



North American Oil and Gas Supply

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Conference Board of Canada,

Ottawa, Ontario,

Canada



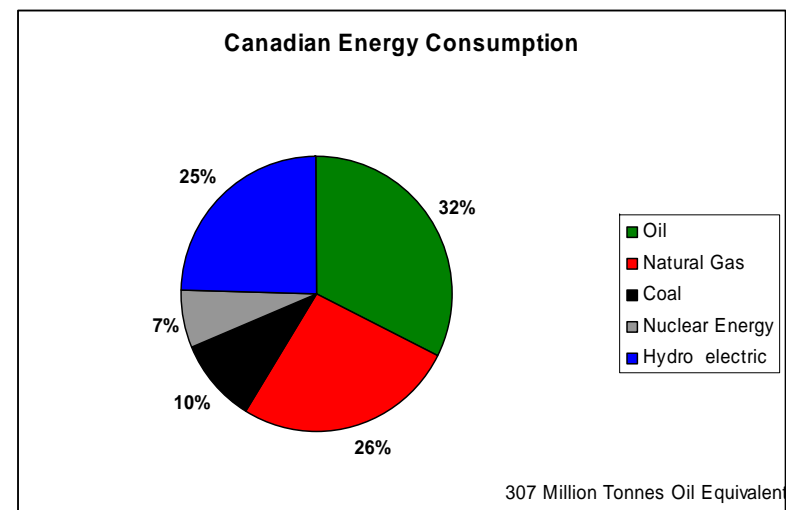
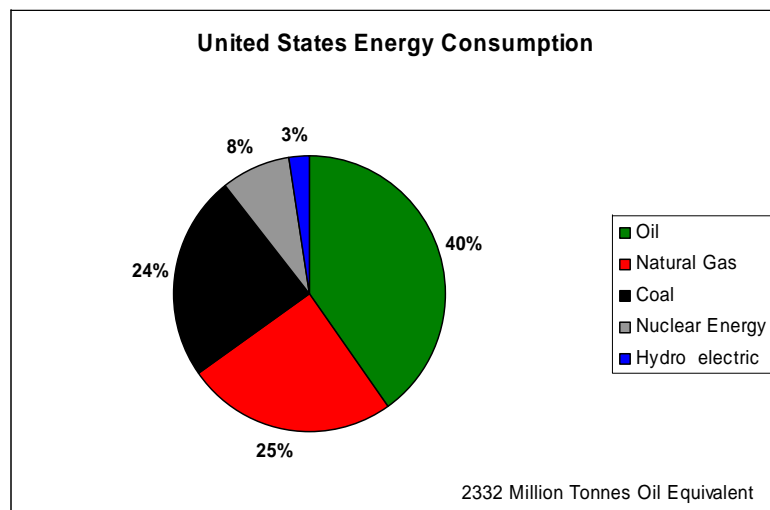
Who We Are



- 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.

Energy Consumption, 2004 (BP, 2005)



- **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.**

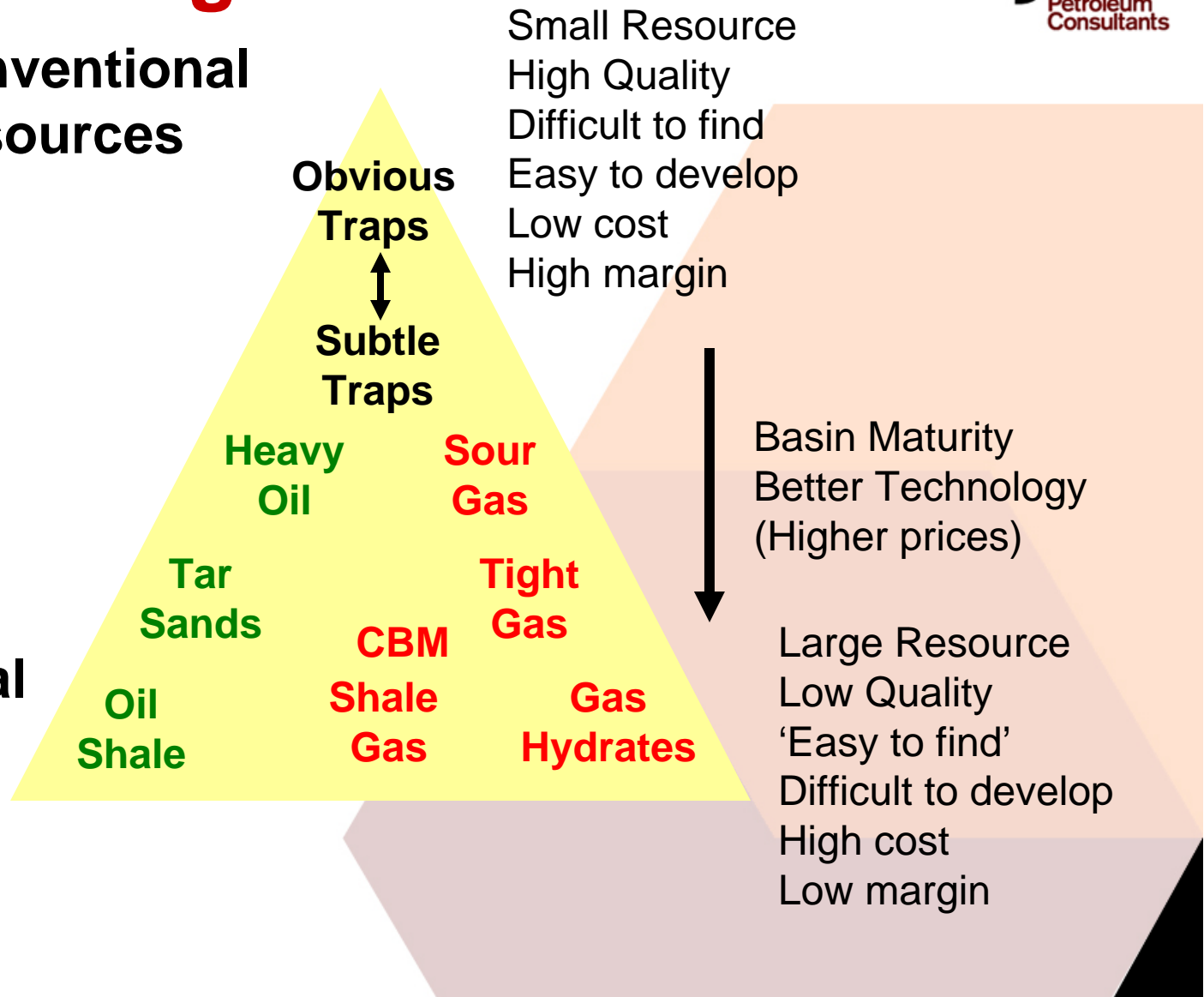
The Current Reality

- **World fixation on oil price**
 - Getting close to World peak oil production?
- **North America's situation is more critical**
 - Canada: the 'swing producer' for North American gas 1990-2000
 - 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

