BC Gas Supply

BC Natural Gas Symposium
Canadian Institute
Vancouver

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www.forwardenergy.ca
May 11, 2005

BC Gas Supply

- 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
**WCSB Production**

- WCSB: recent peak at 16.9 Bcf/d in 2001, decreased to 16.5 in 2003 and rebounded to 16.7 Bcf/d in 2004
- BC production peaked at 2.7 Bcf/d in 2002, decreased slightly in 2003 and recovered to 2.7 Bcf/d in 2004

BC is the only province with a growing share of WCSB production
Supply Challenge: Sustain Production

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

**Competing processes of decline and rate additions**

WCSB supplies 23% of consumption in US and Canada

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**
Supply additions were 1.7 Bcf/d in 1990, peaking at 3.9 Bcf/d 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.

WCSB Supply Additions

WCSB: Very large area, many producing plays, very active.
BC Zone Connection Activity

Event Count per Township
Events Onstream 2002-2004

Natural Gas Supply Trends 1990 - 2004

BC: 963 events onstream in '04; up 70% over 2001

BC Supply Additions

BC rate additions growing!
0.64 Bcfd average 2002-2004

Hot spots sourced from a diversity of plays
More, but lower productivity, opportunities at the economic margin

- 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

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 MMcfd, delivered 24% of 2002-04 rate adds

Few large players dominate; but many other operators
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

Sources of BC's Growing Supply

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

Growth in overall rate additions has come increasingly from lower deliverability wells
Lowest Deliverability Class: <0.5 MMcfd

Deliverability Class: 0 to .5 MMcfd
Rate Added per Township
Events Onstream 2002-2004, MMcfd

Low deliverability zones connected everywhere;
Low rate events common in Jean Marie

Highest Deliverability Classes: 4+ MMcfd

Deliverability Class: 4 MMcfd and greater
Rate Added per Township
Events Onstream 2002-2004, MMcfd

High deliverability zones along Foothills and in Slave Point reservoirs
Sources of BC's Growing Supply

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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
Rate Additions - Devonian

Jean Marie growing; Slave Point declining

High density rate adds – Jean Marie sweet spots

Rate Additions - Triassic

Low density rate adds – Foothills drill to fill
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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
Horizontal Wells

Top Eight Operators, Horizontal Connections, 2002-2004

- 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

Rate Additions – Horizontal Wells

70% of horizontal rate adds from Jean Marie play
Sources of BC's Growing Supply

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- Depth Class

Fracture-stimulated zones are a growing component of supply

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
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

Fractured Rate Additions – Upper Mannville

Natural gas supply trends 1990 - 2004

Tight gas split between deep and shallow
Sources of BC's Growing Supply

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

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
• 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

• Pre 2000, >100% reinvestment ratio of cash flow in WCSB

• Post 2000, the reinvestment 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
Increasing costs threaten profitability and investment

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

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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