

BC Gas Supply

***BC Natural Gas Symposium
Canadian Institute
Vancouver***

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www.forwardenergy.ca
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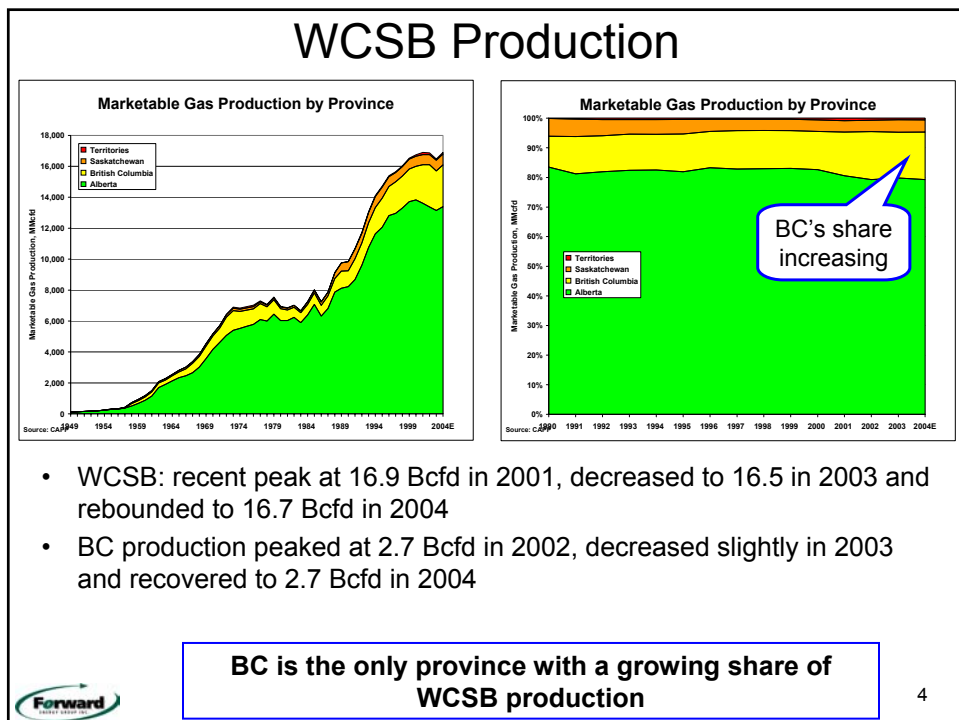
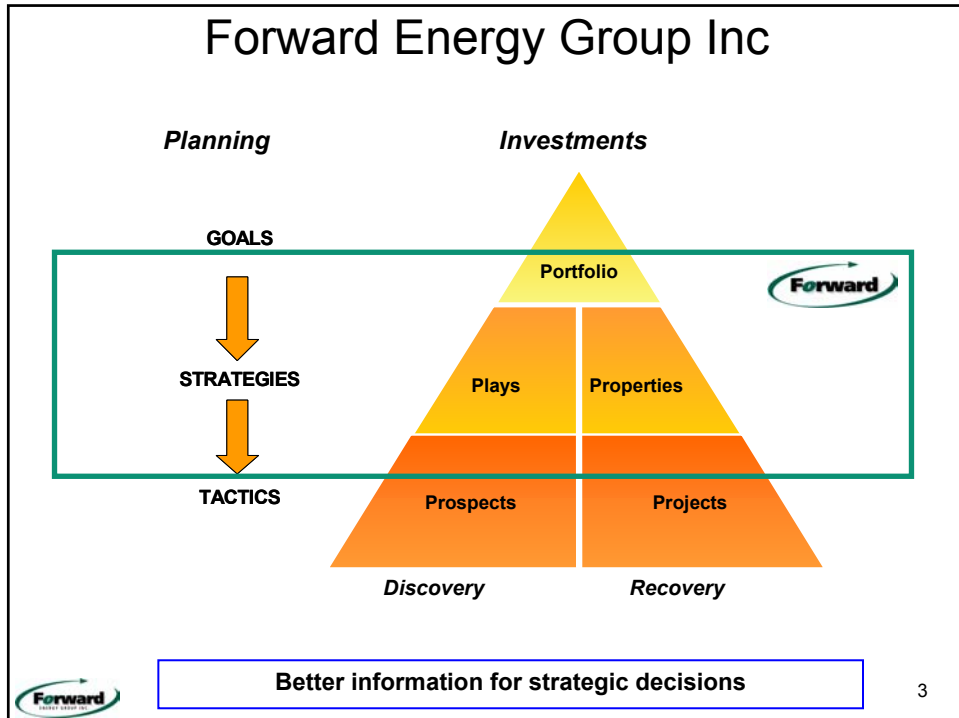
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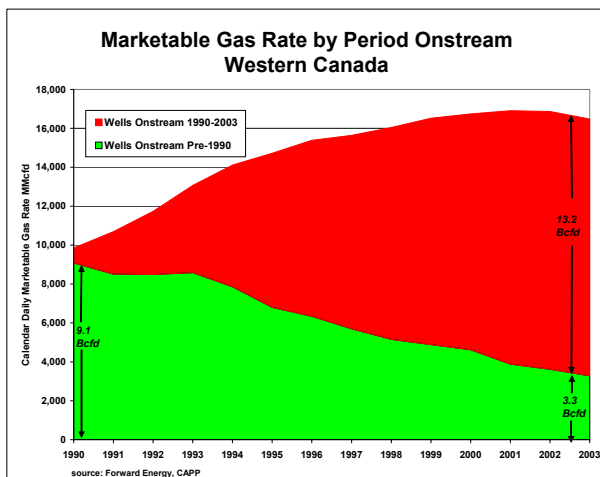
- Introduction
- The challenge to sustain supply profitably; a WCSB perspective
- BC's gas supply growth
- Operators – Who is developing the supply?
- Supply Sources
 - Where is new supply coming from?
 - What technologies are important for the future?
- Supply Costs – competition for capital
- Summary