Resource Triangle

Conventional Resources

Unconventional Resources



Canada's Resources and Reserves Natural Gas



?10,000+Tcf

Resources

Total
Conventional + Unconventional
500Tcf ↓ ?10,000Tcf

Discovered

Raw Gas

Sales Gas

Unproduced

Remaining
Reserves

55 Tcf

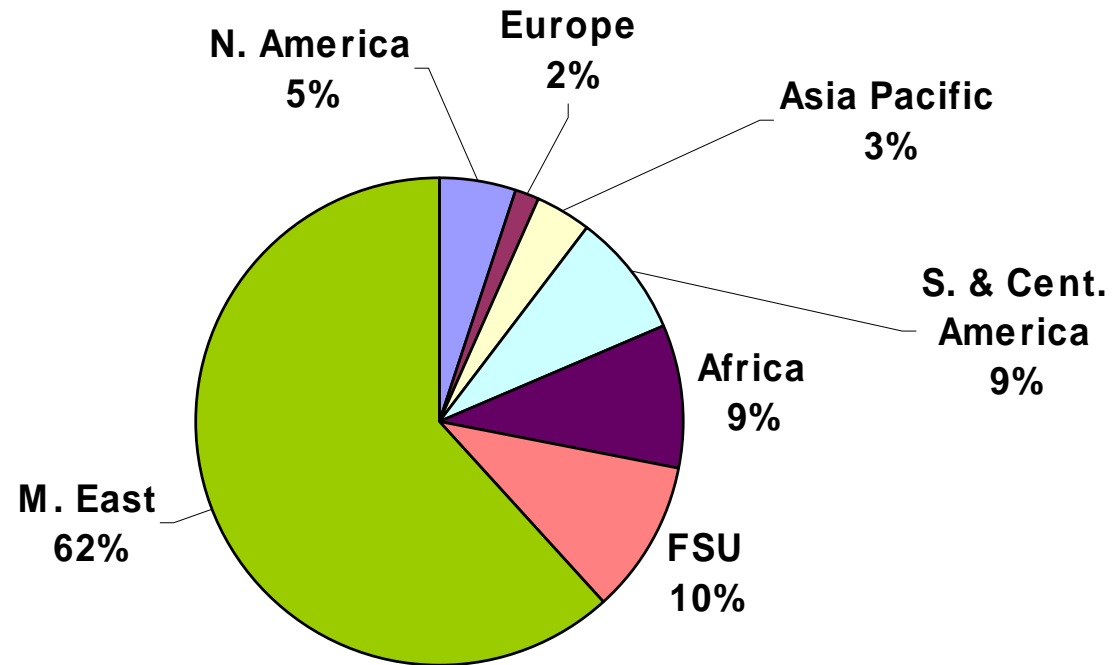
Rate of
Conversion:

Accessibility
Technology
Price
Motivation



OIL Review

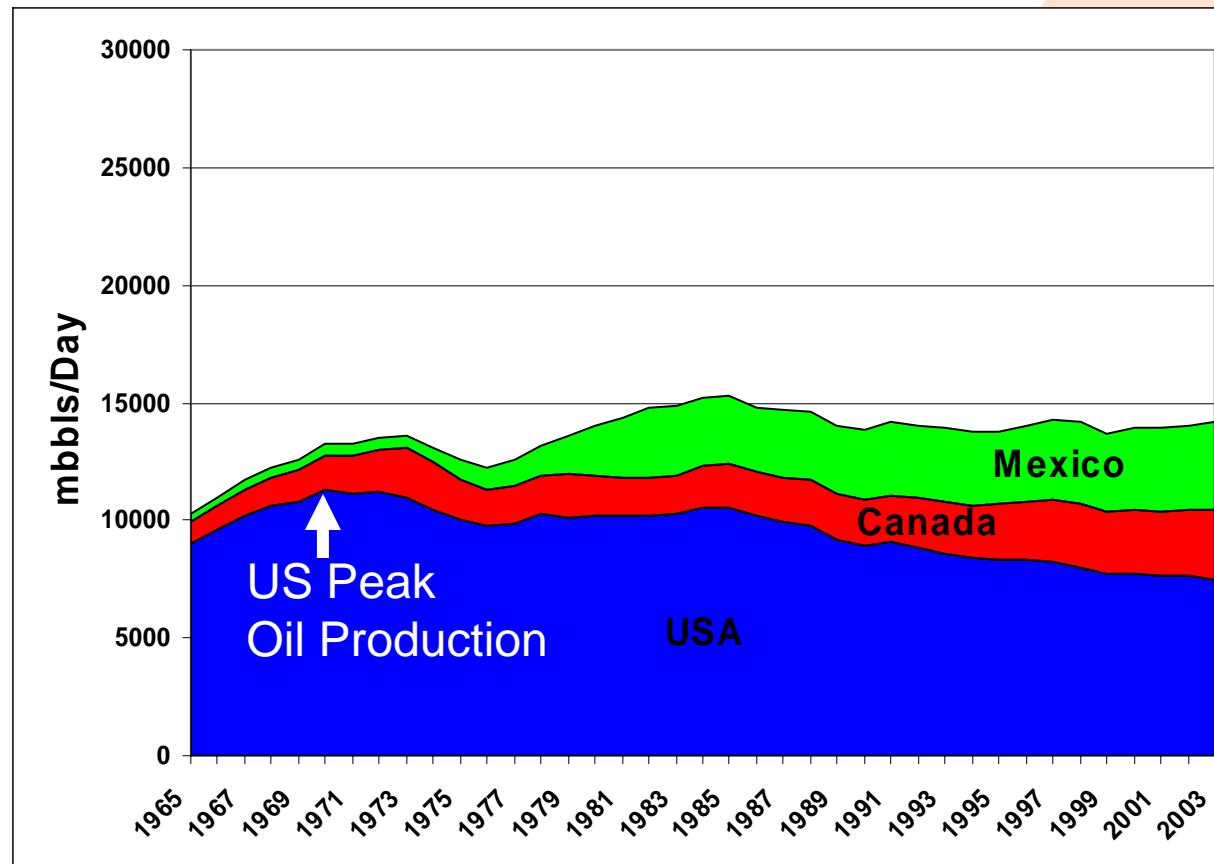
World Oil Reserves (BP, 2005)



**1.2 Trillion Bbls reserves
38 Years supply?**

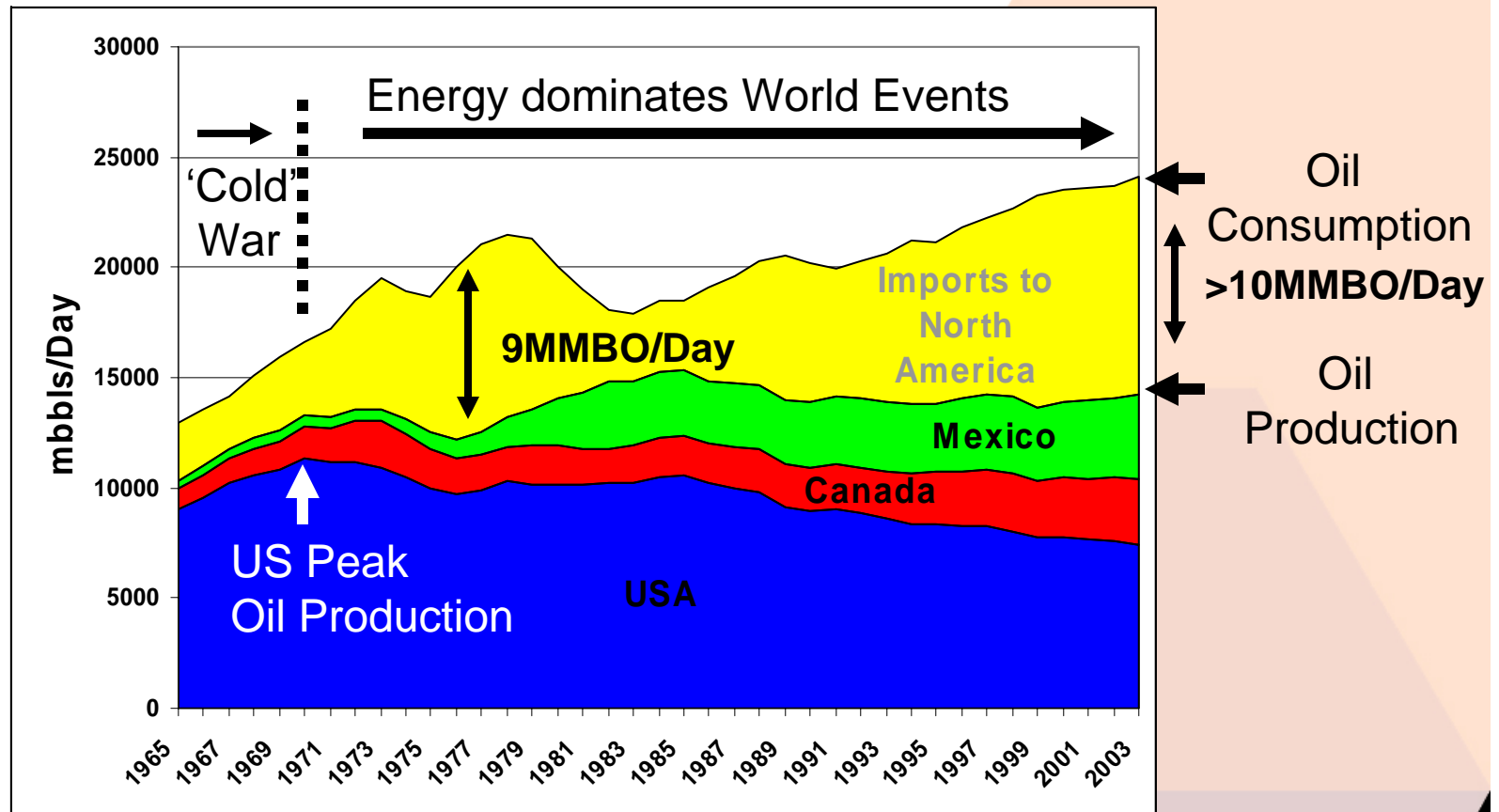
The Alberta tar sands 1.7 Trillion Bbls *resource*

