



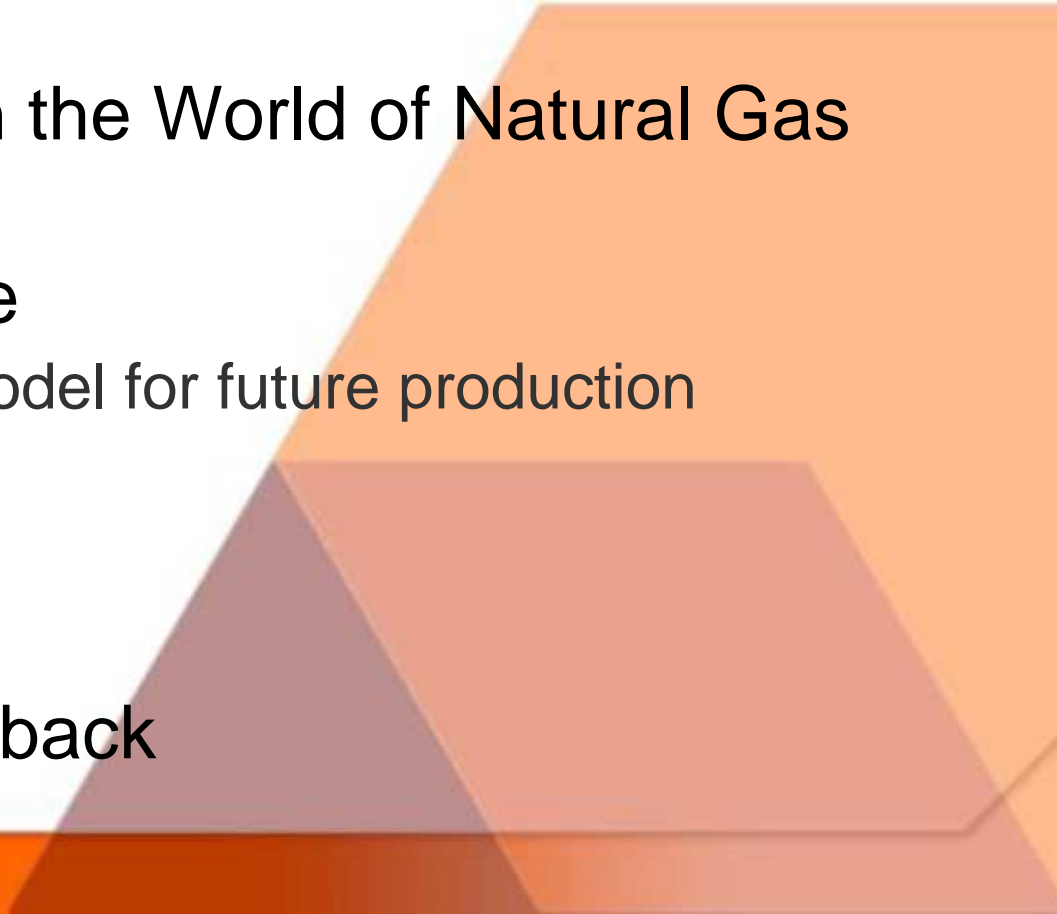
# **The Urgent Need for Unconventional Gas to sustain Canada's Natural Gas Production**

**Dave Russum, P.Geol.  
AJM Petroleum Consultants  
and Geo-Help Inc  
CSUG/PTAC Presentation,  
18<sup>th</sup> November 2004**

# The Reality of 2004

- ◆ **World fixation on oil price**
  - Getting close to World oil peak?
- ◆ **North America's situation is more critical**
  - Reached(?) natural gas peak production
- ◆ **Canada: the 'swing producer' for North American gas for the past decade**
- ◆ **Peak of Alberta gas portends peak in Canadian and North American gas production**
- ◆ **Flat or Declining gas production**
  - good news for Unconventional gas
  - bad news for consumer and economy of North America

# Presentation Format

- ◆ Gas Resources and Reserves
  - ◆ Gas Production and Drilling
  - ◆ Canada's Position in the World of Natural Gas
  - ◆ Predicting the Future
    - A Comprehensive model for future production
    - NEB view
    - My assessment
  - ◆ Questions and Feedback
- 



# **Canada's Natural Gas Resources and Reserves**

# Resource Triangle

**Conventional  
Reservoirs**

Small Resource  
High Quality  
Difficult to find  
Easy to develop  
Low cost  
High margin

**Obvious  
Traps**



**W.C.S.B.**

Basin Maturity  
Better Technology  
(Higher prices)



**Unconventional  
Reservoirs**

**Oil  
Shale**

**Gas  
Hydrates**

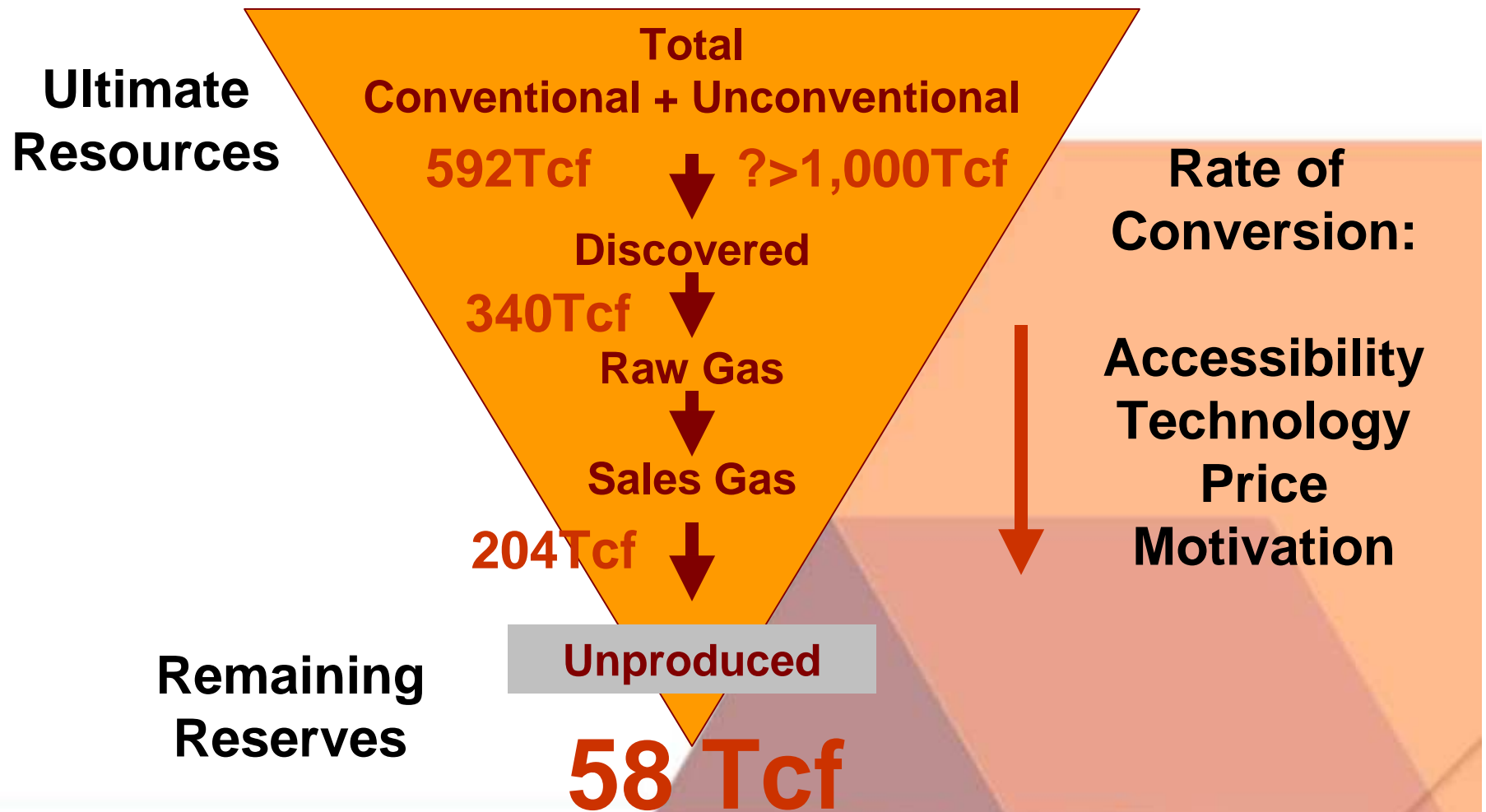
Large Resource  
Low Quality  
Easy to find  
Difficult to develop  
High cost  
Low margin