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Supply Challenge: Sustain Production



- Total production flat at 16.7 Bcfd \pm 0.2
- Decline in production from connected wells
- Rate additions from new wells onstream provide growth
- Wells onstream since 1989 produce 80% of gas

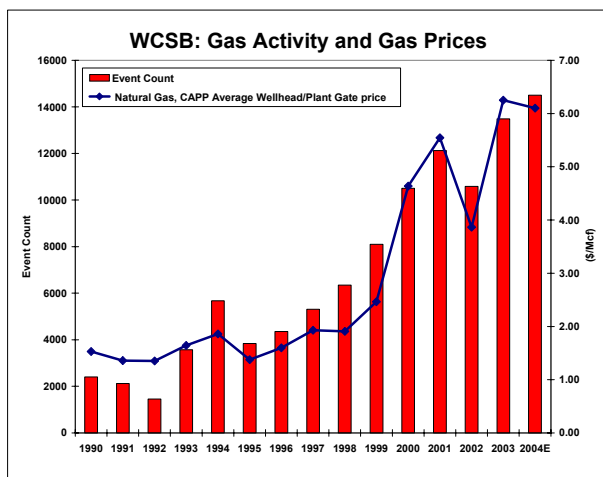
- WCSB supplies 23% of consumption in US and Canada



Competing processes of decline and rate additions

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How has industry responded?



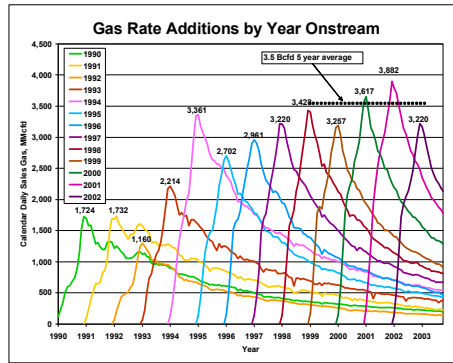
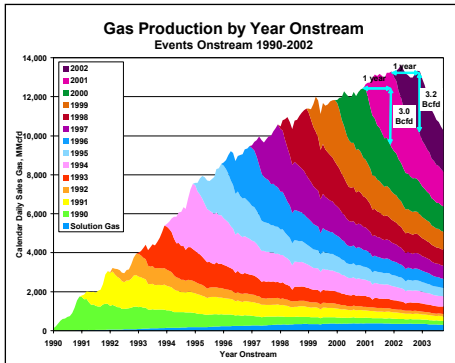
- Connection activity reached record levels, above 14,000 connections, by the end of 2004
- Activity, and rate additions, responded to prices, cash flow, acquisition and capital markets, export capacity, etc.



Gas price and gas connection activity correlated

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How big is the annual challenge?



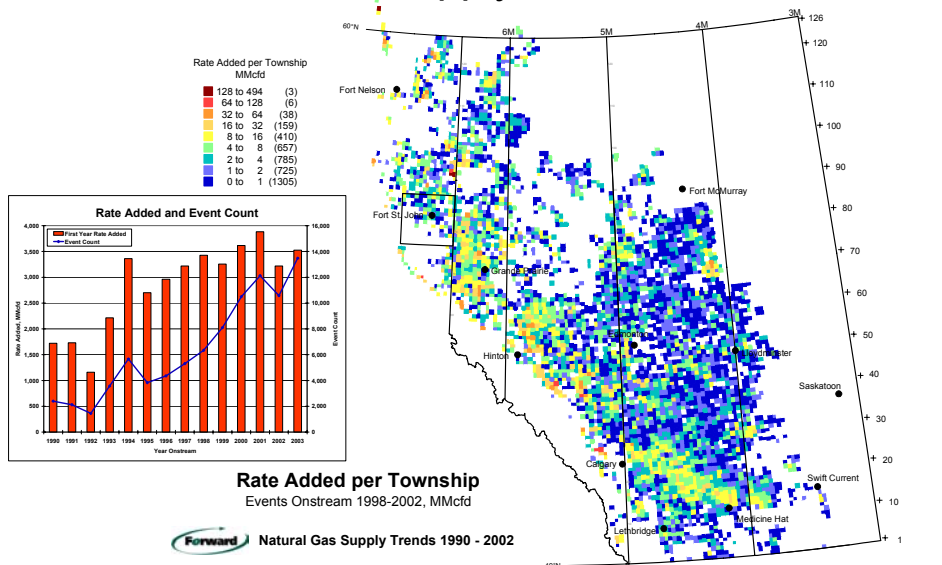
- Supply additions were 1.7 Bcfd in 1990, peaking at 3.9 Bcfd in 2001
- Shallow declines in early years; first year decline has increased from less than 30% to 40%
- Rate additions for all wells onstream in year is the peak monthly rate