North American Oil Production

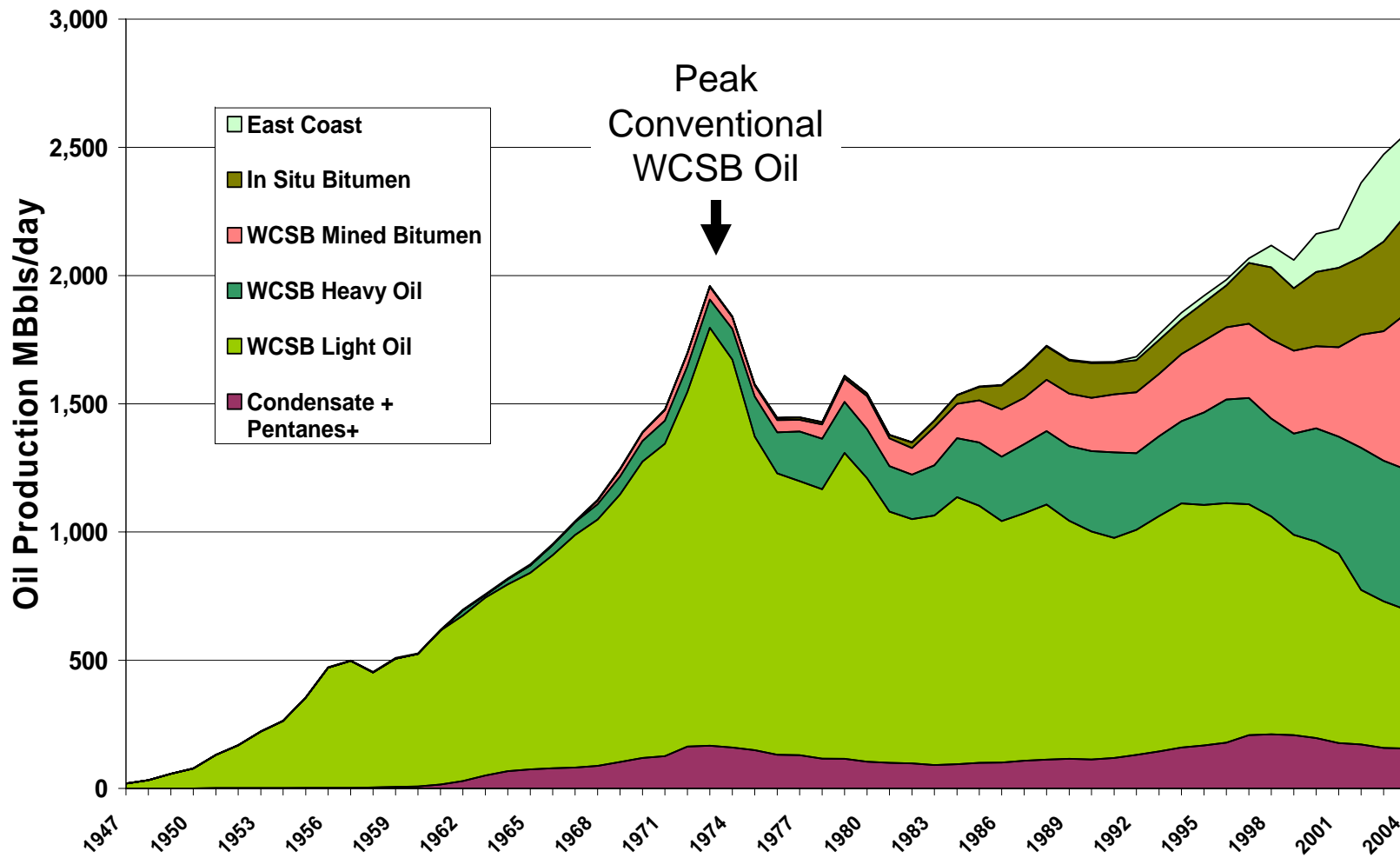


Source: BP, 2004

North American Oil Production + Imports

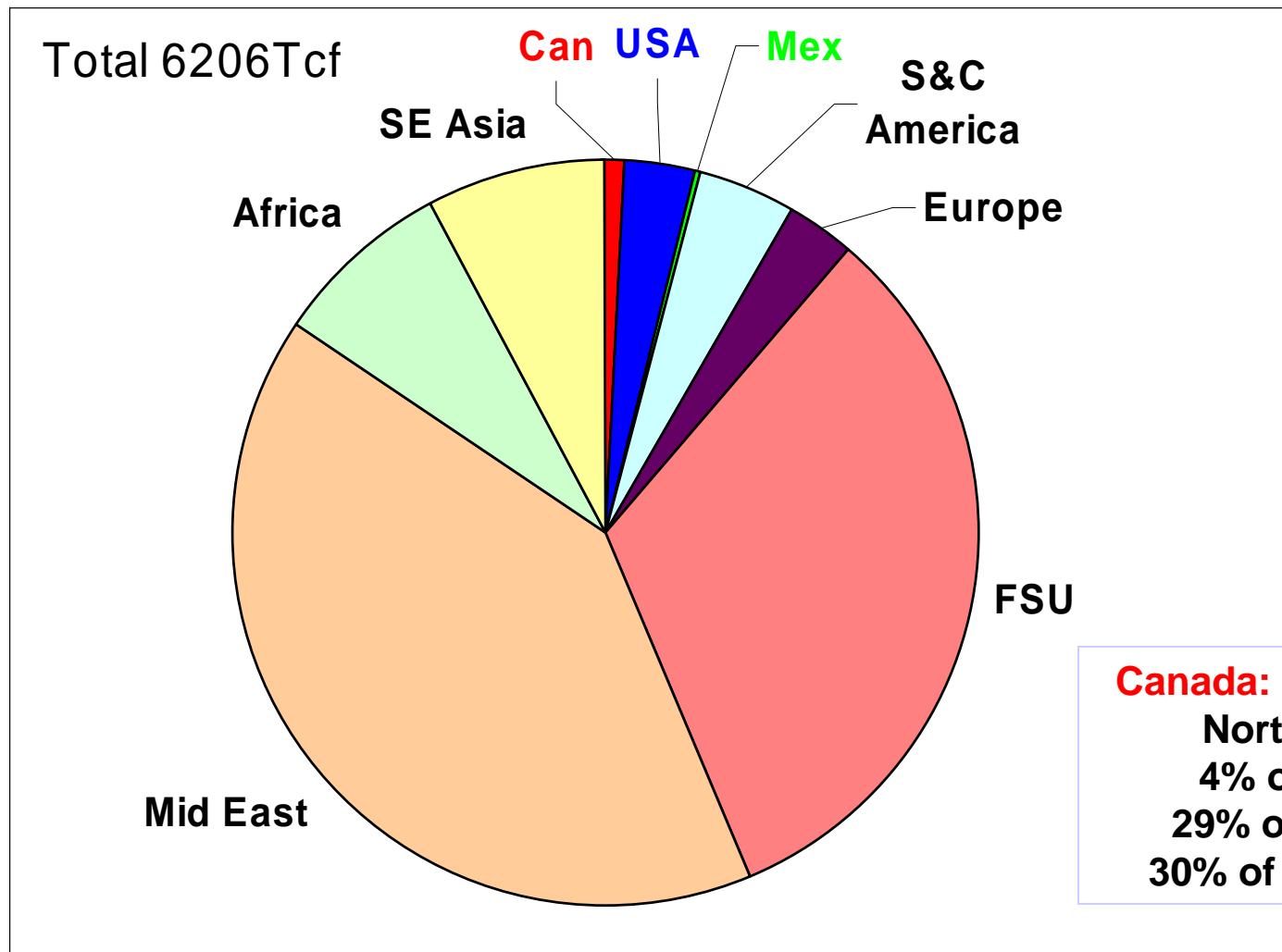


Canadian Oil Production



NATURAL GAS
Review

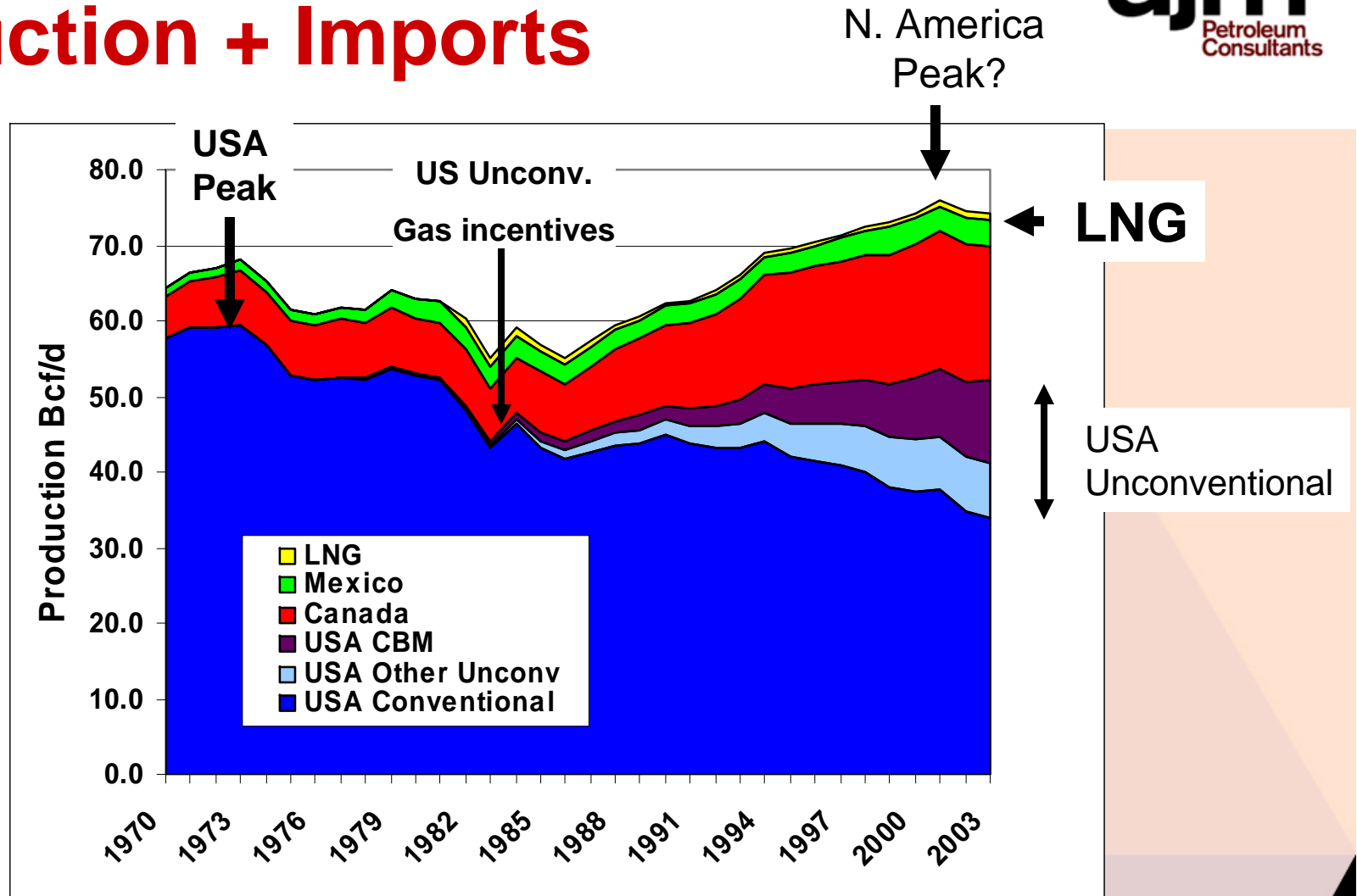
World Gas Reserves (BP, 2004)



