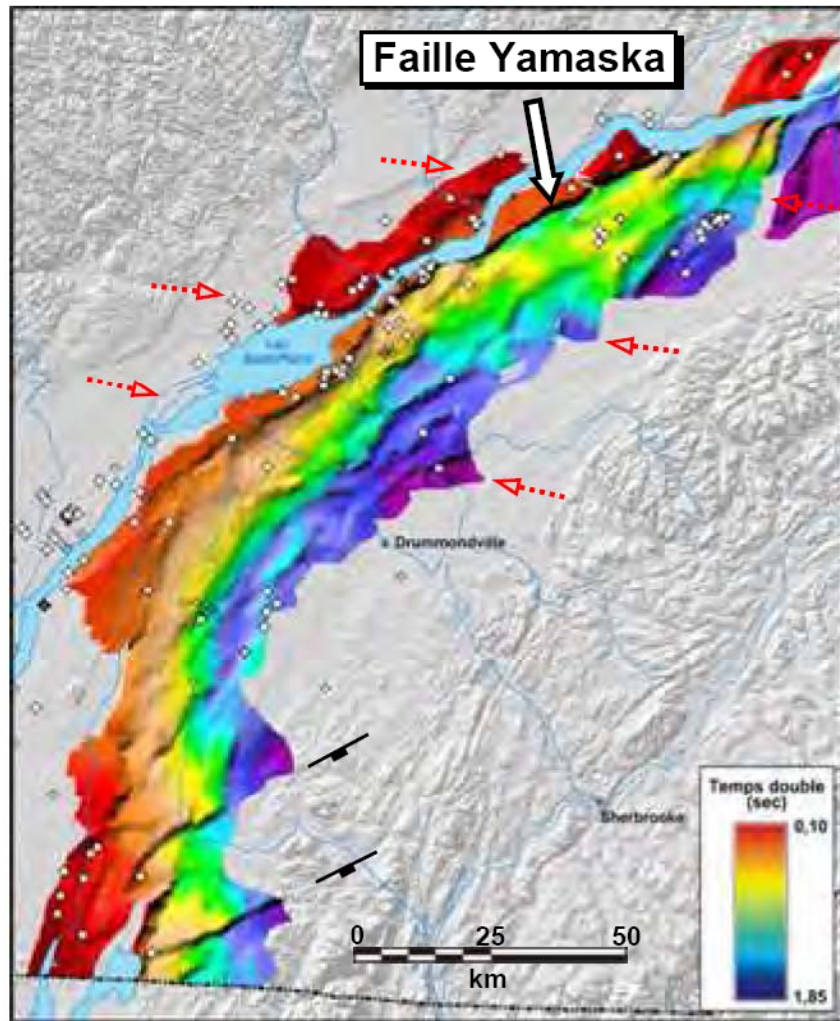
# Duvernay Shale



From AGS, 2009



# Quebec

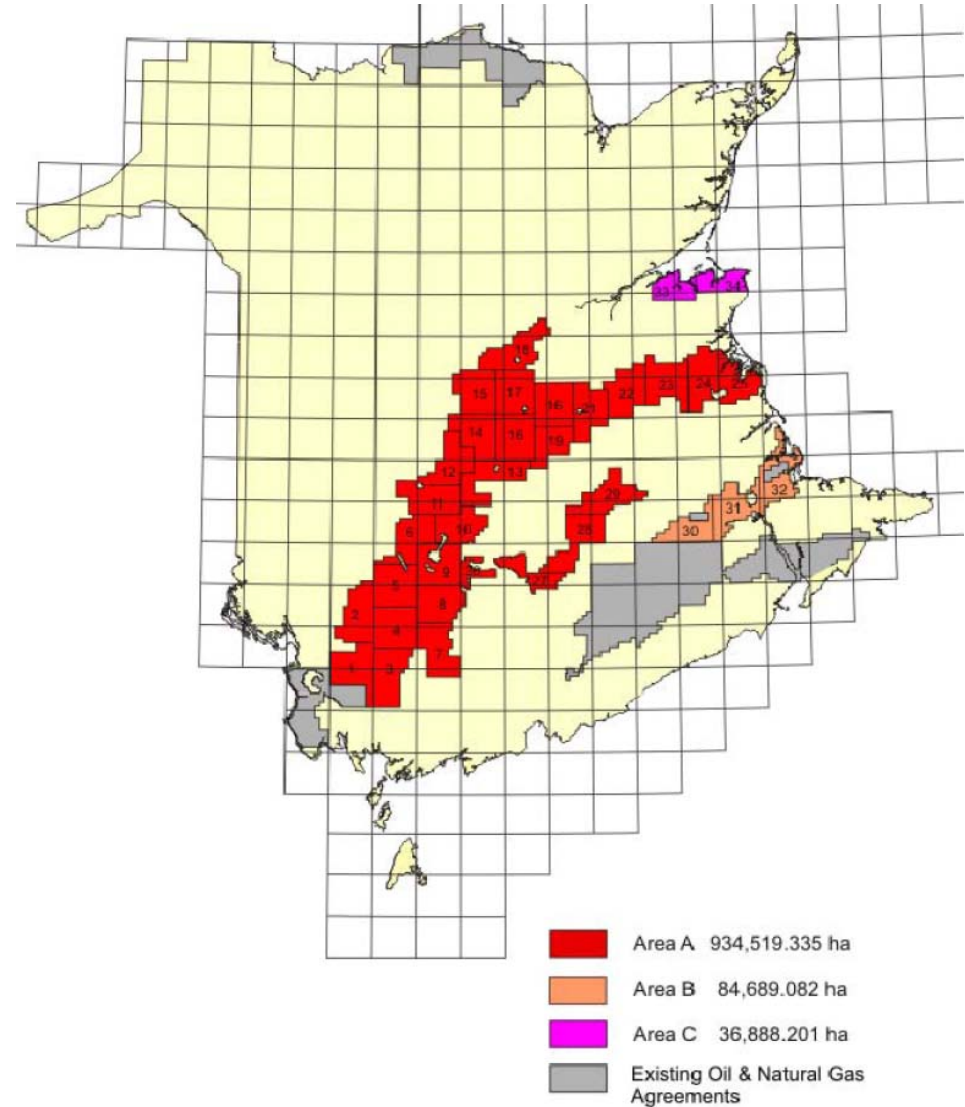


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From Thériault, 2009