Higher production rates require higher production replacement

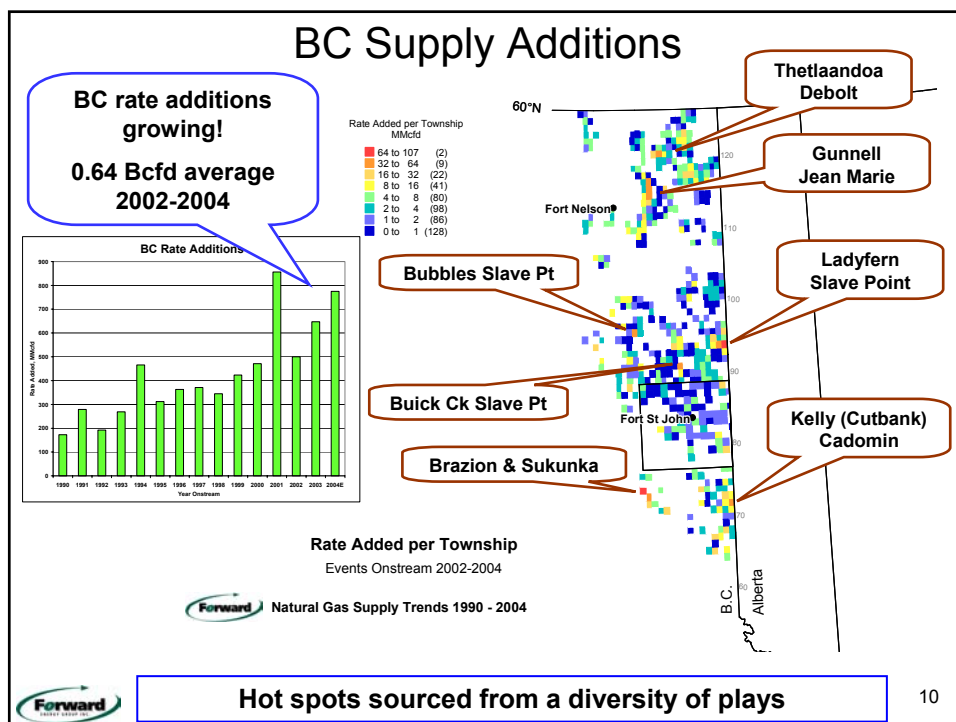
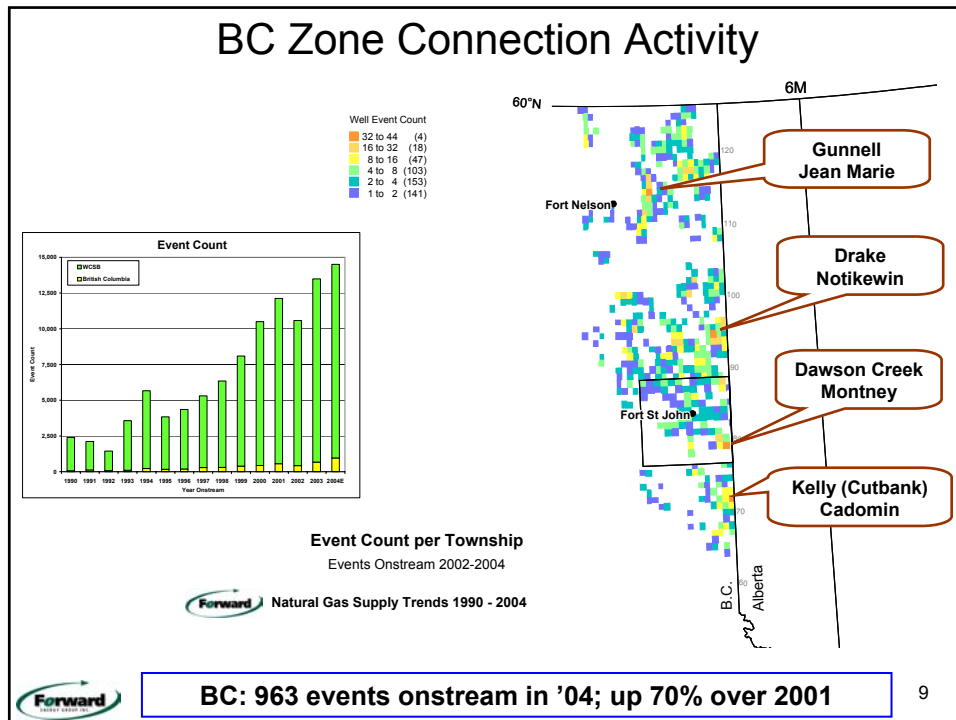
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WCSB Supply Additions

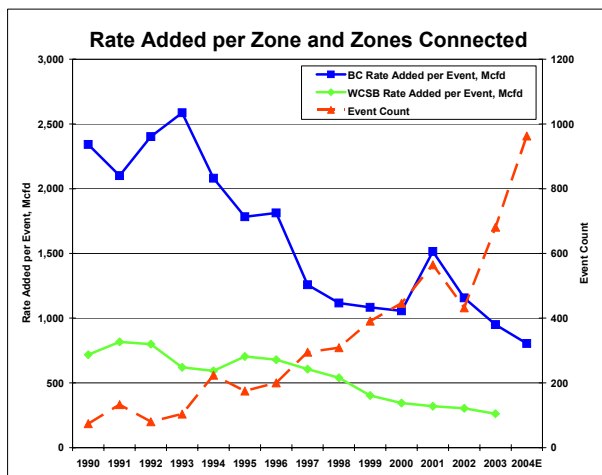


WCSB: Very large area, many producing plays, very active

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Rate Additions per Zone Connected



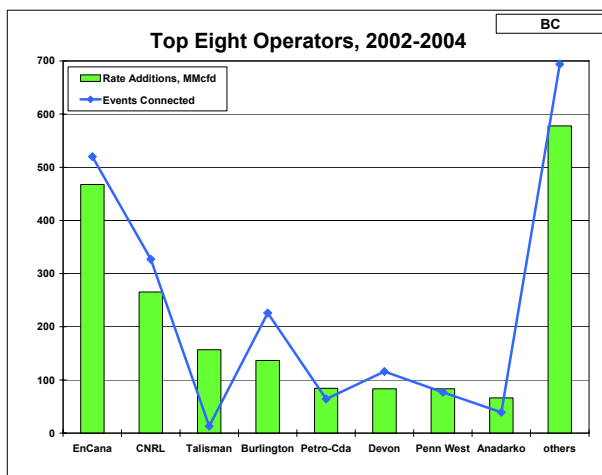
- Rate added by new BC events declined to 800 Mcfd per zone (2004)
- Threshold size of an economic well decreased as gas price and netback increased
- Expanded opportunity set: smaller, higher cost, lower quality, higher risk or more remote prospects