# Canada's Resources and Reserves

## Natural Gas

(Conventional data adapted from CGPC 2001)

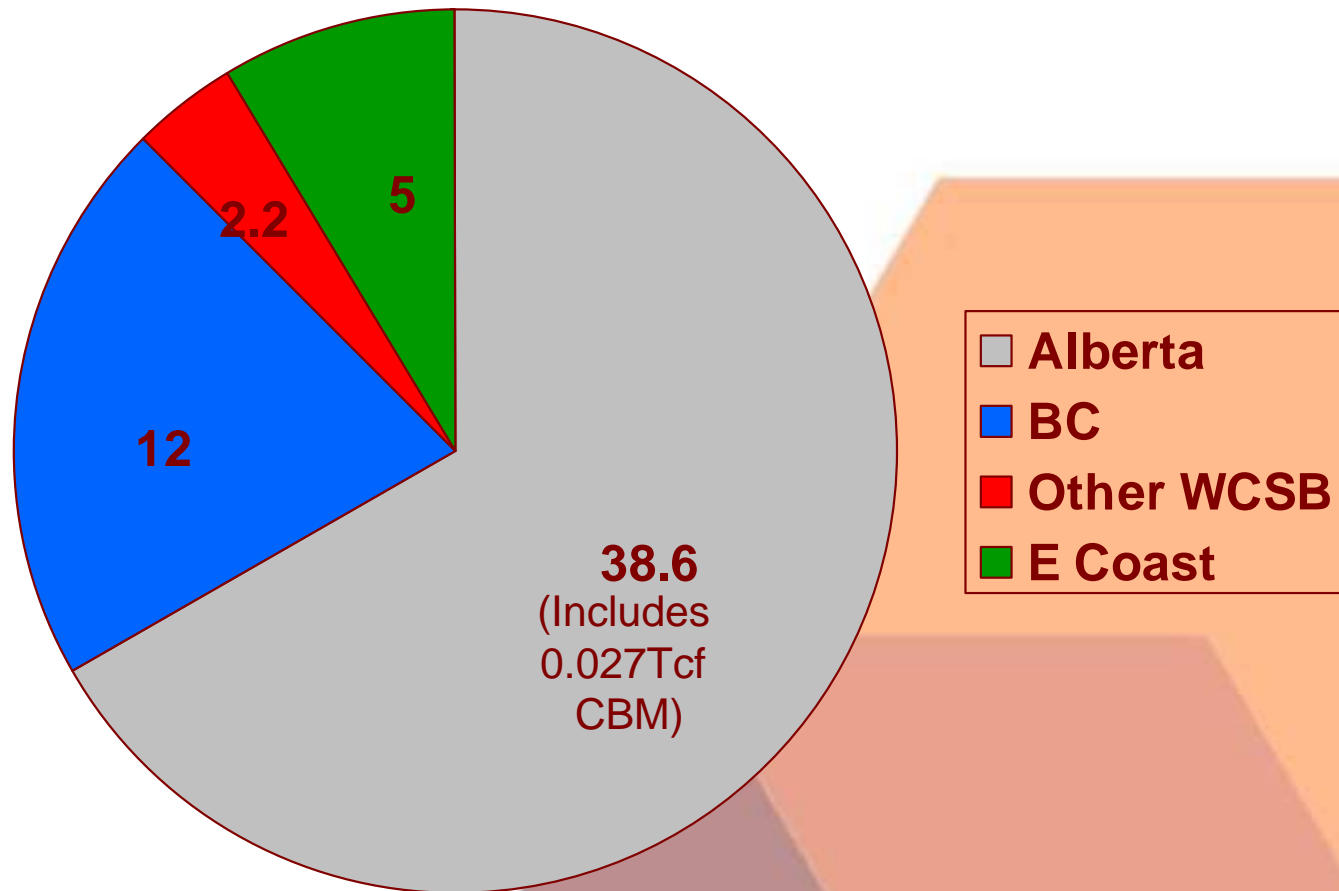
### ?1000'sTcf



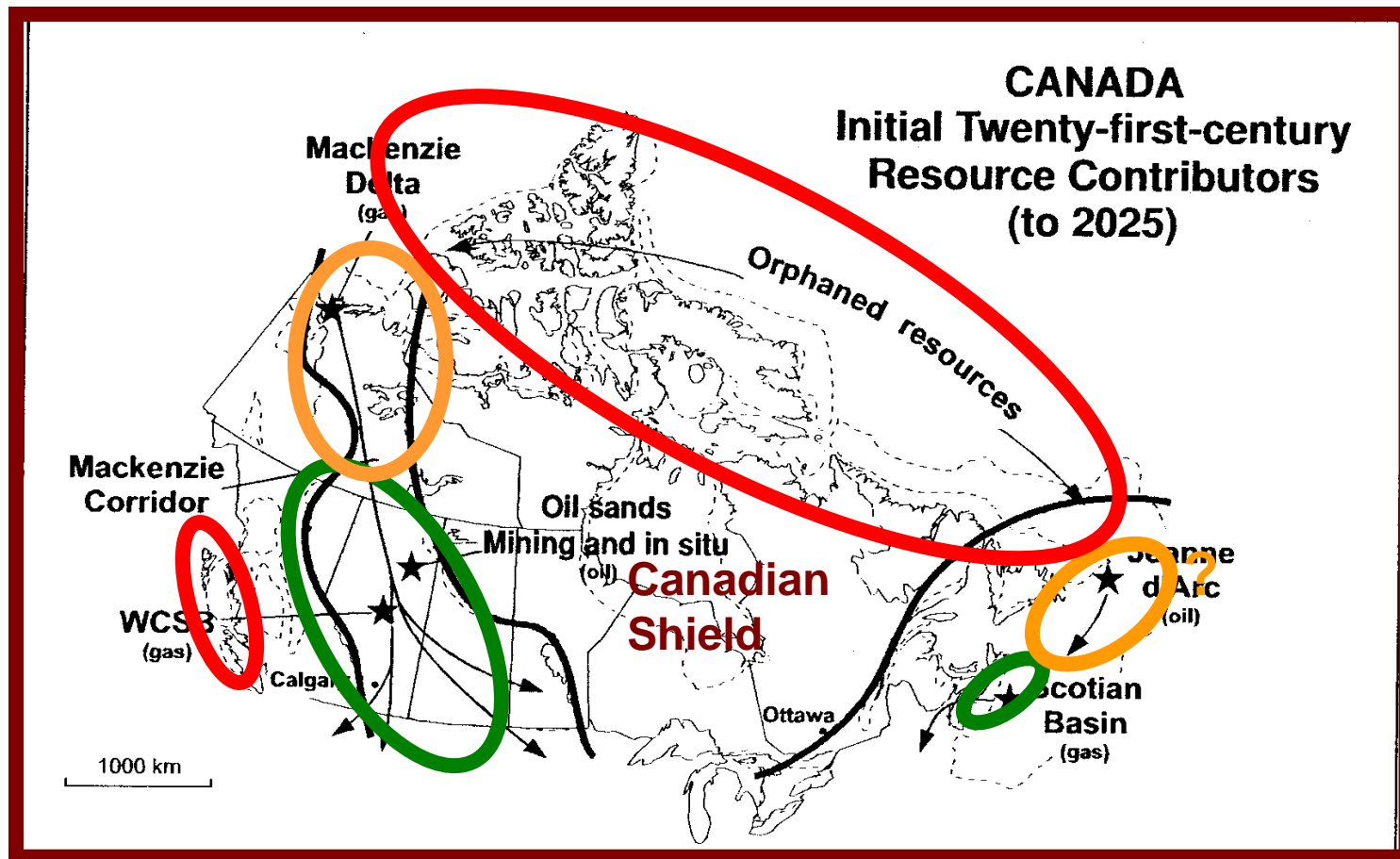
# Canada's Remaining Accessible, Proven, Marketable Gas Reserves