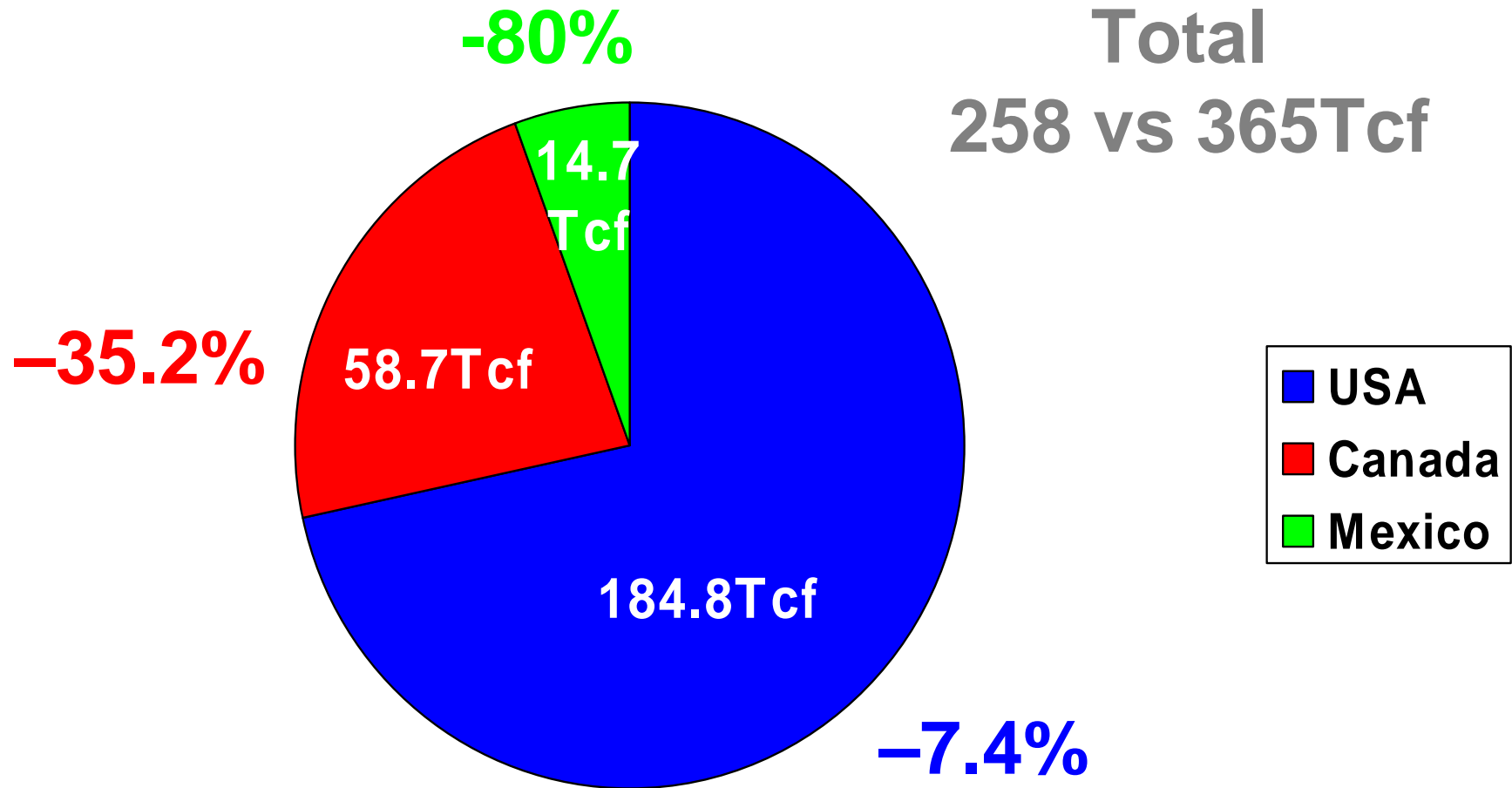
Canada: 1% of Reserves
North America:
4% of Reserves
29% of Production
30% of Consumption

Currently a landlocked resource, LNG could make gas a world commodity

North American Natural Gas Production + Imports



North America - Change in Gas Reserves 2003 vs 1981 (BP 2004 Data)