More, but lower productivity, opportunities at the economic margin

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Top BC Operators



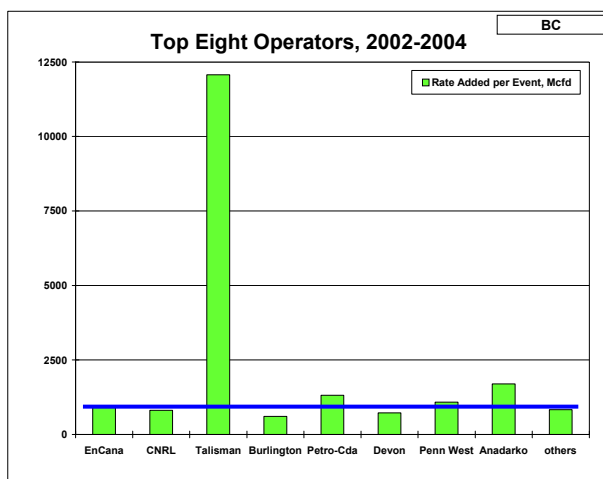
- 80+ operators connected supply in BC in 2002-2004
- Top 4 operators dominating; they contributed over 53% of the rate additions
- EnCana, at an annual rate of 155 MMcf, delivered 24% of 2002-04 rate adds



Few large players dominate; but many other operators

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Rate Additions per Zone



- EnCana: many connections at average of 900 Mcfd, indicative of resource play strategy
- Talisman: averaging over 12 MMcfd per zone; influence of Brazion b-60-E is very evident
- Most other top operators near the industry average of 930 Mcfd per zone connected



EnCana/Talisman: Contrasting styles both achieve growth

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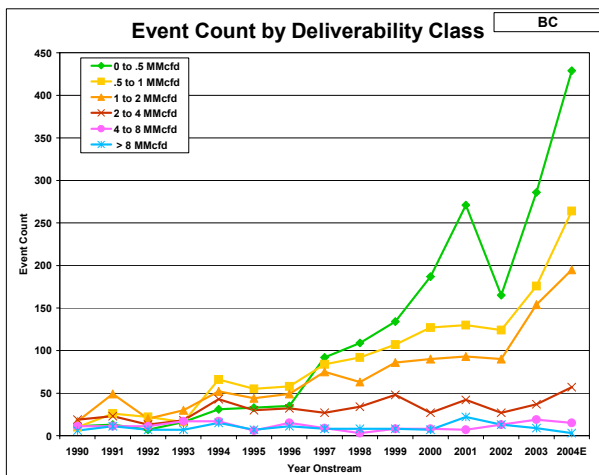
Sources of BC's Growing Supply

- Deliverability Class
- Stratigraphic Group
 - Plays
- Well Orientation
- Fracture Stimulation
- Depth Class



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Connections by Deliverability Class



- Significant growth in the number of lower rate (<2 MMcfd) connections since 1996
- The number of connections in the higher rate classes has remained essentially constant
- Low deliverability connections are price-sensitive

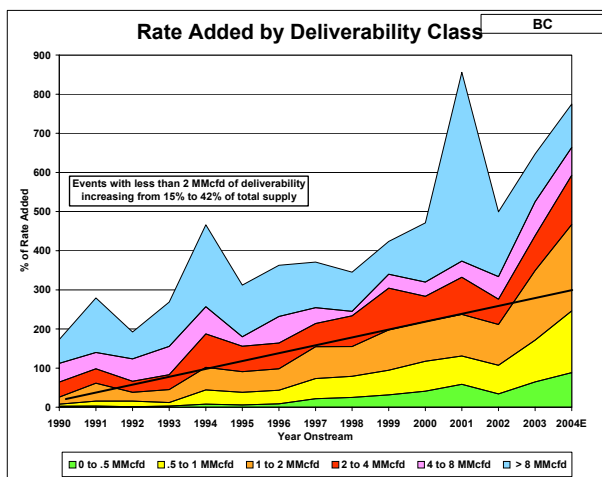
- Higher deliverability connections are not price-sensitive and are the outcome of longer-term, higher risk projects



All activity growth is from lower deliverability wells

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Rate Additions by Deliverability Class

