Who We Are

• AJM provides Engineering, Geology, Geophysics and Economics to the Oil and Gas Industry

• Evaluations
  – Corporate Reserves
  – Acquisitions & Divestitures
  – Due Diligence, Special Studies

• AJM is a Leader in providing predictive tools to the Oil and Gas Industry (eg. PetroCube, Well load)

• Areas of Expertise Include:
  – All areas of Canada with a very strong Western Canadian Presence
  – Most Hydrocarbon Basins in the US
  – International Projects
  – Unconventional Gas – especially Natural Gas From Coal

This expertise gives a unique perspective of activity, results and expectations in the WCSB.
• N. America (Canada, USA, Mexico): 27% of World Energy Consumption, 6.8% of World Population, 6.7 Tonnes/person

• Canada: 3% of World Energy Consumption, 0.5% of World Population, 9.9 Tonnes/person (USA: 8.2Tonnes/person, Mexico: 1.4Tonnes/person)

• World Average: 1.7 Tonnes/person

• Oil and Gas – other industries: Petrochemicals, Fertiliser, Asphalt etc.
The Current Reality

• World fixation on oil price
  – Getting close to World peak oil production?

• North America’s situation is more critical
  – Peak of Alberta gas is likely the peak in Canadian gas production (2001)
  – Likely the peak in North American gas production

• Flat or Declining gas production
  – Supply/Demand tight – high prices
  – Good news for the oil and gas industry
  – Bad news for consumer North American economy
Canada’s Resources and Reserves
Natural Gas

?10,000+Tcf

Total Conventional + Unconventional

500Tcf

Discovered

Raw Gas

Sales Gas

55 Tcf

Unproduced Remaining Reserves

Rate of Conversion:

Accessibility Technology Price Motivation

Resources
World Oil Reserves (BP, 2005)

1.2 Trillion Bbls reserves
38 Years supply?

The Alberta tar sands 1.7 Trillion Bbls resource
North American Oil Production

Source: BP, 2004
North American Oil Production + Imports

Energy dominates World Events

‘Cold’ War

Oil Consumption >10MMBO/Day

Oil Production

mbbls/Day

US Peak Oil Production

9MMBO/Day

Imports to North America

Mexico

Canada

USA

NATURAL GAS
Review
World Gas Reserves (BP, 2004)

Total 6206 Tcf

- FSU
- Mid East
- SE Asia
- S&C America
- USA
- Canada
- Mexico

Canada: 1% of Reserves
North America:
- 4% of Reserves
- 29% of Production
- 30% of Consumption

Currently a landlocked resource, LNG could make gas a world commodity
North American Natural Gas Production + Imports

- LNG
- USA Unconventional

Production Bcf/d

- USA Peak
- US Unconv. Gas incentives

Years:
- 1970
- 1973
- 1976
- 1979
- 1982
- 1985
- 1988
- 1991
- 1994
- 1997
- 2000
- 2003

Sources:
- LNG
- Mexico
- Canada
- USA CBM
- USA Other Unconv
- USA Conventional

N. America Peak?
North America - Change in Gas Reserves 2003 vs 1981 (BP 2004 Data)

- 14.7 Tcf (USA) -35.2%
- 58.7 Tcf (Canada) -7.4%
- 184.8 Tcf (Mexico)

Total 258 vs 365 Tcf -80%
North American Natural Gas Production

• Trend lags oil by about 30 Years
• Demand increasing at same time that production is declining
• Solutions:
  – Consume less
  – Promote energy alternatives
  – Import more Natural Gas (LNG)
  – Unconventional Gas
• All four will become vital to sustain the North American economy
• What can Canada deliver?
Canada:

- 3rd Largest Natural Gas Producer
- 2nd Largest Natural Gas Exporter
- <1% of World Natural Gas Reserves
- >20% of World Drilling Rig Count
- Large Resources of Unconventional gas
Canada’s Natural Gas Production
(Bcf/d Adapted from CAPP Data)

Production Growth controlled by pipeline capacity

>50% of Canada’s production is exported to USA
High activity, high price and flat production = Red Flag
Alberta Natural Gas Drilling vs. Gas Price

Activity driven by price rather than production
Reserve Replacement Cost

2002 $US/BOE (Adapted from: John S. Herold / Harrison Lovegrove & Co.)

Asia-Pacific $2.50
Africa & M.E. $3.10
S&C America $5.30
Europe $6.50
United States $7.10
Canada $8.40

Comments

• As pass peak: gas price vulnerable to fluctuations in supply and demand

• Canada’s long term position as a natural gas producer/exporter is weakening – has significant political and economic implications

• Washington has a far clearer understanding of the implications than Ottawa

• Vital that we accurately predict future supply

• Have developed a model that improves future prediction
Predicting the Future

(From: Dave Russum, Geo-Help Inc., 2003)
Natural Gas In Canada – Where are we going?