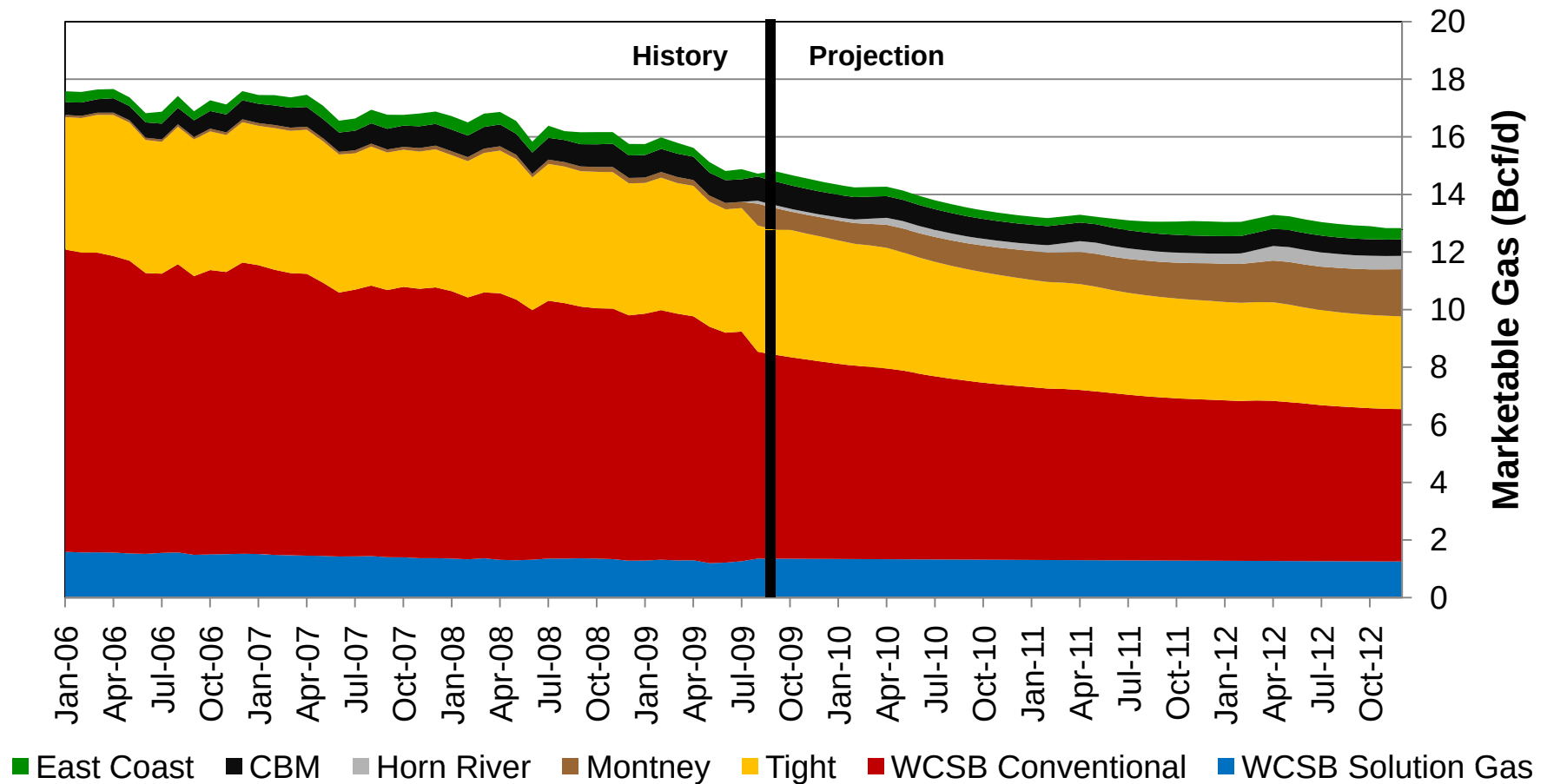
# New Brunswick



From N.B. Dept. of  
Natural Resources

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# Canadian Short-Term Deliverability Mid-case