(Estimated December 2003)

**Total:  
57.8 Tcf**



# 'Orphaned' Conventional Resources (Skipper, 2001)



**Green-Amber-Red Resource Assessment**

# Understanding Remaining Gas Resources – Accessible and Economically Available

	Accessible	Accessible with restrictions	Inaccessible
Available at current prices	Presently Available Resources	Future Available Resources	Unavailable Resources
Available at higher prices	Future Available Resources	Future Available Resources	Unavailable Resources

# Approximate distribution of Un-produced Natural Gas Resources

Present	Post 2010	>2025
57.8Tcf Disc. + ?Tcf Undisc.		
	9.5Tcf + ?Tcf Undisc.	
		1,000'sTcf

Working with the CGPC to fill out the table for 2005

The '?' will depend on Unconventional Resources



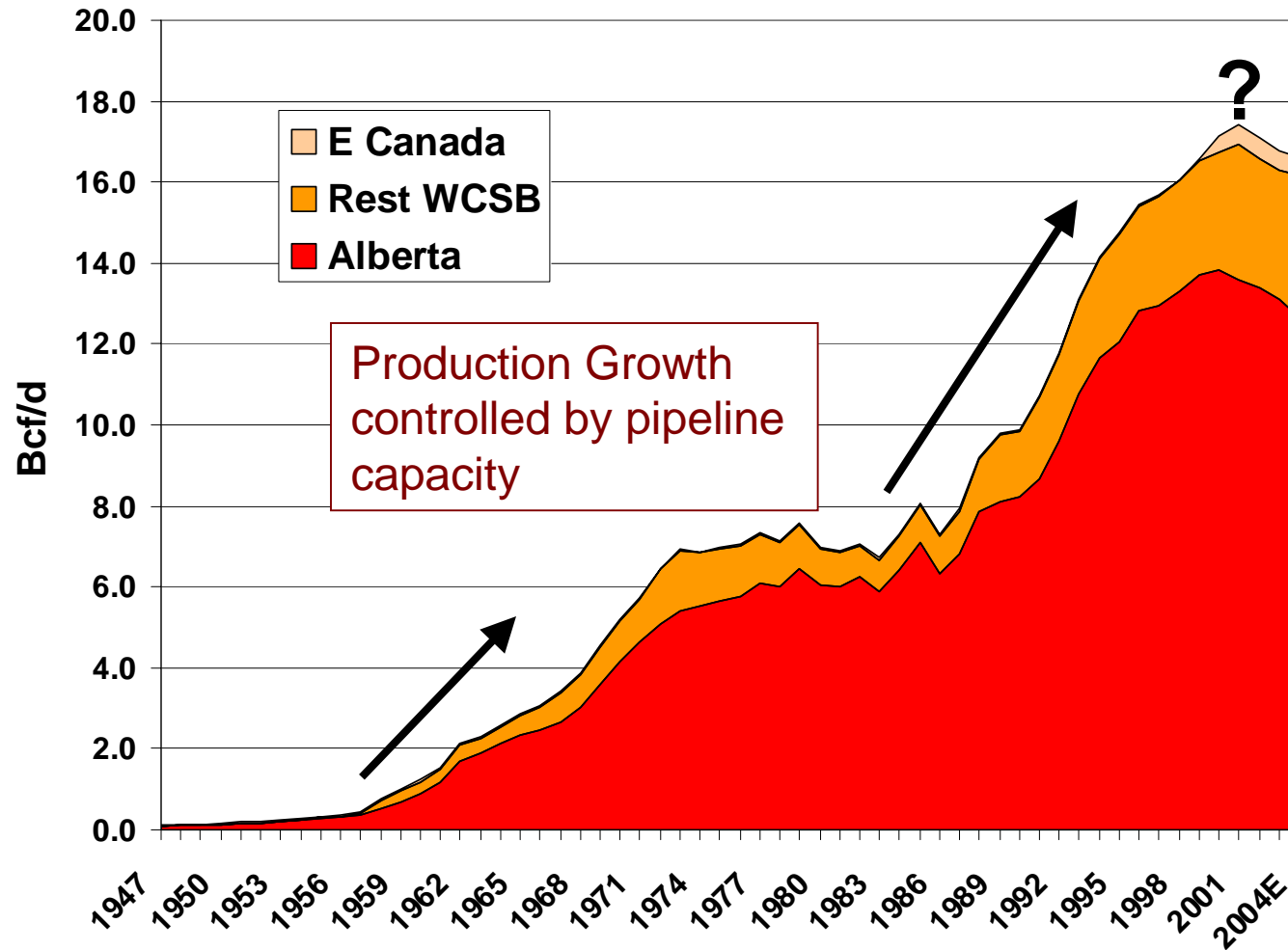
# Canada's Gas Production

# Canada:

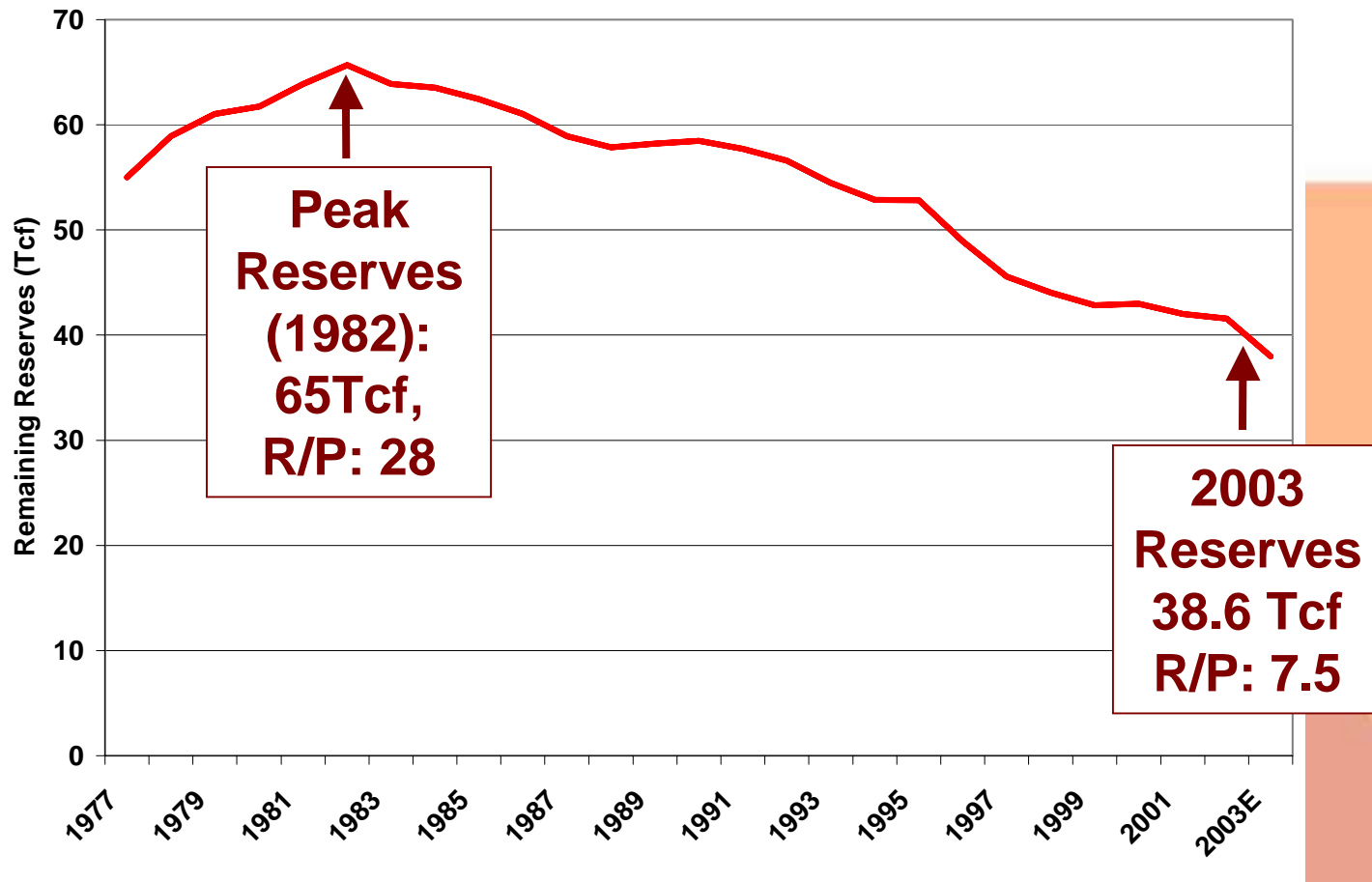
- ◆ 3<sup>rd</sup> Largest Natural Gas Producer
  - ◆ 2<sup>nd</sup> Largest Natural Gas Exporter
  - ◆ 1% of World Natural Gas Reserves
  - ◆ ~20% of World Drilling Rig Count
- 