North American Natural Gas Production



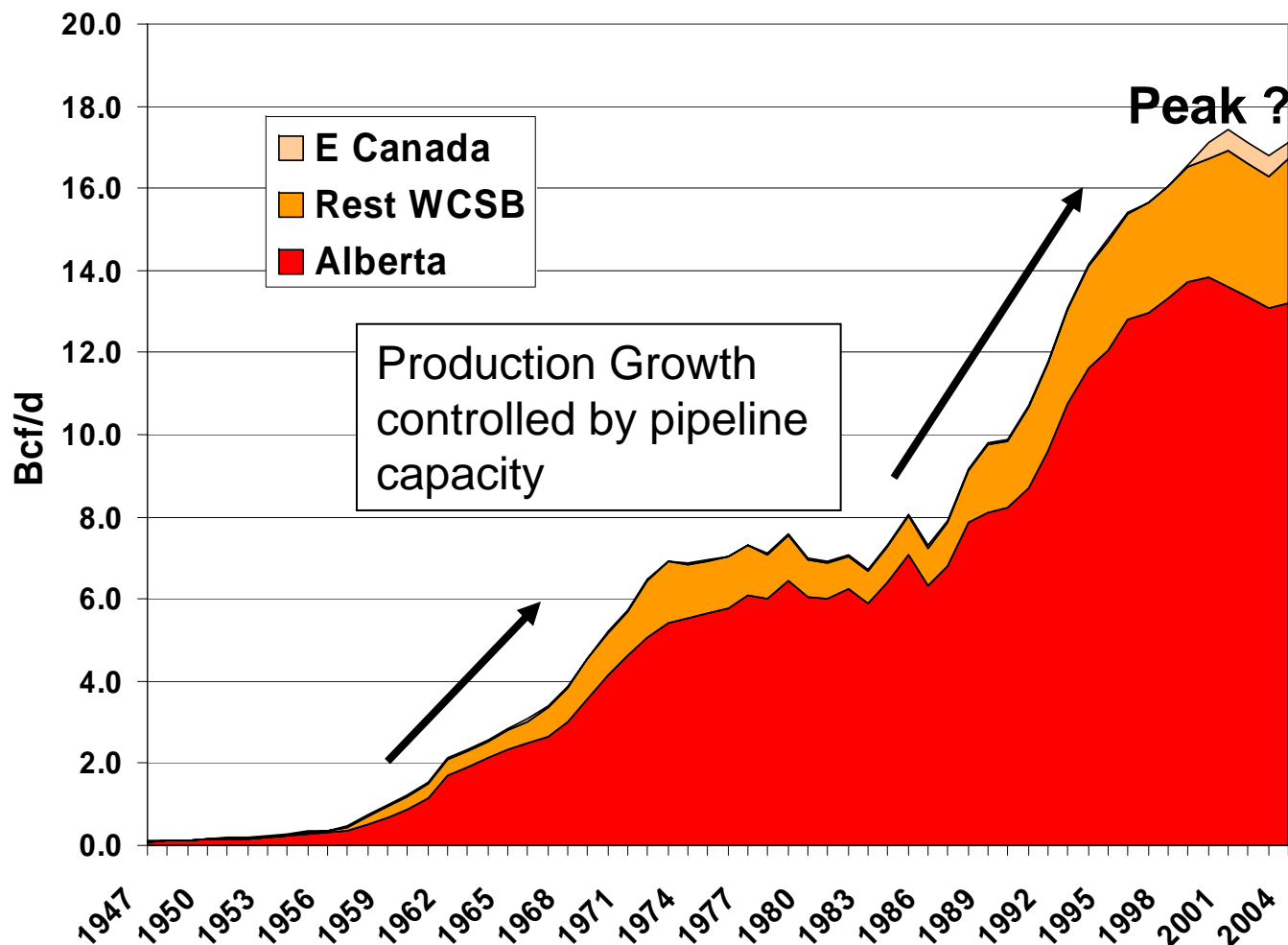
- Trend lags oil by about 30 Years
- Demand increasing at same time that production is declining
- Solutions:
 - Consume less
 - Promote energy alternatives
 - Import more Natural Gas (LNG)
 - Unconventional Gas
- All four will become vital to sustain the North American economy
- What can Canada deliver?

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)