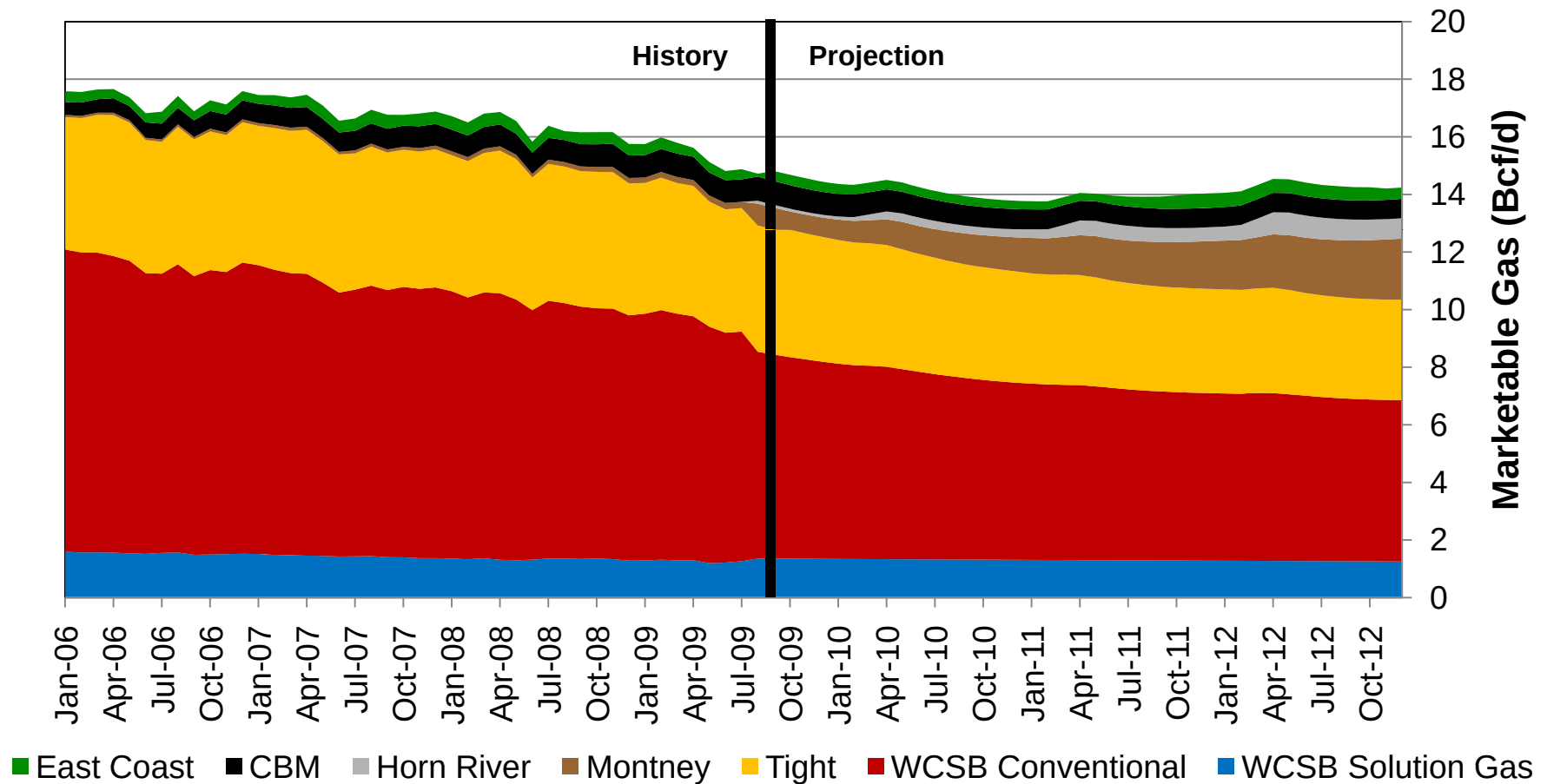


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# Canadian Short-Term Deliverability High-case