# Canada's Natural Gas Production

(Bcf/d Adapted from CAPP Data)

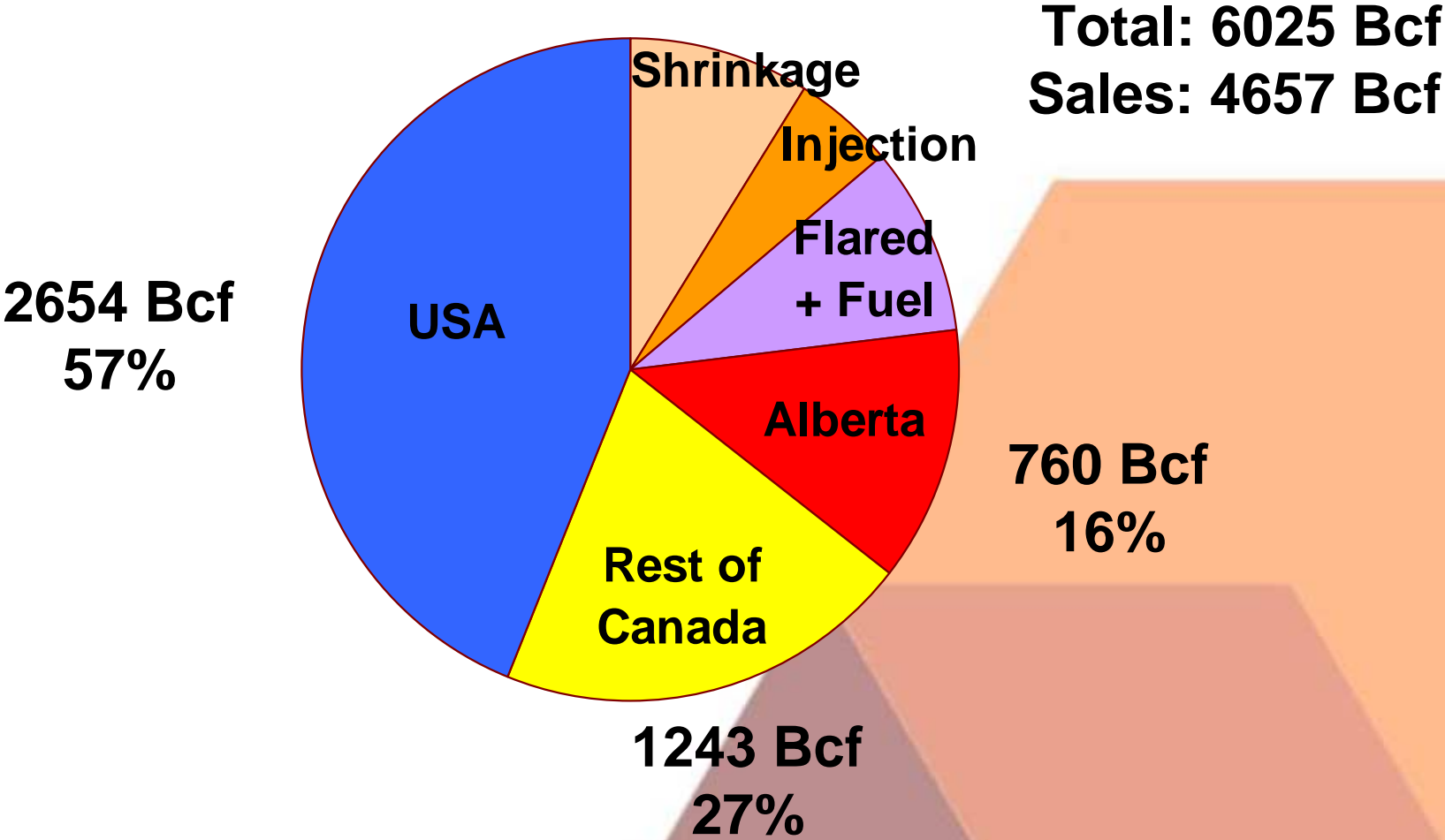


# Alberta Remaining Reserves and R/P (Reserves to Production Ratio)

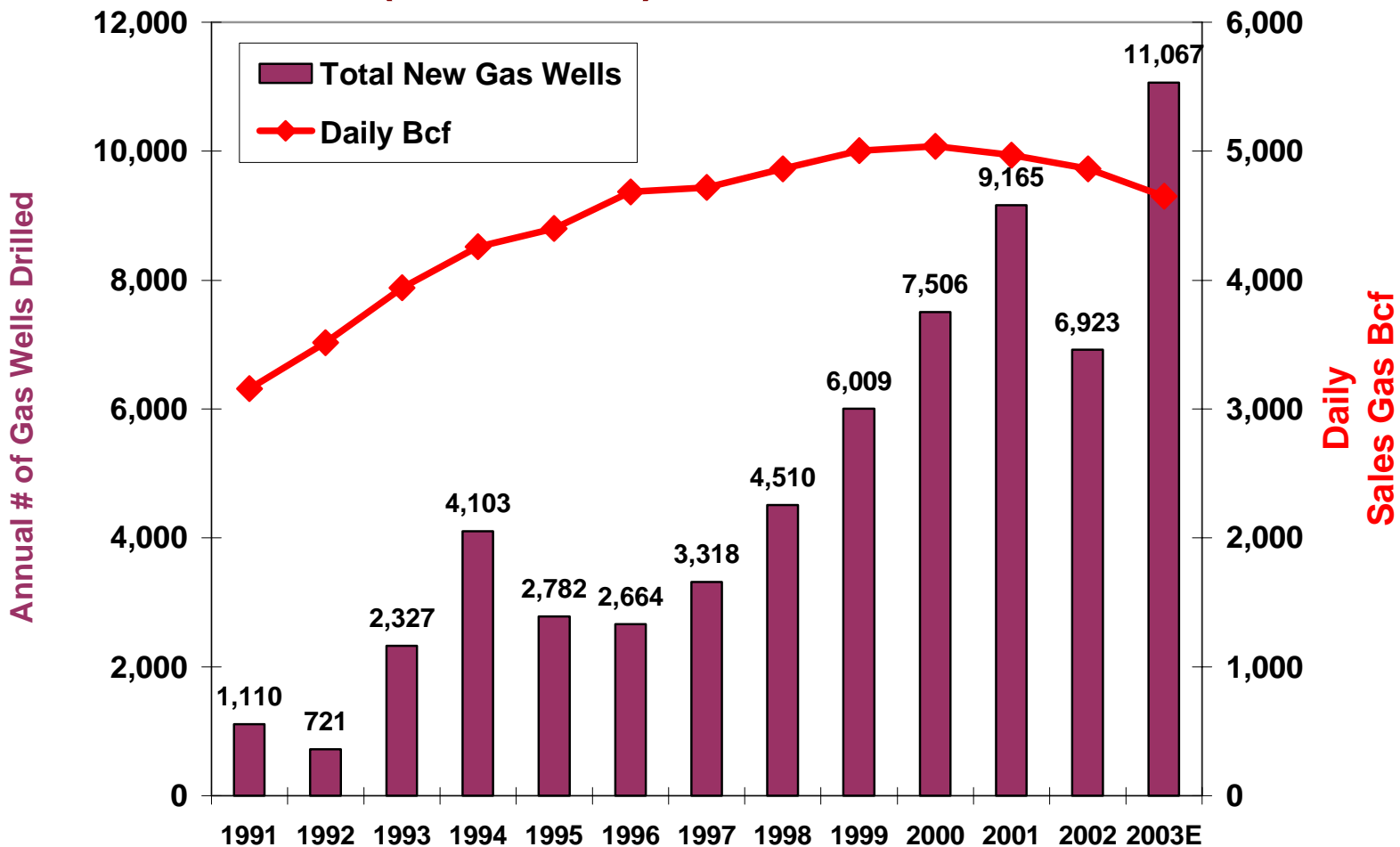


**Found more gas than produced only 3 years since 1982**

# Where did Alberta's Gas Go in 2002? (AEUB ST-3)

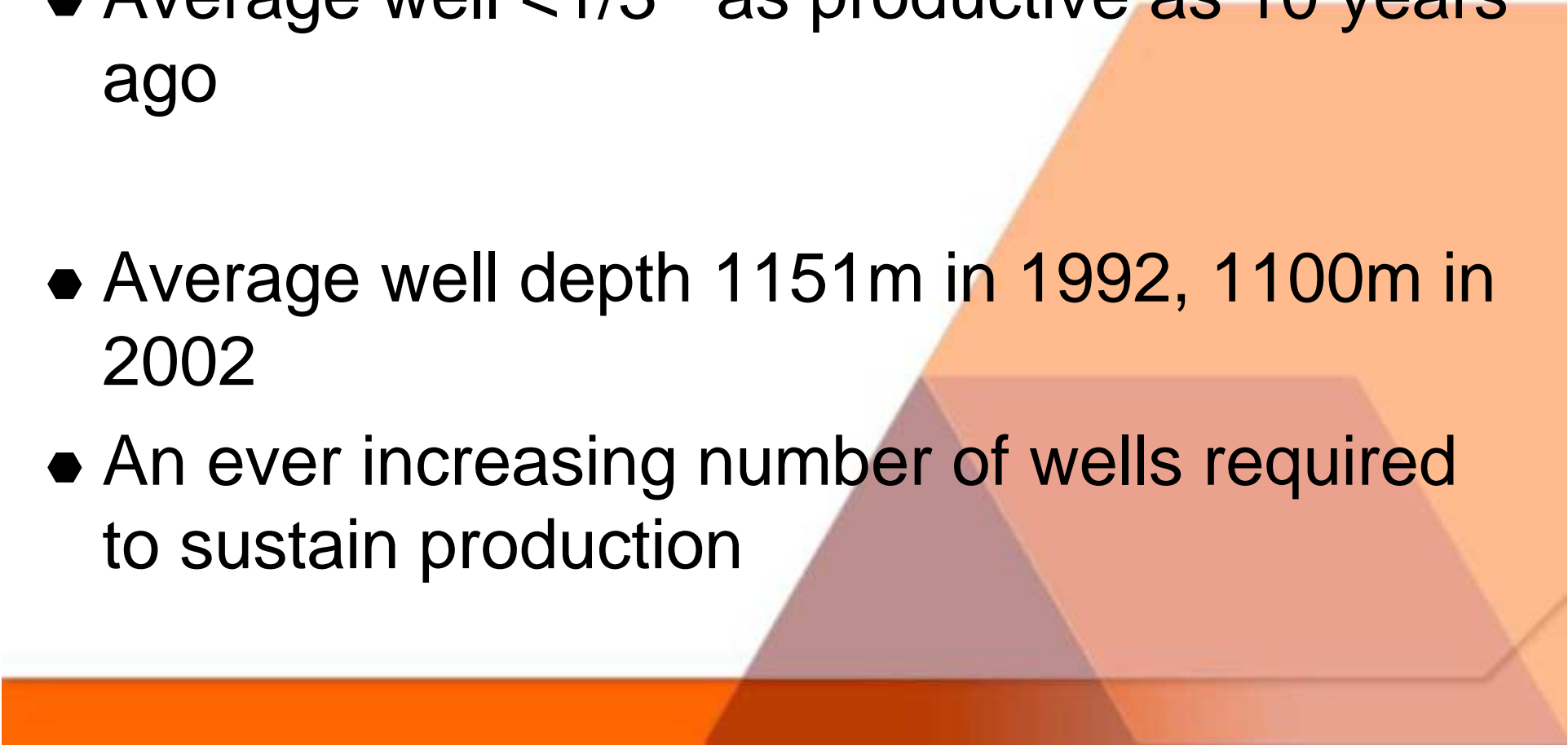


# Alberta New Gas Drilling and Daily Sales Gas (CAPP Data)



High activity, high price and declining production = Red Flag