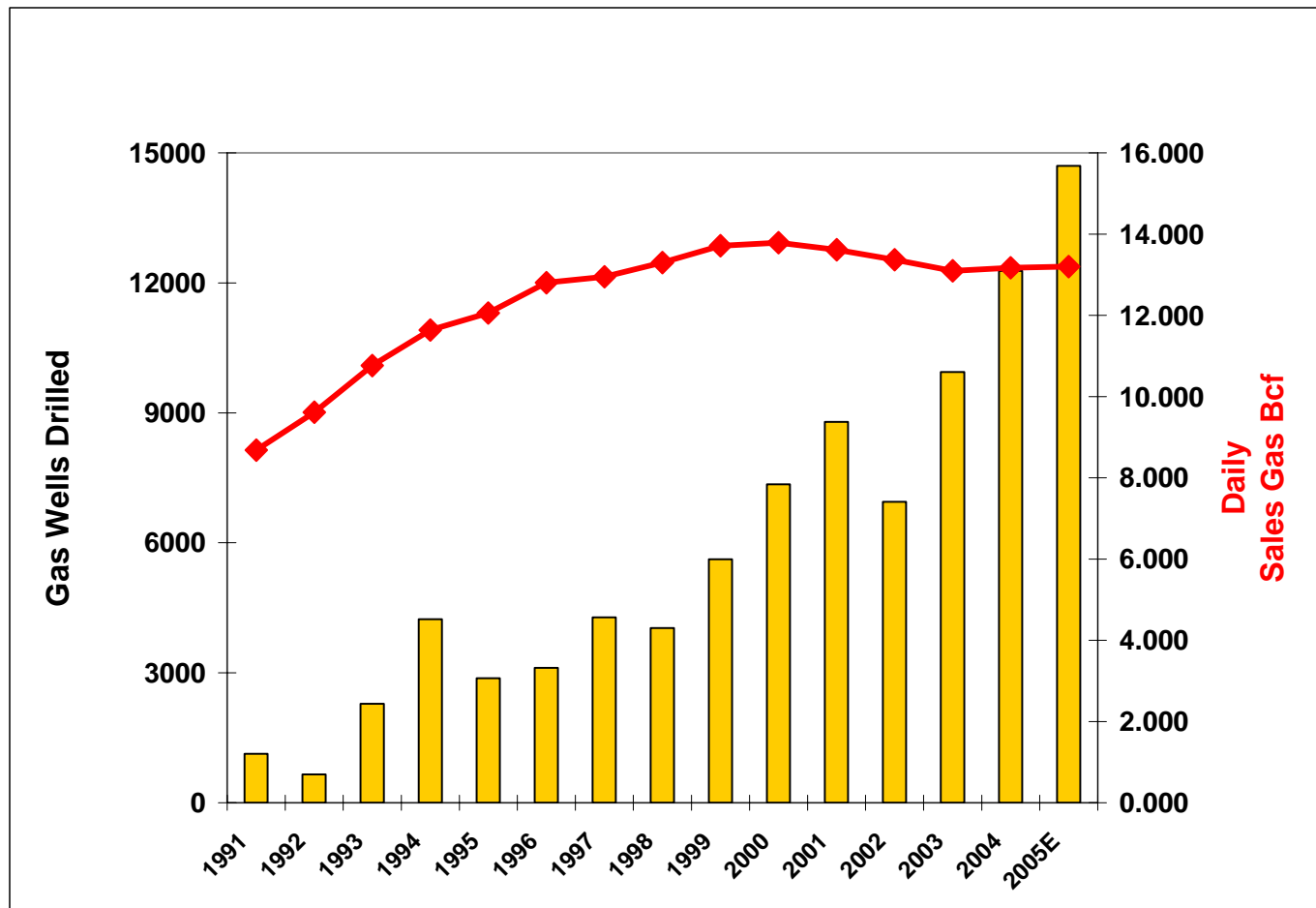


>50% of Canada's production is exported to USA

Alberta Natural Gas

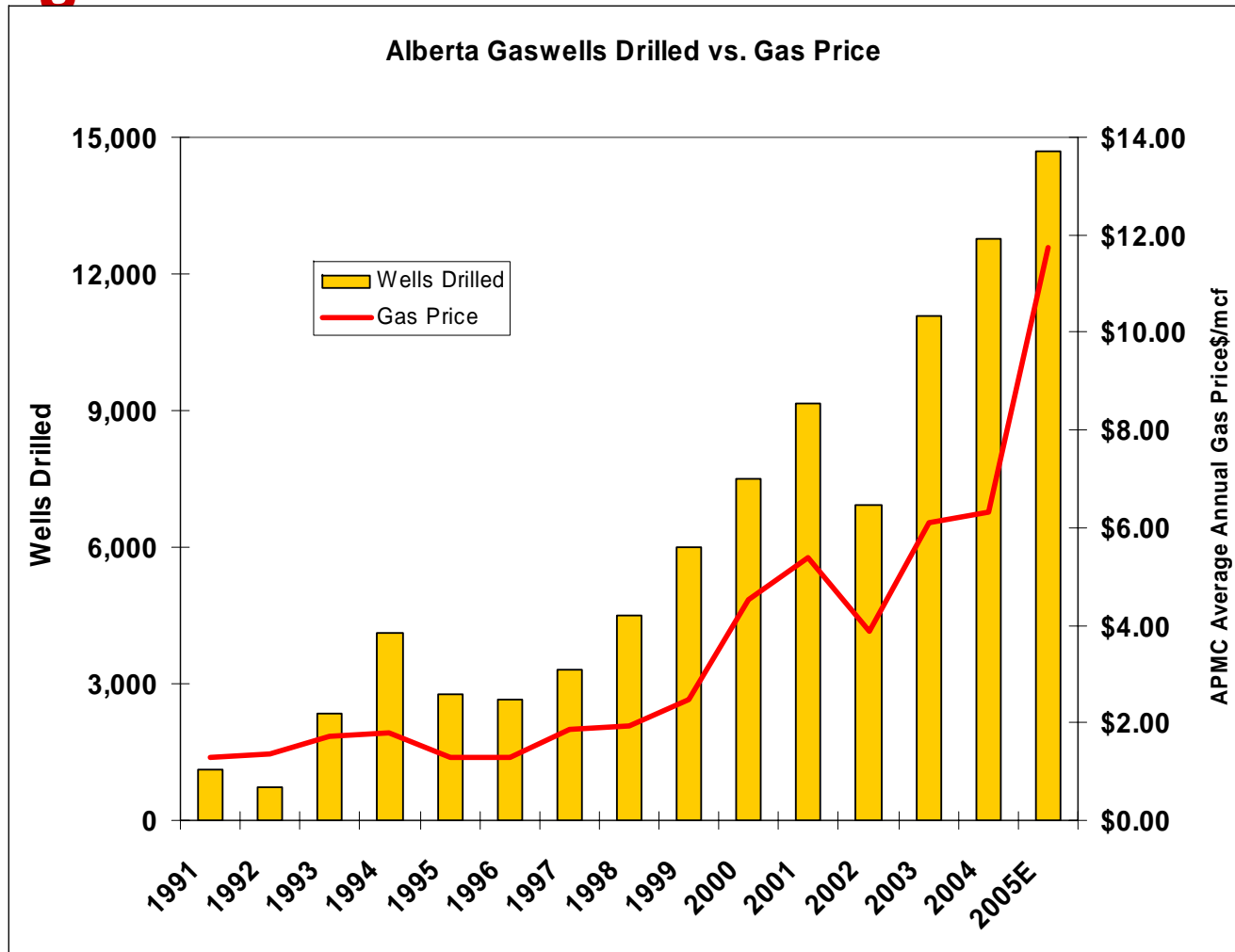


Drilling and Daily Sales Gas Bcf/d (CAPP Data)



High activity, high price and flat production = Red Flag

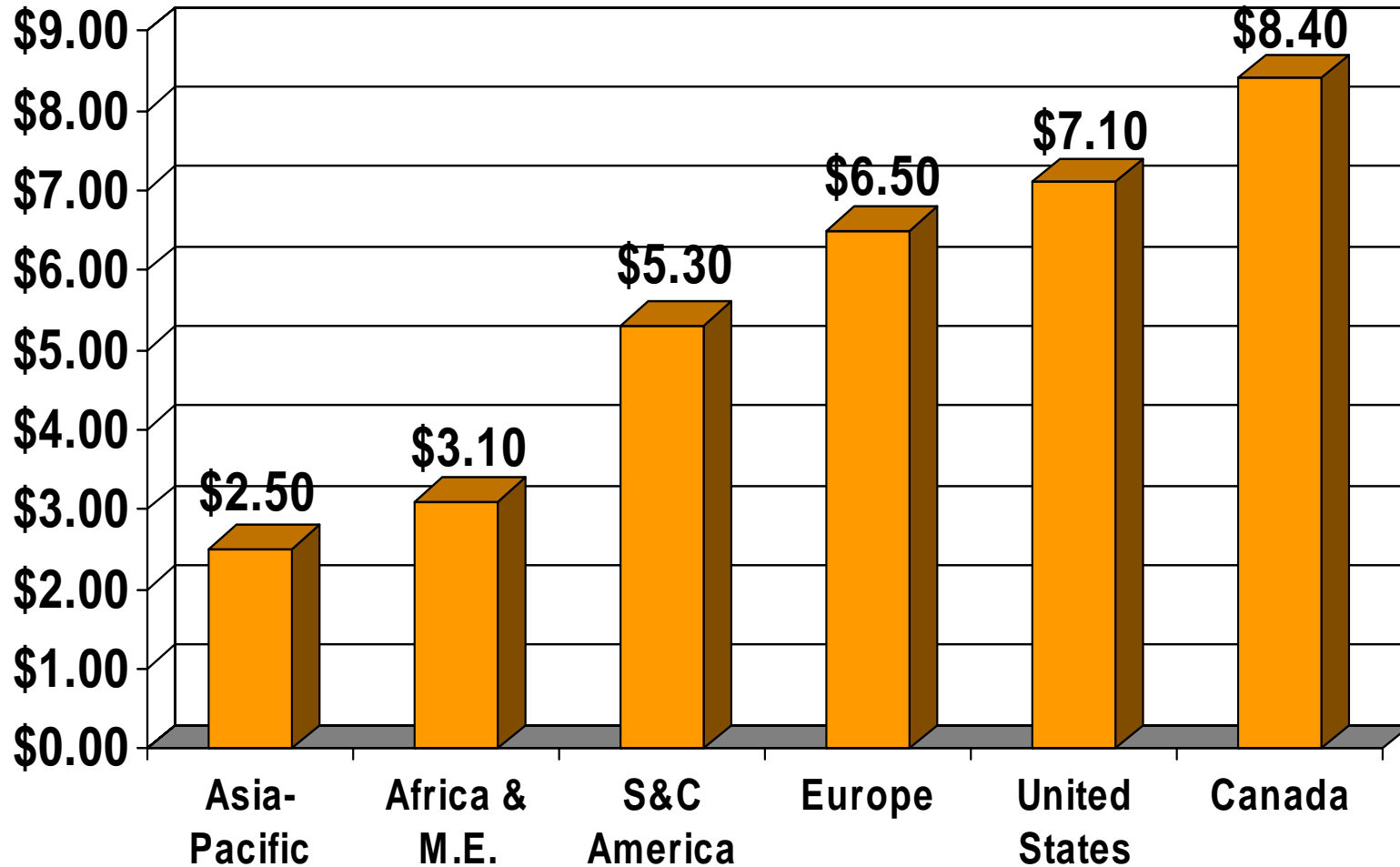
Alberta Natural Gas Drilling vs. Gas Price



Activity driven by price rather than production

Reserve Replacement Cost

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



W.C.S.B. 2005 Estimate \$19.09Cdn/BOE (First Energy, 2005)