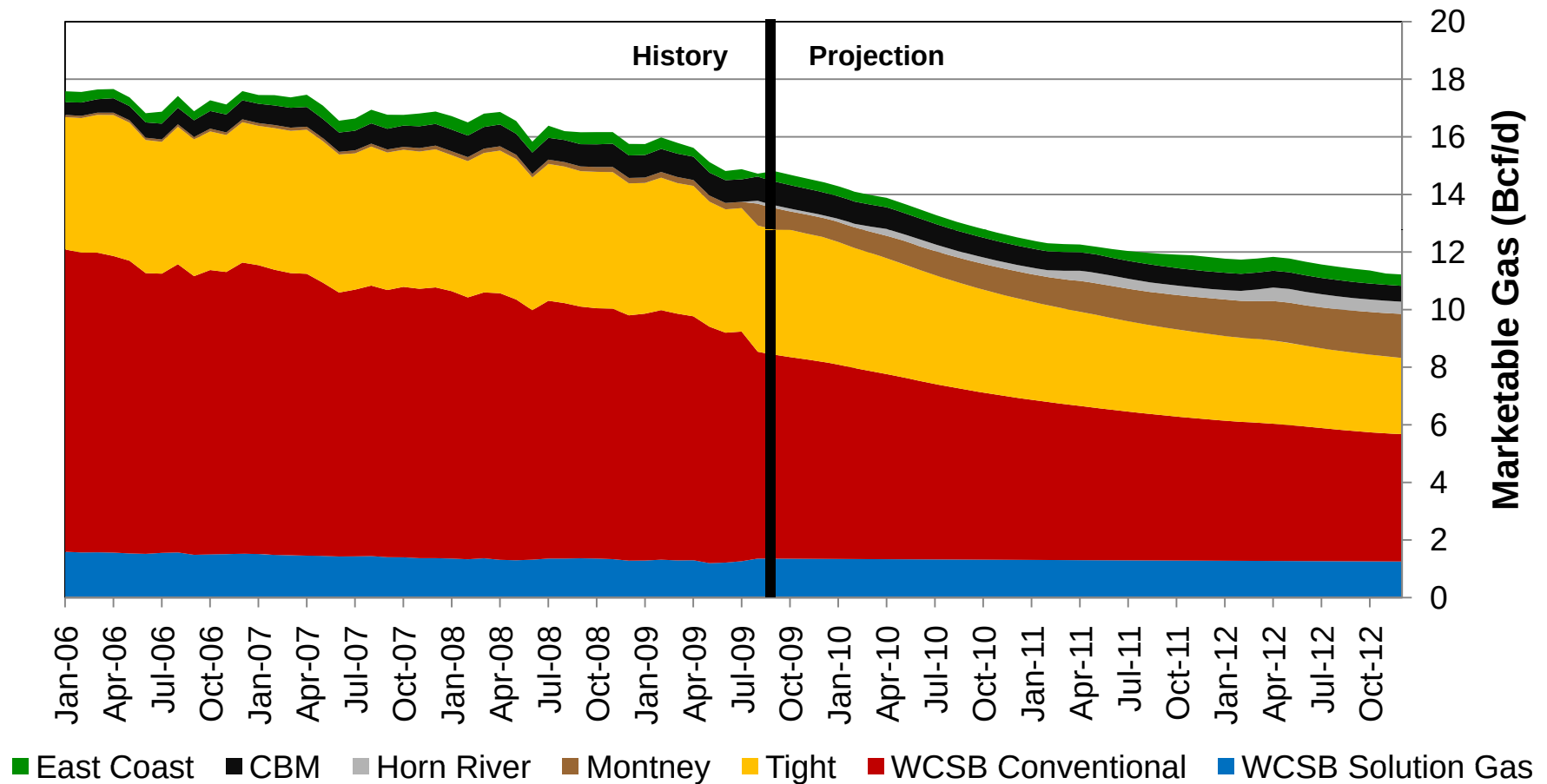
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# Canadian Short-Term Deliverability