# Alberta Gas Trends 1992-2002

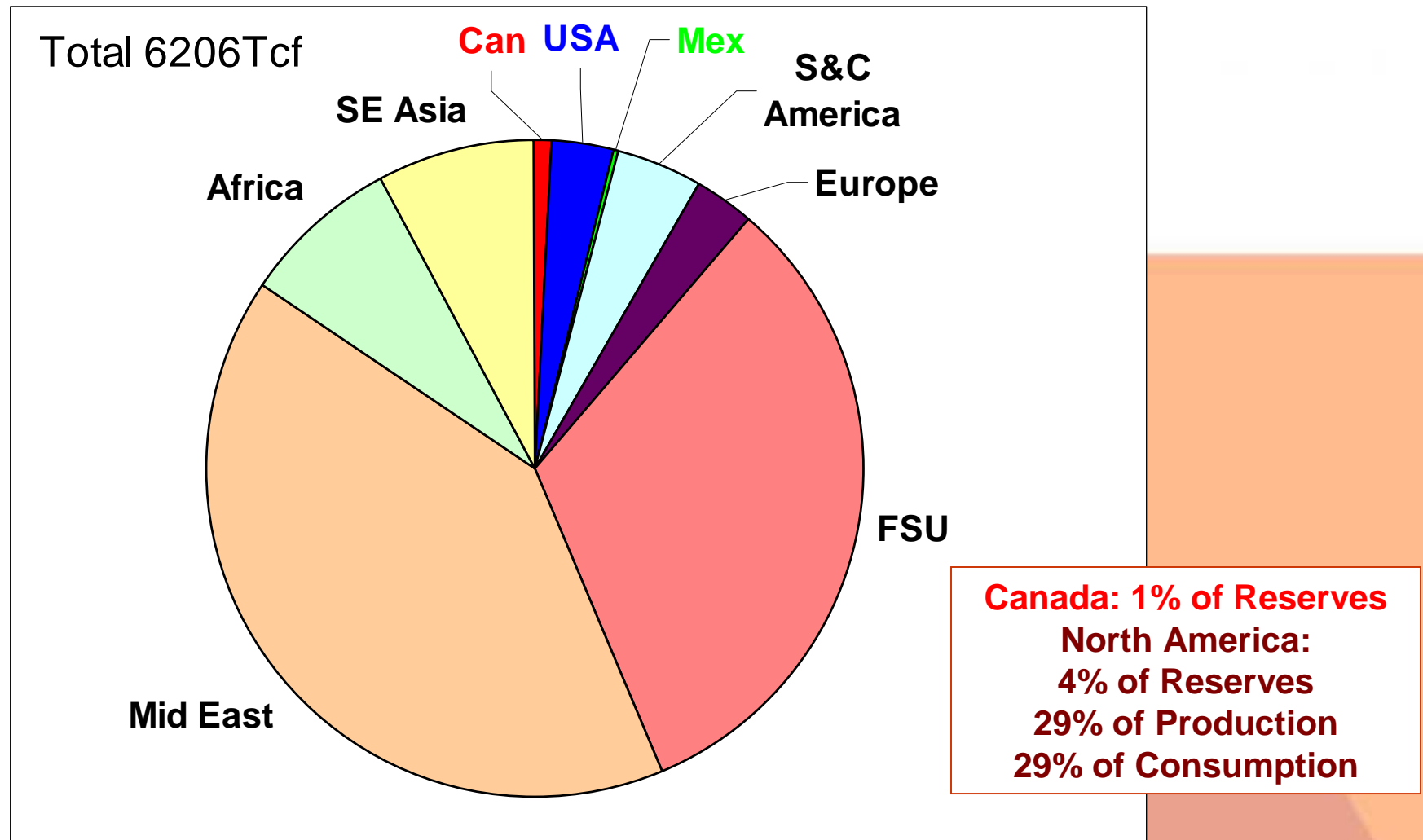
- ◆ Average IP down 61%
  - ◆ Average Decline rate up 21%
  - ◆ Average well  $<1/3^{\text{rd}}$  as productive as 10 years ago
  - ◆ Average well depth 1151m in 1992, 1100m in 2002
  - ◆ An ever increasing number of wells required to sustain production
- 



# **Canada's Position in the world of Natural Gas**

# World Gas Reserves

(BP, 2004)