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**

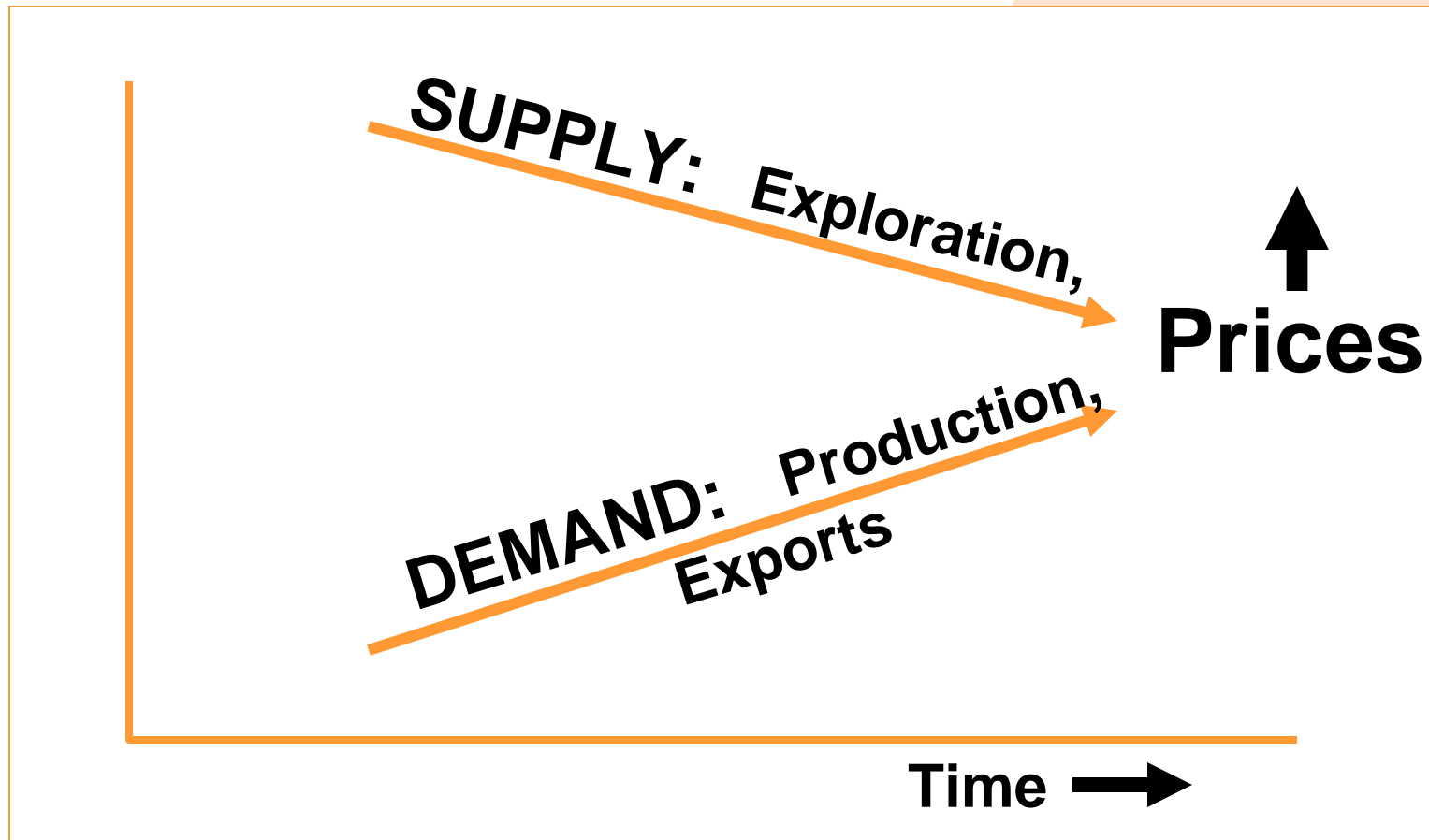
Predicting the Future

(From: Dave Russum, Geo-Help Inc., 2003)

Natural Gas In Canada – Where are we going?

GLOBAL FUTURE?

Kyoto?
El Nino?
NAFTA?
OPEC?
LNG?
Politics?
Terrorism?
N.Am
Economy?
Energy
alternatives
?



Understanding Remaining Gas Resources

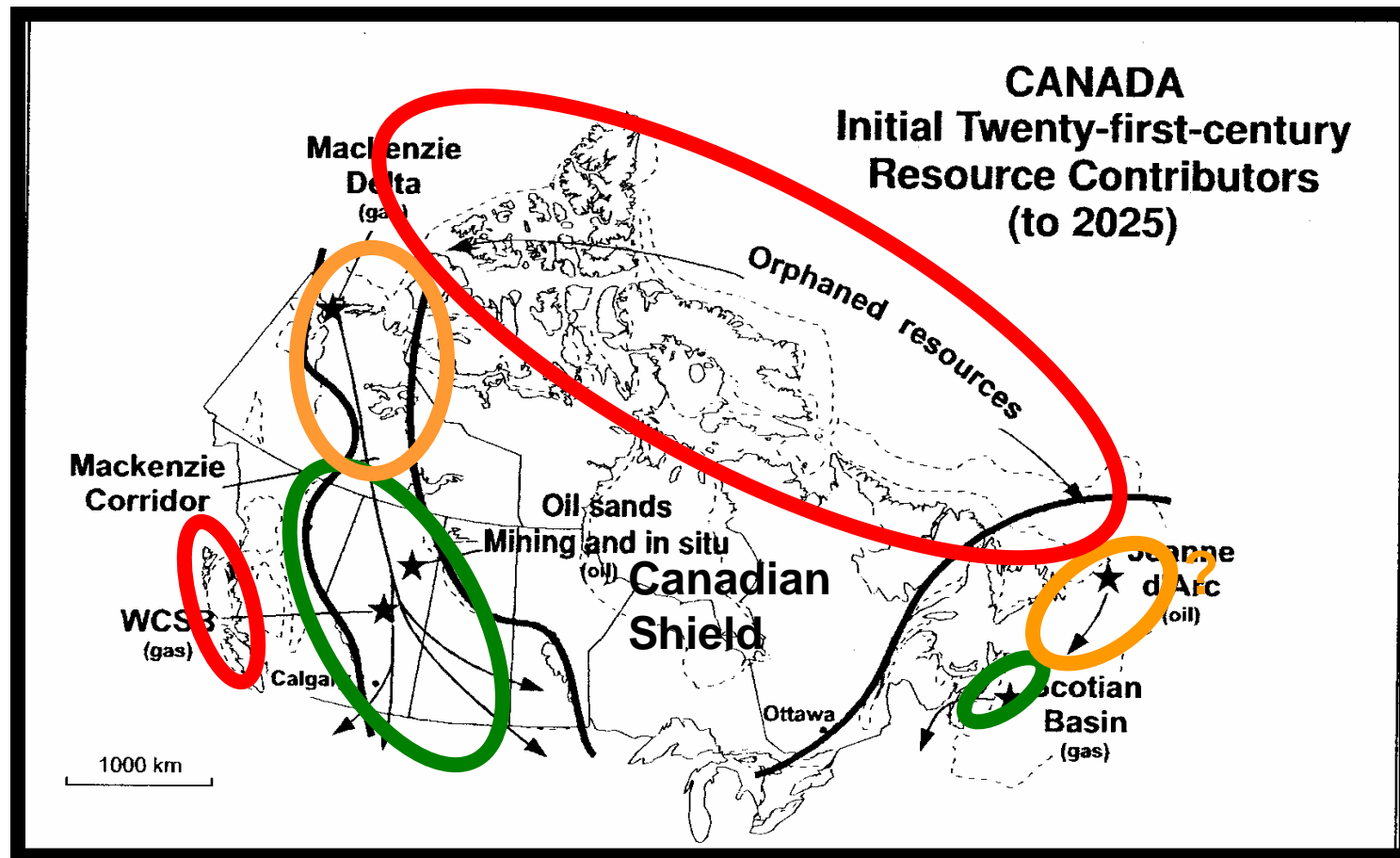


– Accessible and Economically Available

	Accessible	Accessible with Restrictions	Inaccessible
Available at current prices	Presently Available Resources (Reserves)	Future Available Resources	Unavailable Resources
Available at higher prices or new technology	Future Available Resources	Future Available Resources	Unavailable Resources

Can apply this approach to Conventional and Unconventional Resources

'Orphaned' Conventional Resources (Skipper, 2001)