GLOBAL FUTURE?

SUPPLY: Exploration, Exports

DEMAND: Production, Exports

Prices

Time
# Understanding Remaining Gas Resources

– Accessible and Economically Available

<table>
<thead>
<tr>
<th>Available at current prices</th>
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<th>Accessible with Restrictions</th>
<th>Inaccessible</th>
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<tbody>
<tr>
<td>Presently Available Resources (Reserves)</td>
<td>Future Available Resources</td>
<td>Unavailable Resources</td>
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<th>Available at higher prices or new technology</th>
<th>Accessible</th>
<th>Accessible with Restrictions</th>
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<tr>
<td>Future Available Resources</td>
<td>Future Available Resources</td>
<td>Unavailable Resources</td>
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Can apply this approach to Conventional and Unconventional Resources

Source: Russum, CSEG Recorder, June 2003
‘Orphaned’ Conventional Resources (Skipper, 2001)

Green-Amber-Red Resource Assessment
Resource Development Model (RDM) – 8 Stages

1. Discovery
2. Evaluation
3. Development
4. Growth
5. Peak
6. Decline
7. Reality
8. Abandonment

Knowing current stage of project can better predict future
Stage 6: **Decline**

- “Denial” - Companies, workers, politicians, regulators and consumers expect continued growth in production
  - “Current decline is temporary”
  - “Hockey stick” predictions of future

- Future predictions disconnected from current reality (often based on old data)

- High Spending based on unrealistic expectations

- Costs to maintain production increase

Alberta’s Conventional Gas Production is at this stage
Canada’s Hydrocarbon Stages - Gas

<table>
<thead>
<tr>
<th>Stage</th>
<th>1 Disc</th>
<th>2 Eval</th>
<th>3 Dev</th>
<th>4 Grow</th>
<th>5 Peak</th>
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# Canada’s Hydrocarbon Stages – Oil

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<th>Stage</th>
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<th>7 Real</th>
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Predicting the future

Resource Development Model
  +
Current Production*
  +
Decline Analysis*
  +
Investment/Exploration/Drilling/Technology trends
  =
Accurate prediction of future production

* Data from PetroCube© a new product from AJM Petroleum Consultants
Forecast of Canada’s Future Gas Production *(Russum/AJM, 2005)*
The Shopping List - Examples

OIL

Oil sands extraction Mined: $5 - $7.5Billion/100,000bbls/d, Lead time: 5 years
   – Issues: Environmental, energy and water supply, manpower, transport of product to market, operating costs

Oil Sands extraction Insitu: $3 Billion/100,000bbls/d, Lead time: 2 years+ can be staged
   – Issues: Environmental, energy and water supply, manpower, transport of product to market, operating costs

White Rose: $2.35Billion/100,000bbls/d, On production 2006
   – Issues: Environmental, discovered 22 years ago

NATURAL GAS

MacKenzie Valley Pipeline: $7Billion, 1.2Bcf/d, Lead time: 5 years?
   – Issues: Environmental, Governments/First Nations, manpower, first drilling in Arctic in 1961.

LNG: $1 Billion/Bcf/d for landing terminal, Lead time: 3+ Years
   – Issues: Lack of liquefaction terminals (5 year lead time), Global competition for source and transport of gas, NIMBY
Our Challenges in Canadian Oil and Gas Industry:

- ‘Just in time’ Industry focused on short-term results
- We have become risk averse
- Not investing in enough research for exploration and extraction
- Escalating COF&D
- Governments have taken a hands-off approach to energy (no overall energy management or plan)
- Obligations to Kyoto and NAFTA
- Increased demand for energy to extract oil
Solving the Future Energy Shortfall

1. Develop a more accurate, flexible and current model for predicting energy production

2. Determine realistic levels of production and export for Canada

3. Educate the Public on the implications of a change from low cost to high cost energy

4. Substantial reduction in North American energy consumption

5. Make Energy R&D the #1 priority of Governments
Summary

• Canada (North America) is not running out of oil and gas resources

• Depleted our low cost oil reserves, rapidly depleting our accessible, low cost gas reserves

• Alternatives exist – take research, time and considerable investment

• We need to be very conscious of costs and economic viability of energy in relation to a North American and World market

• Vital that Canada develop an energy plan
Welcome your feedback

Contact Dave Russum
Email: daver@ajma.net

More Information:
www.ajma.net

Thank You