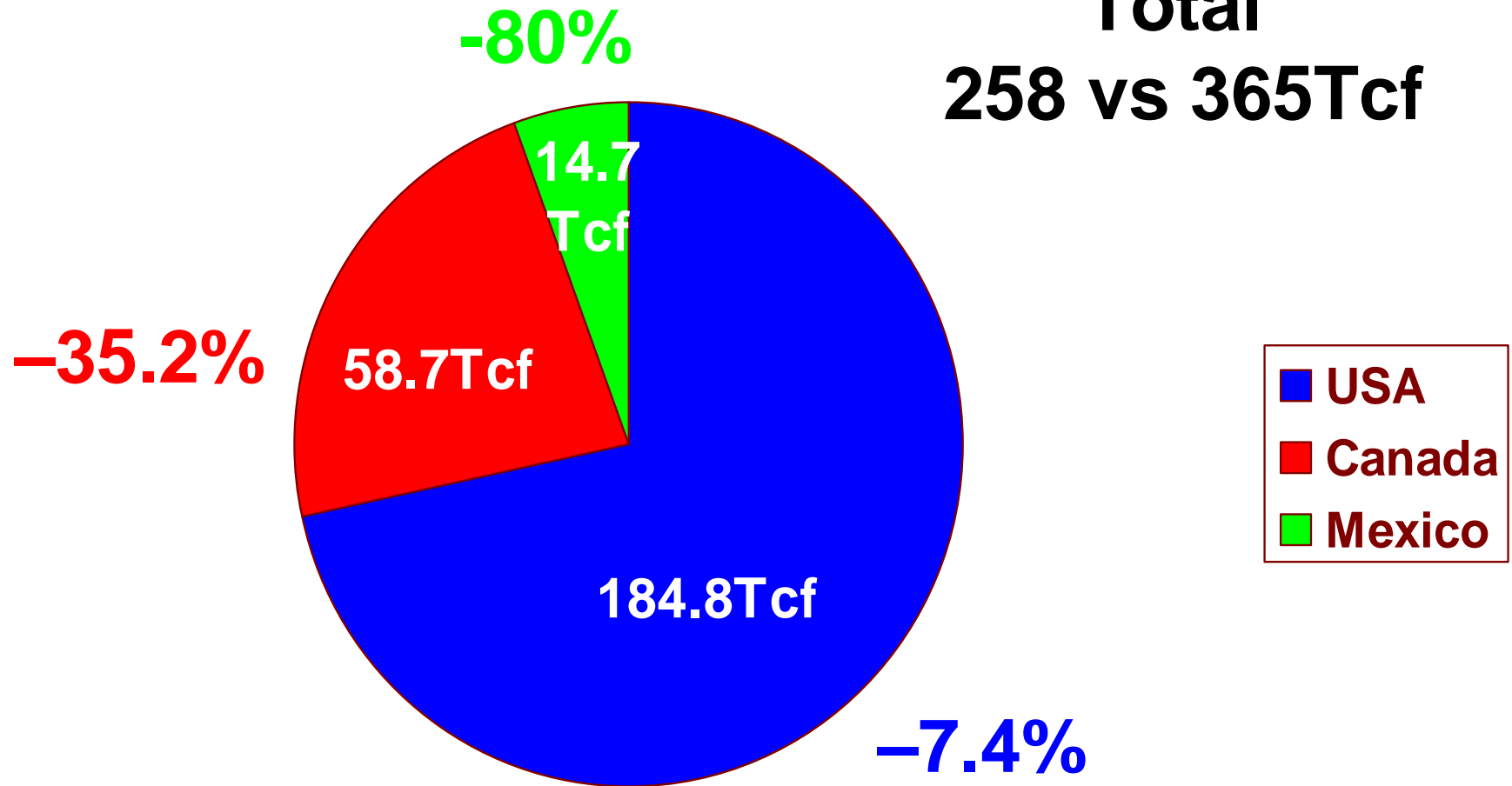


Currently a landlocked resource, LNG could make gas a world commodity

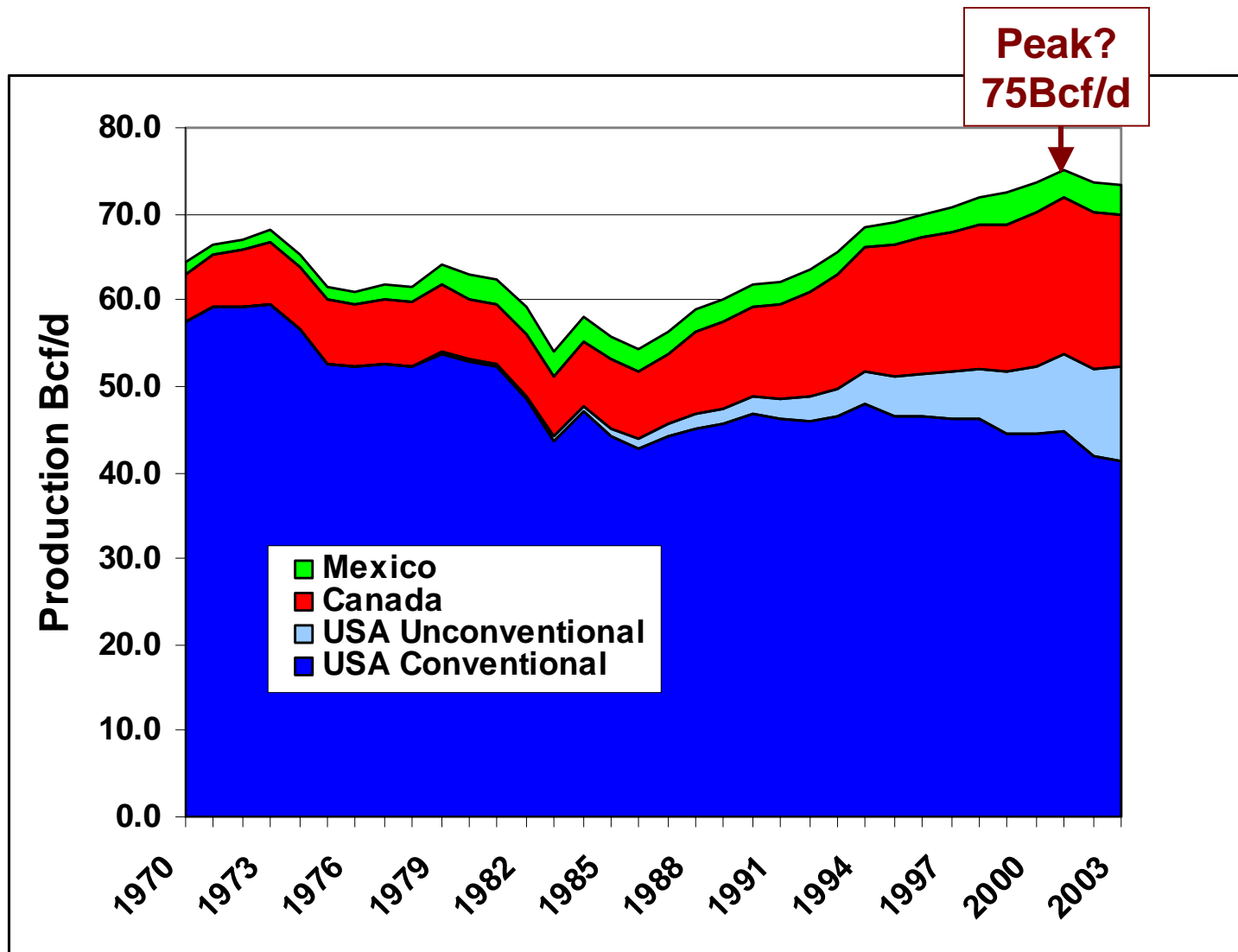
# North America Reserves

2003 vs 1981 (BP 2004 Data)

Total  
258 vs 365Tcf



# North American Gas Production

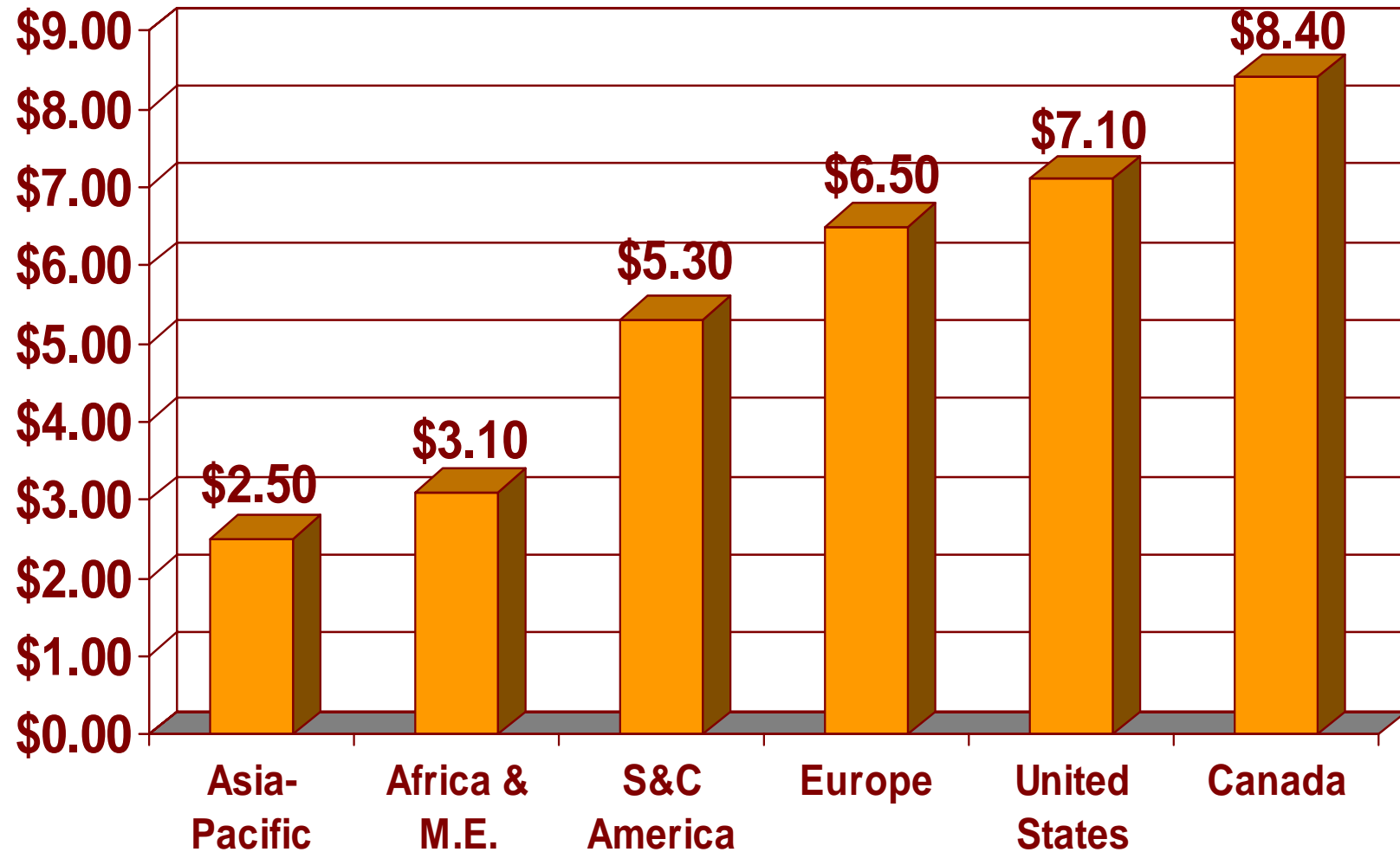


# Reserves to Production R/P or RLI

- 1% of the proven Natural Gas reserves in the World (18th place)
- R/P:
  - Total World: 67.1 Years
  - Russia 81.2 Years
  - USA 9.5 Years
  - Canada 9.2 Years
  - UK 6.2 Years (Peaked in 2000)
- Alberta's R/P is 7.5 (28 in 1982)
- Does not mean we will run out of gas in 7.5 years!!!
  - Cannot sustain production rate as reserves decline