## Low-case

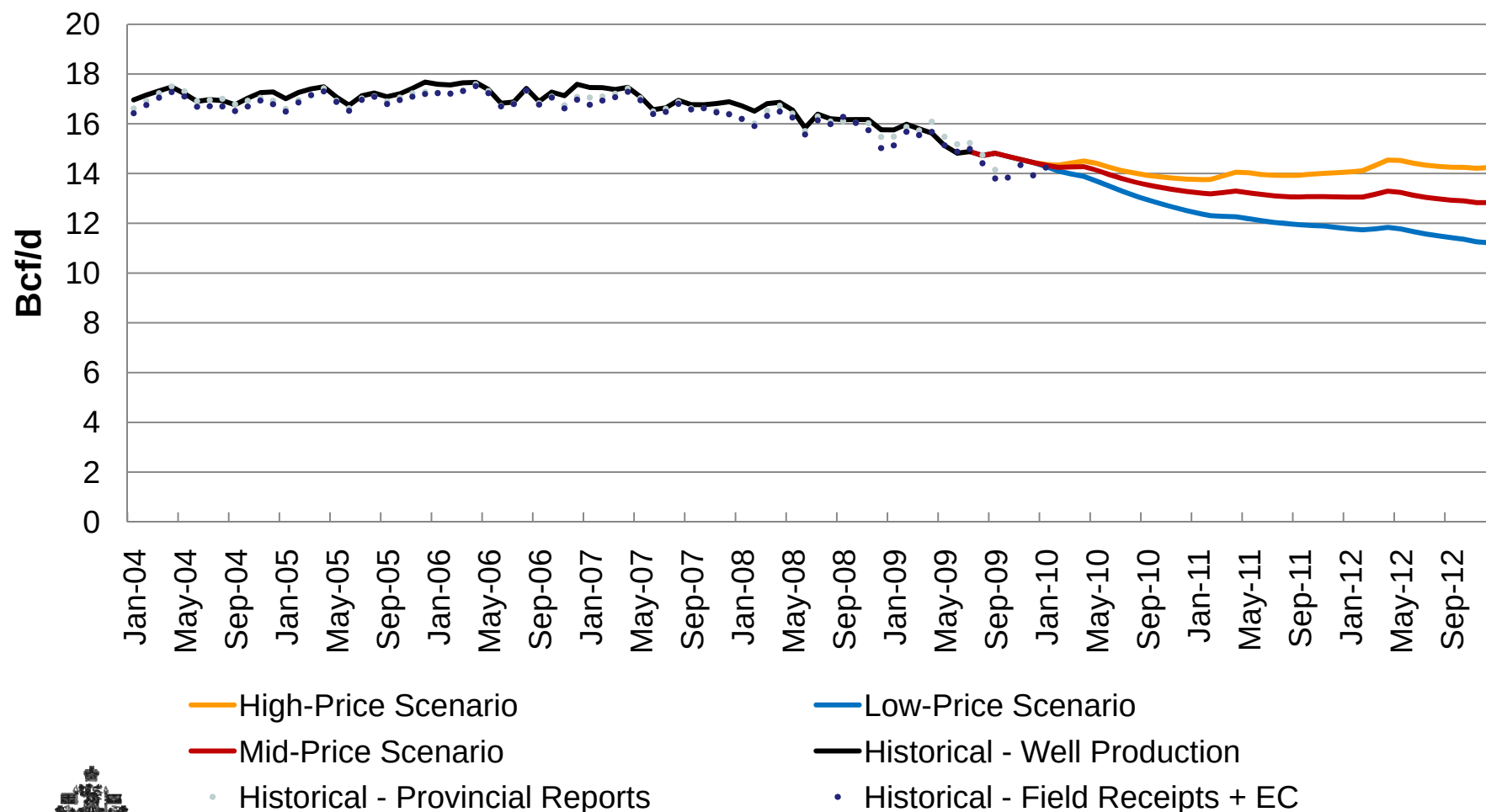


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# Canadian Natural Gas Deliverability 2010-2012



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# Conclusions

- Development of shale gas is going to have its share of challenges, but...
- Industry has shown signs of adapting
- Shale deliverability is expected to rise towards 2012 in all three price scenarios, but...
- Total Canadian deliverability declines in the Low and Mid cases while only the High case shows growth



# Thanks for the free lunch!

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**“Canadian Short-term Deliverability 2010-2012”  
and other energy reports can be found at:**

[www.neb-one.gc.ca](http://www.neb-one.gc.ca)



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