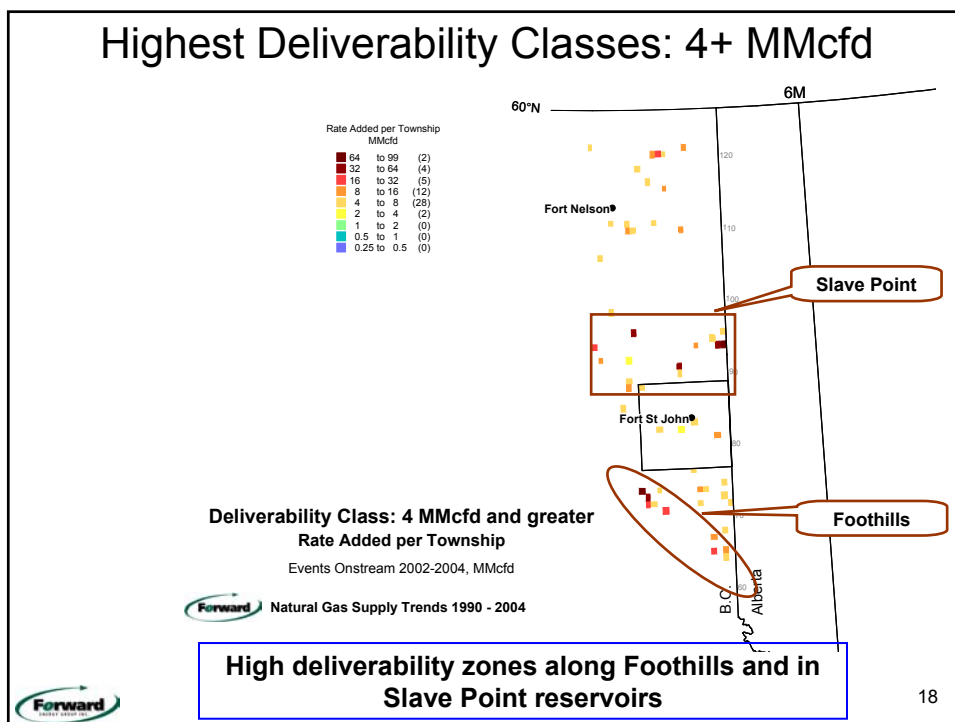
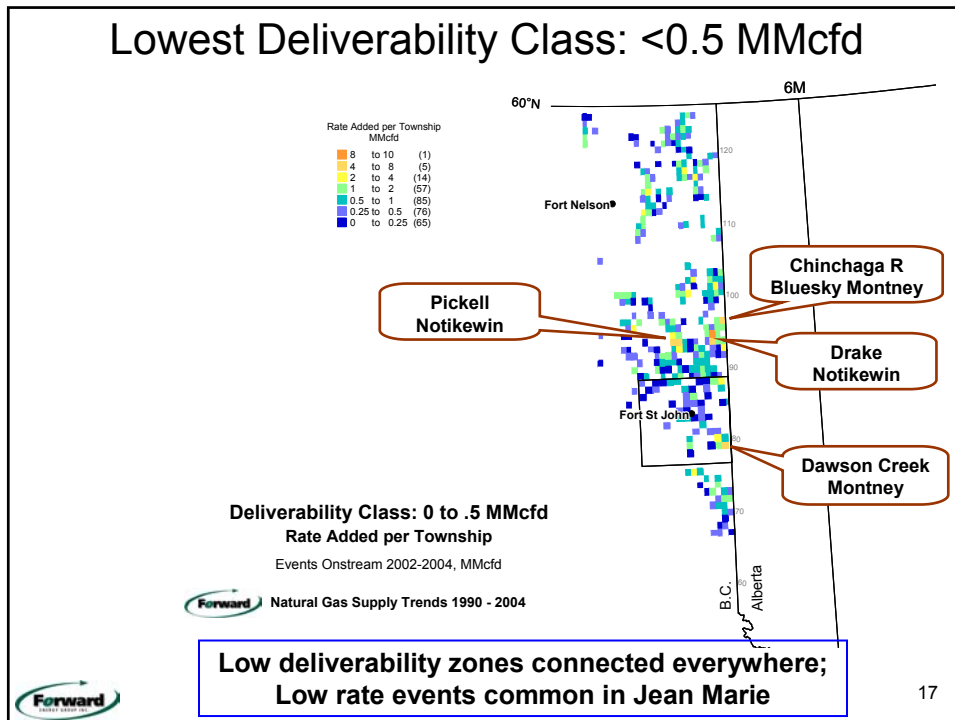


- Rate adds from the lower deliverability classes growing steadily
- Rate additions from mid-range deliverability events (1 to 4 MMcfd) providing the bulk of BC supply growth
- Except for Ladyfern spike, high deliverability zones (>4 MMcfd) have maintained relatively constant additions since 1990

Growth in overall rate additions has come increasingly from lower deliverability wells



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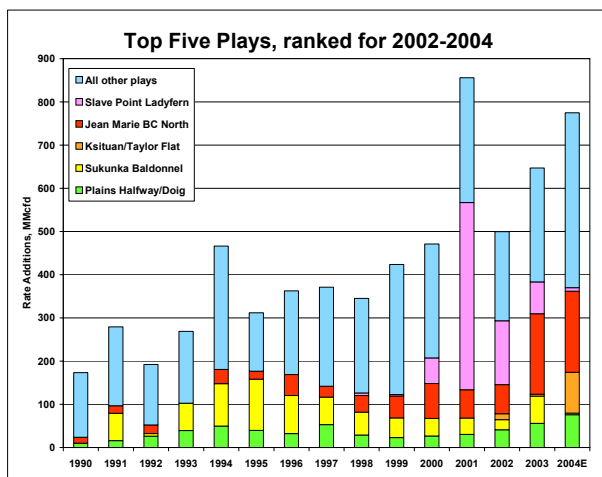
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Rate Additions by Top Five Plays