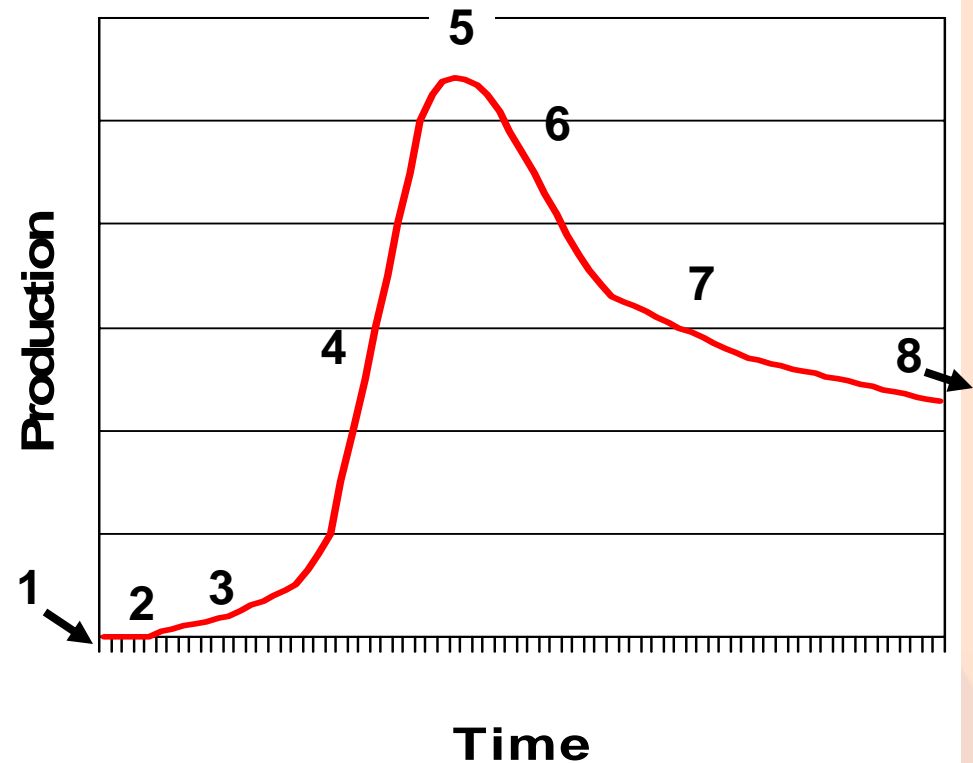


Green-Amber-Red Resource Assessment

Resource Development Model (RDM) – 8 Stages



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

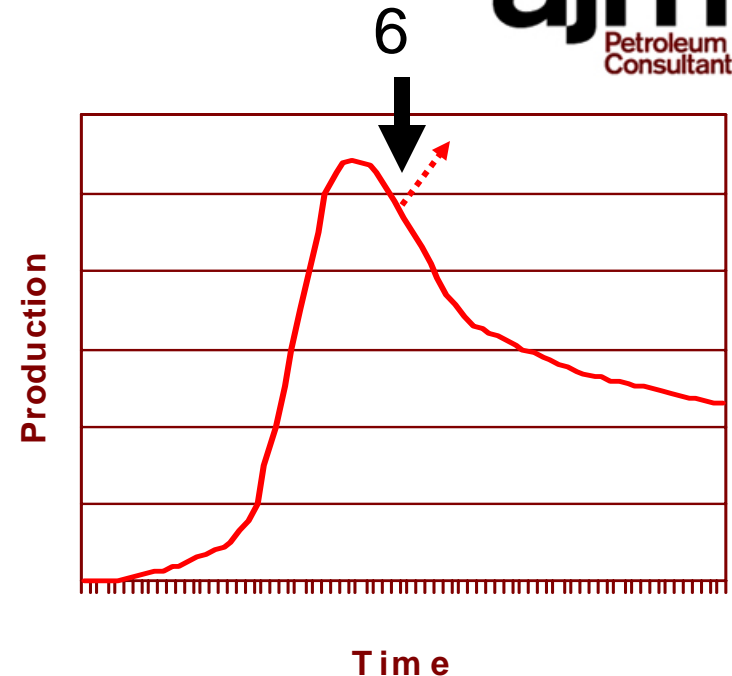


Knowing current stage of project can better predict future

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



Stage	1 Disc	2 Eval	3 Dev	4 Grow	5 Peak	6 Dec	7 Real	8 Abn	Cost
Alberta Gas									\$
British Columbia Gas									\$\$
Saskatchewan Gas									\$
East Coast Gas				?		?			\$\$\$
Mackenzie Gas									\$\$\$
Coalbed Methane			→						\$-\$\$\$
Shale Gas		→							\$\$?
Gas Hydrates									\$\$\$
West Coast Gas									\$\$\$
Liquefied Natural Gas									\$\$

Canada's Hydrocarbon Stages – Oil



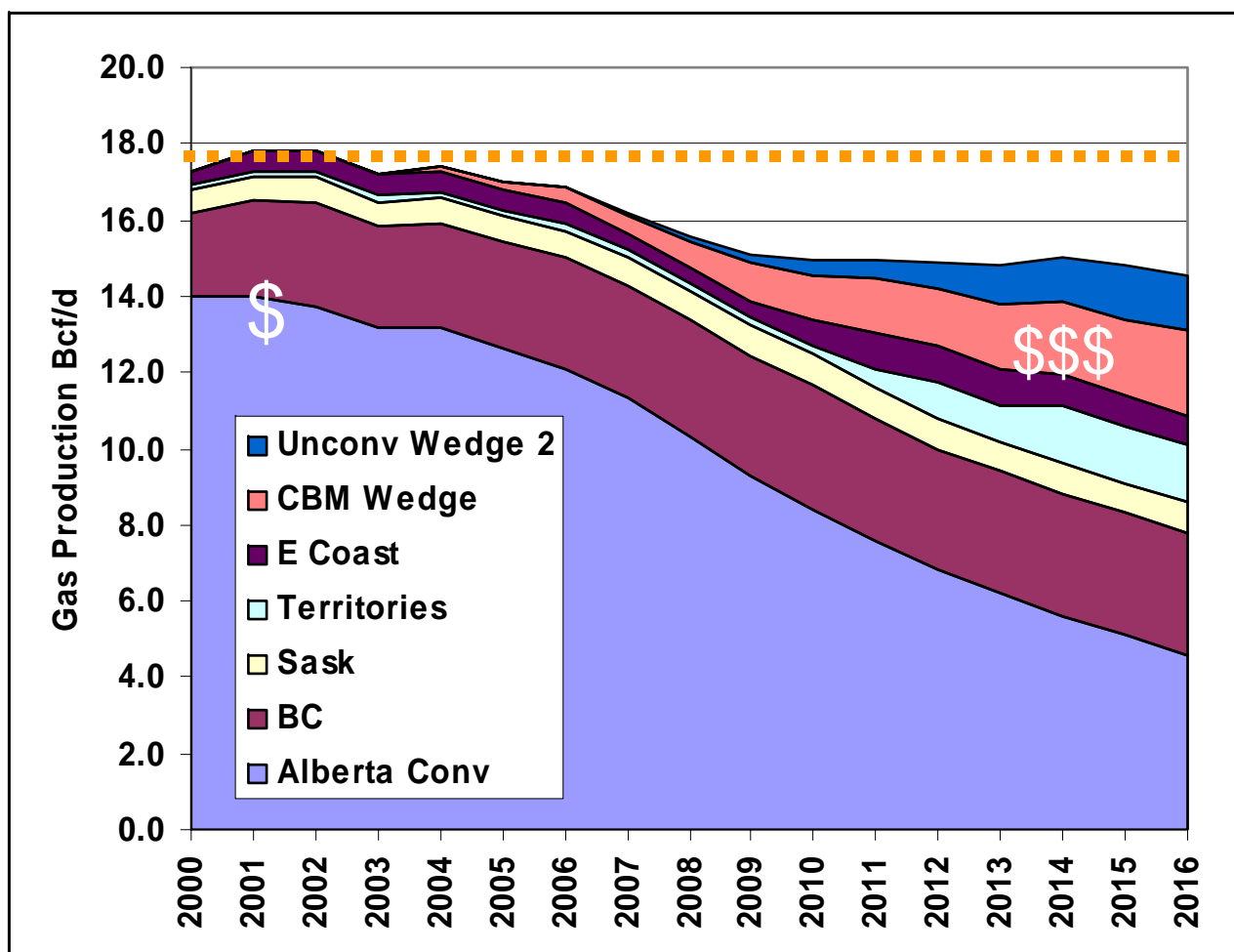
Stage	1 Disc	2 Eval	3 Dev	4 Grow	5 Peak	6 Dec	7 Real	8 Abn	Cost
AB Oil - Light									\$
AB Oil - Heavy									\$\$
Tar sands - surface									\$\$\$
Tar sands – in situ									\$\$\$
Other Fossil Fuels:									
Coal									\$\$

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

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More Information:
www.ajma.net

Thank You