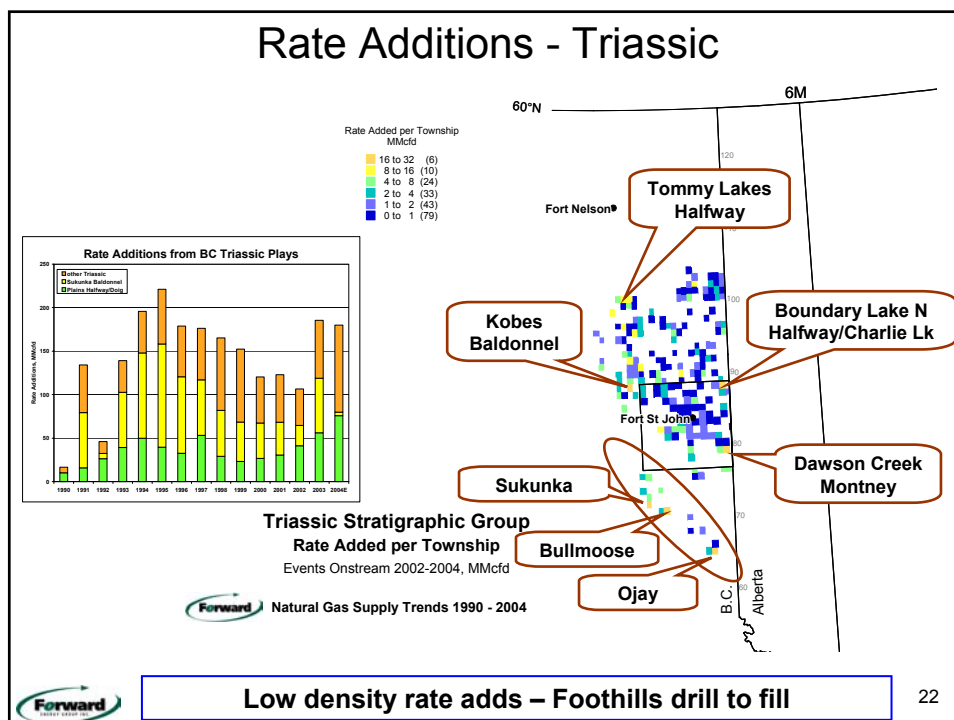
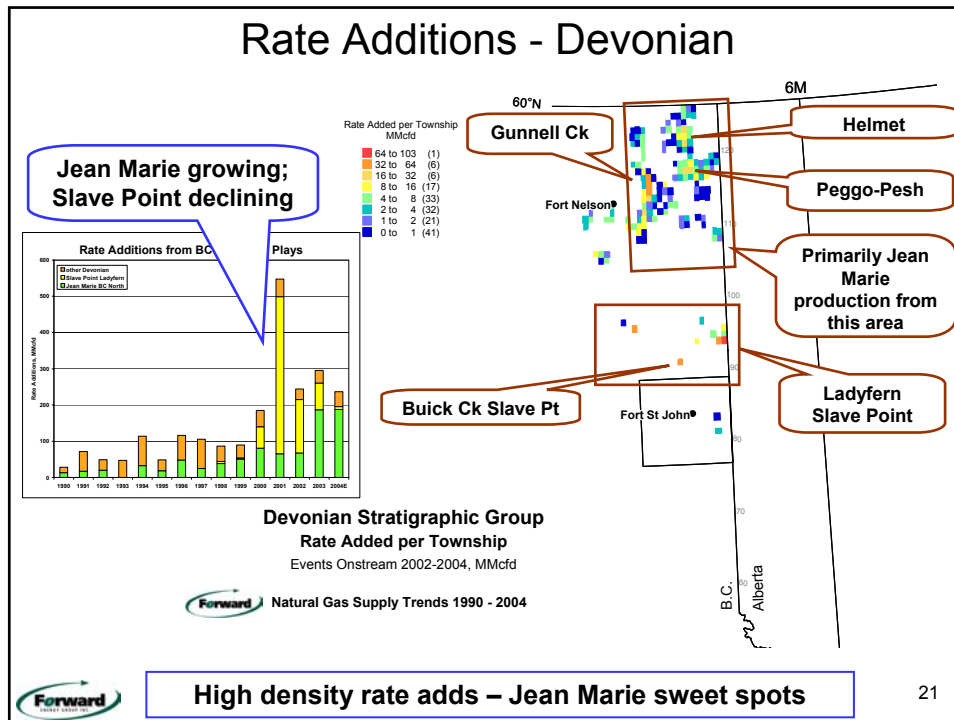


- Top 5 plays (of 29 plays defined) contributed over 50% of 2002-2004 rate additions
- Jean Marie largest play, contributing 150 MMcfd; EnCana major operator
- Sukunka: steady supply source
- Emergence of Ksituan play
- Halfway/Doig: steady supply source
- Ladyfern: new supply is limited



Top plays dominate

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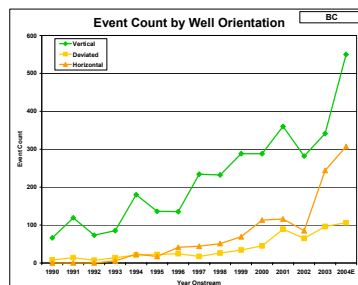
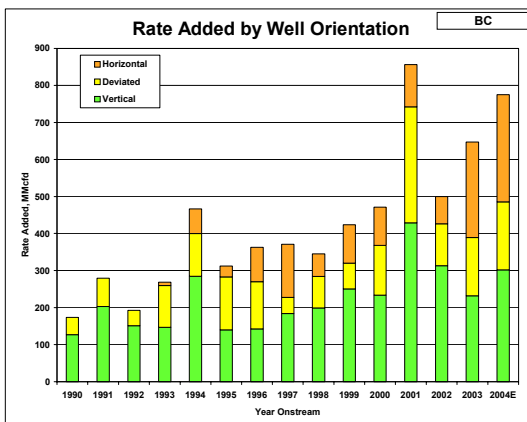
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Well Orientation



- Activity in all classes increasing; horizontal activity up 270% in 2004, over 2000

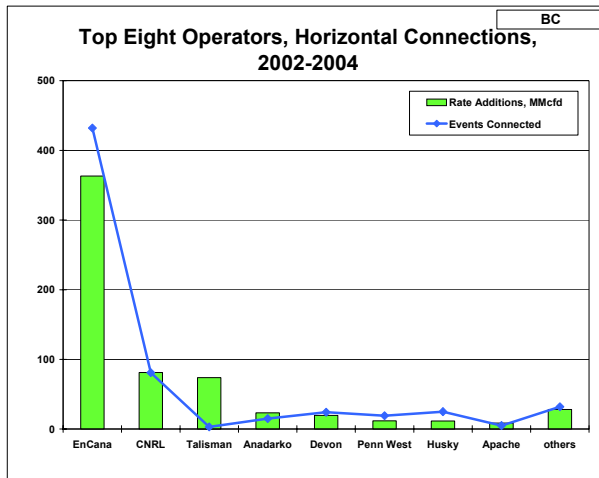
- Directionally-drilled wells, both deviated and horizontal, grew to be the source of 60% of the rate additions in 2004
- Increased supply from directional wells requires increased effort and expense



Horizontal well technology: a boon to BC supply growth

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Horizontal Wells



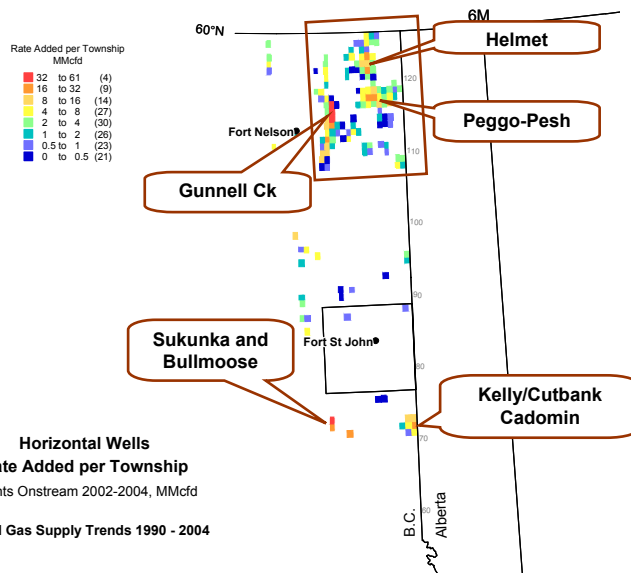
- For 2002-2004, top 8 operators developed 95% of all horizontal connections; EnCana operated almost 70% themselves
- Similarly, the top 8 operators connected 95% of all horizontal rate additions; EnCana, at an annual rate of 121 MMcfd, delivered almost 60% of 2002-04 rate adds



EnCana: the dominant BC player in application of horizontal well technology

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Rate Additions – Horizontal Wells



70% of horizontal rate adds from Jean Marie play

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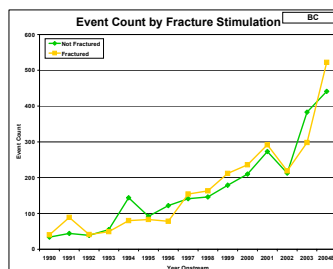
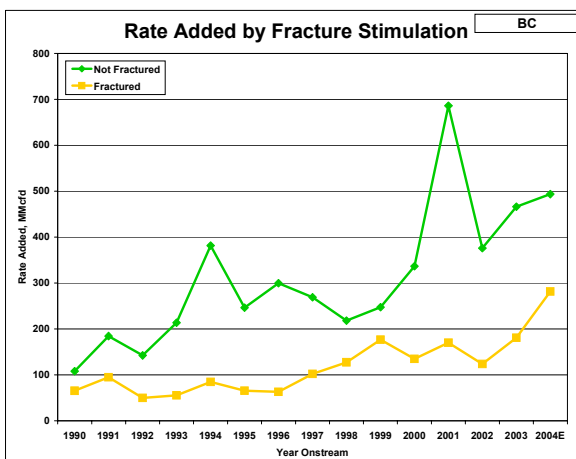
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- Depth Class



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Rate Additions by Fracturing



- Most unconventional gas - tight gas and CBM - requires fracturing

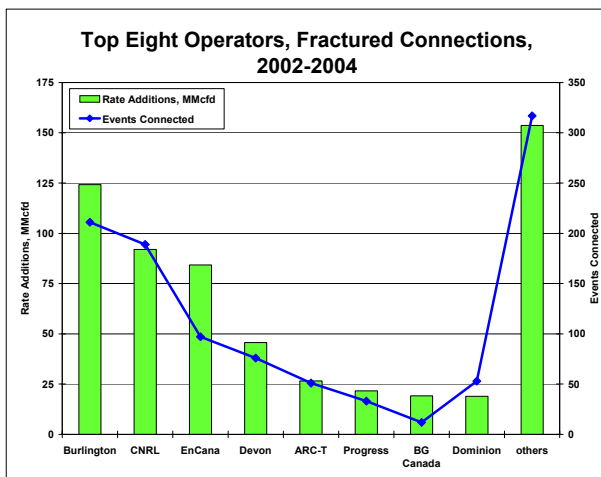
- Connections of fracture-stimulated events more than tripled between 1998 and 2004
- Fracture-stimulated zones accounted for 30% of the 2002-2004 rate added

Fracture-stimulated zones are a growing component of supply



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Top BC Operators



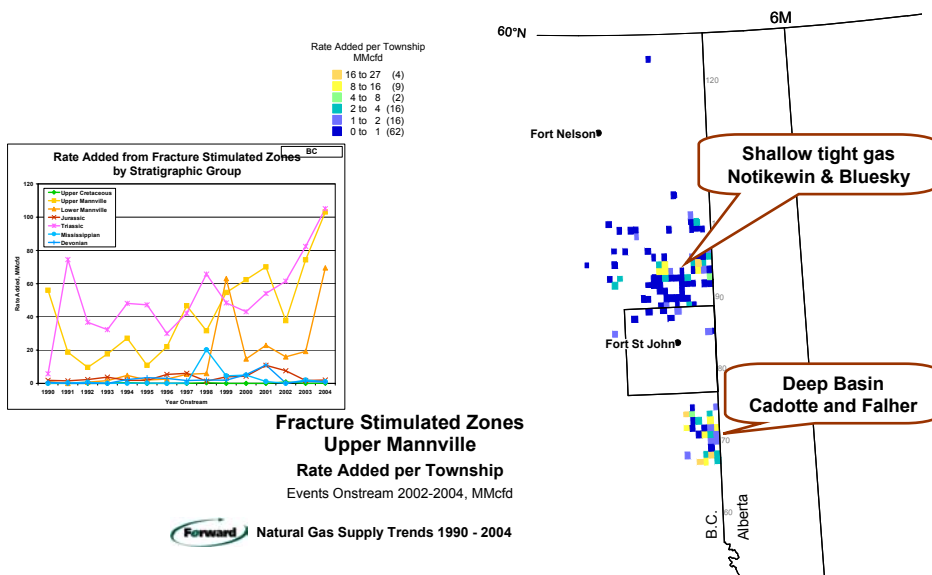
- 50+ operators connected 'fractured' supply in BC in 2002-2004
- The top 4 operators dominated; they contributed almost 60% of the rate additions
- Burlington, at an annual rate of 41 MMcfd, delivered 21% of 2002-04 rate adds



Few large players dominate; but many other operators

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Fractured Rate Additions – Upper Mannville



Tight gas split between deep and shallow

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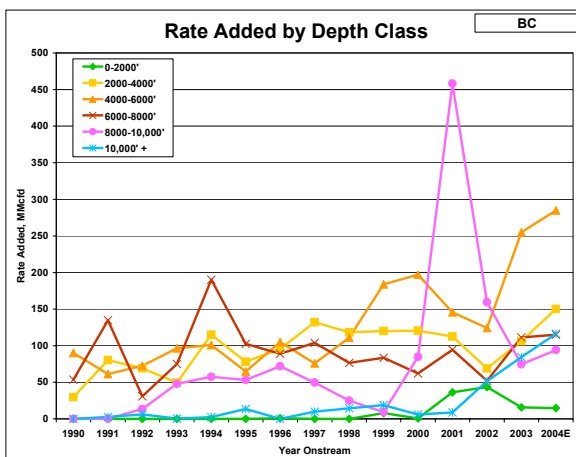
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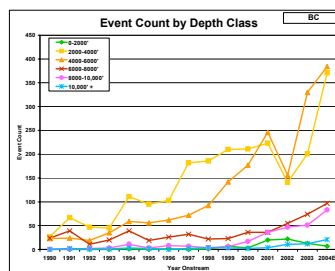


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Rate Additions by Depth Class



- Rate Additions:
 - Moderate increases in supply from 2000'-6000' and 10,000'+ wells



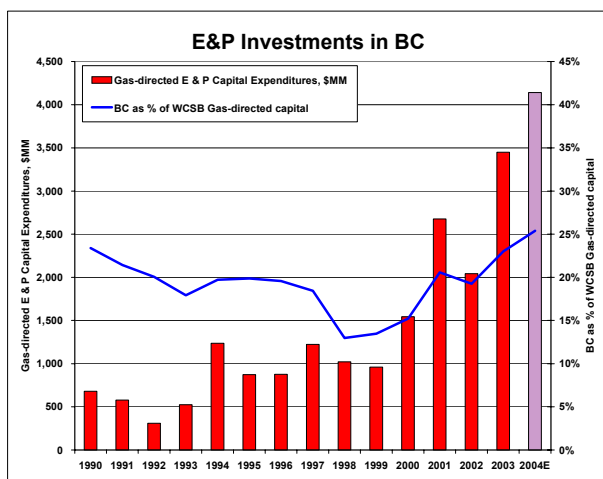
- Activity:
 - Significant increase in 2000'-6000' wells
 - Moderate increase in 6000'-10,000' wells
 - Connection activity for deep wells (>10,000') not a big factor in new supply to date



Like rest of WCSB, BC operators moving to deeper wells

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Gas E&P Investment in BC



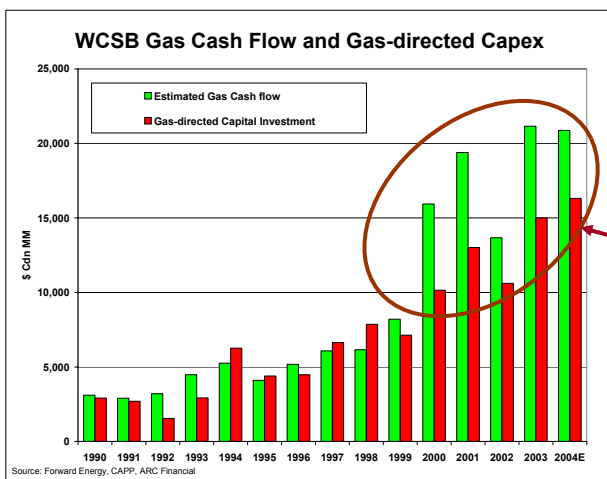
- Industry's BC gas-directed capital: estimated at over \$4 billion in 2004
- This represents an increase of over 400% from the levels of the late 1990s
- BC share of basin gas-directed capital above 25% and increasing



Industry is voting for BC gas with its wallet

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Gas Cash Flow and Investment



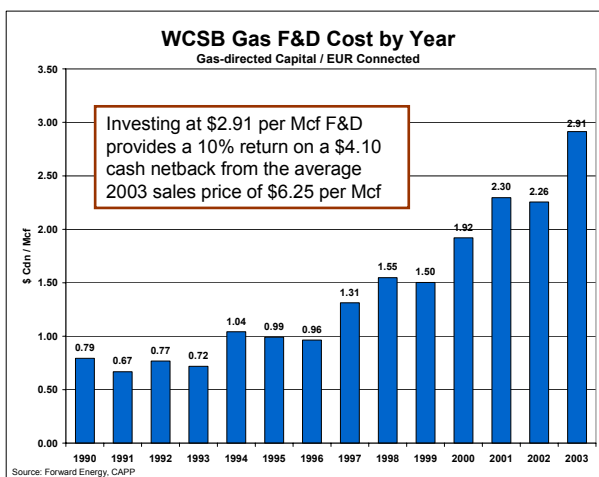
- Pre 2000, >100% re-investment ratio of cash flow in WCSB
- Post 2000, the re-investment ratio is <75%
- Surplus cash flow is distributed either as income/dividends or invested outside the WCSB gas business: oilsands, frontier, international or downstream



More capital available for good opportunities

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Gas F&D cost



- Gas-directed capital / extrapolated recovery in newly-connected zones
- 2003 cost is triple the pre-1997 average
- To sustain investment return, increasing F&D cost must be matched by increasing netback and hence, increasing price

To attract capital:

- WCSB gas investments must be profitable
- WCSB gas opportunities must be better than alternatives



Increasing costs threaten profitability and investment

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BC Gas Supply – Key Messages

- WCSB on a treadmill, annual supply replacements nearly equal to annual withdrawals
- BC annual supply additions on an increasing trend – at nearly 0.8 Bcfd in 2004
- BC growing its share of total production
- Supply growth sourced both from lower-deliverability zones and from deeper wells
- Multiple successful gas supply growth strategies
- Technology will be an important component in the development of future BC gas production
- To maintain profitability, cost growth must be managed



**The sky is not falling - the sky is growing
The challenge is cost-effective rate additions**

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