# Reserve Replacement Cost 2002

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

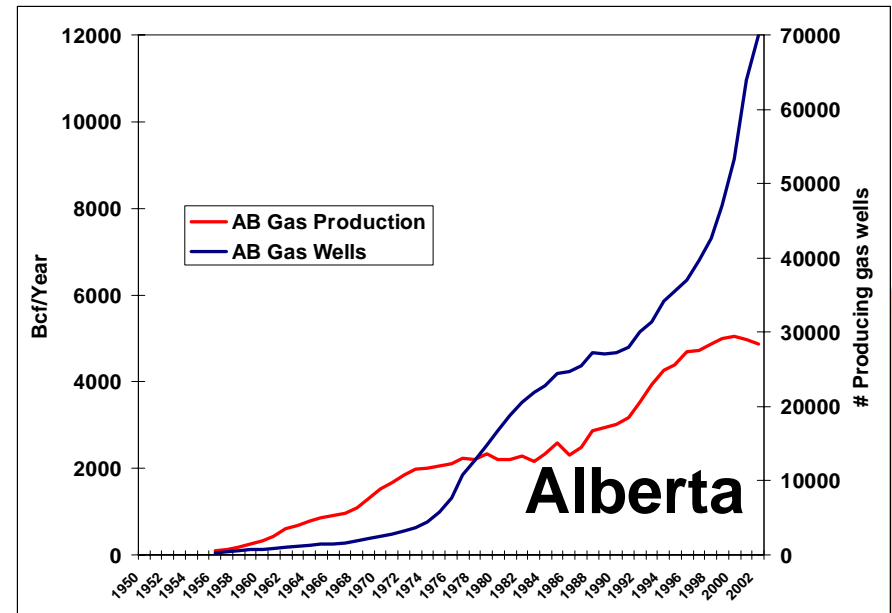
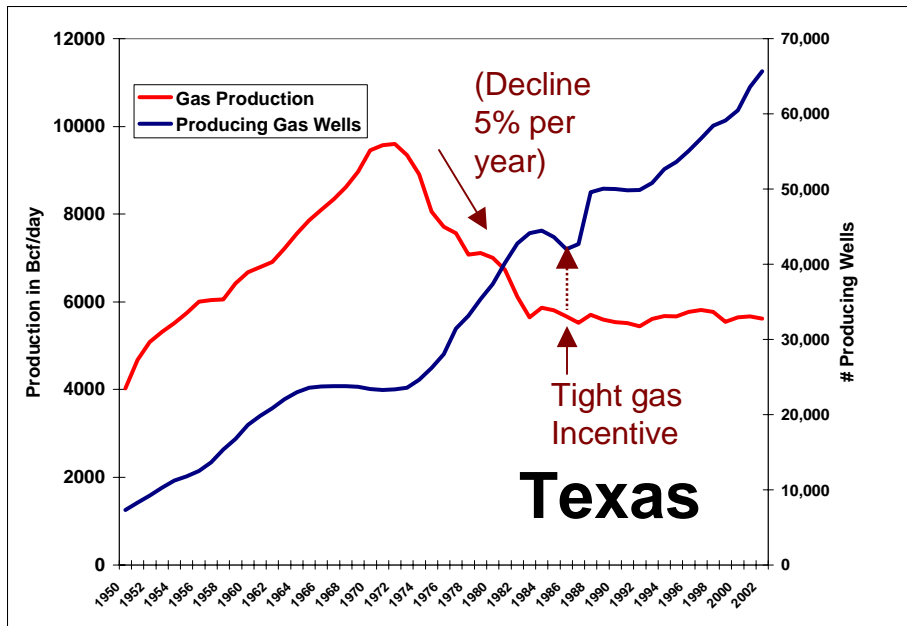


# “Don’t worry - Canada is less explored than the US”

- ◆ Every Basin and geologic trend has different potential
- ◆ The WCSB has been more efficiently exploited than any other Basin in the World
- ◆ Some of early ‘Unconventional’ knowledge evolved in Canada (Deep Basin=BCG, Shallow biogenic gas)

**Should not assume we will see the same trends in Canada as have occurred in the USA**

# Texas (on shore) vs. Alberta



**Area:** 269,000 Sq Miles.

**Peak:** 1971

**Rem. Res:** 43Tcf

**Annual Prodn:** 5.6Tcf

**R/P:** 7.7

**Cum Prod:** 319Tcf

**255,000 Sq Miles**

**2001**

**38.6Tcf**

**4.8Tcf**

**8.0**

**116Tcf**

**Texas is richer in natural gas than Alberta!**

# Comments

- ◆ **As pass peak: gas price vulnerable to fluctuations in supply and demand**
- ◆ **Canada's long term position as a natural gas producer 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**
- ◆ **Want to show a model that improves prediction**



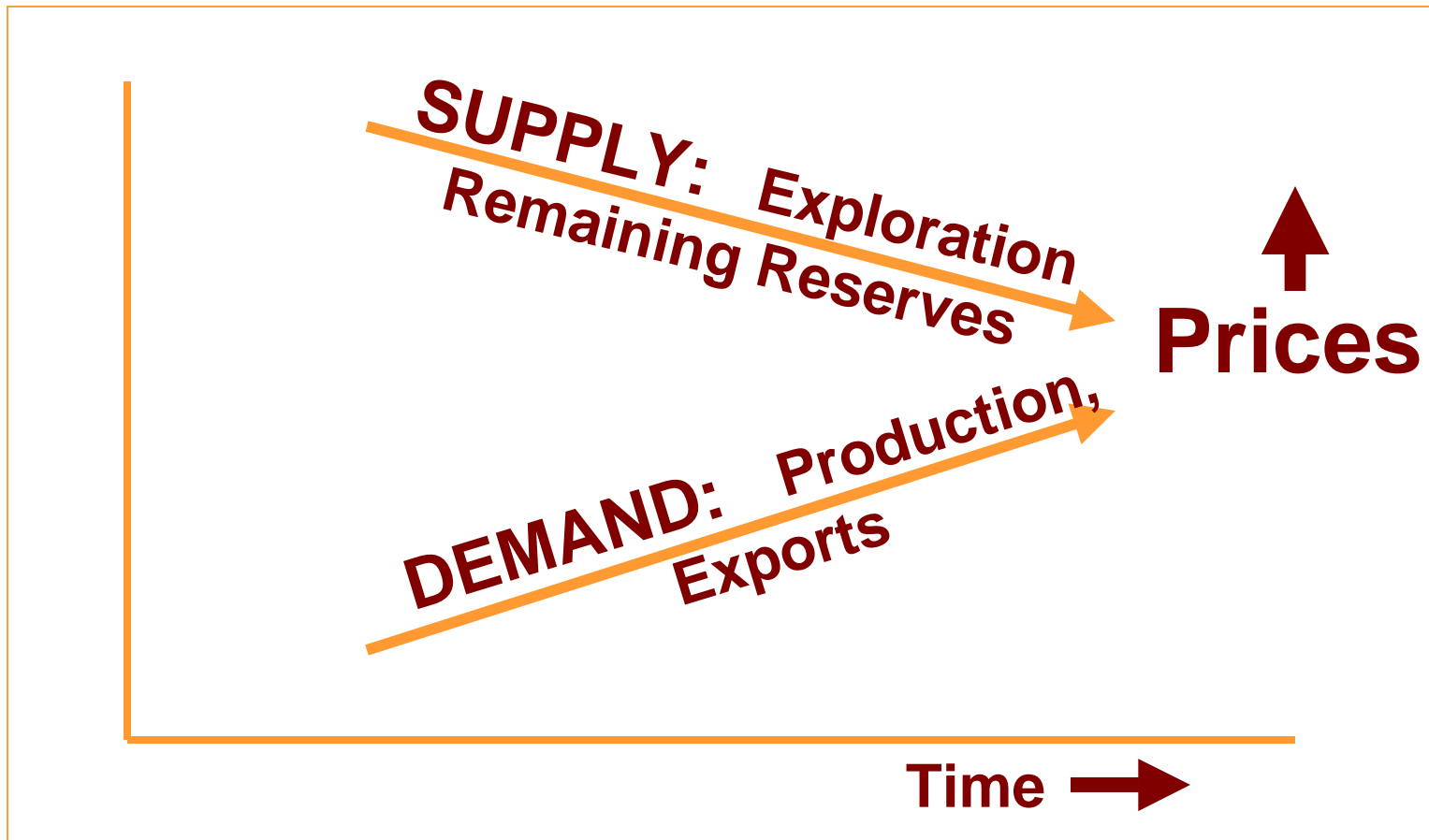
# Predicting the Future

**Dave Russum**  
**Geo-Help Inc**  
**June 2003**

# Natural Gas In Canada – Where are we going?

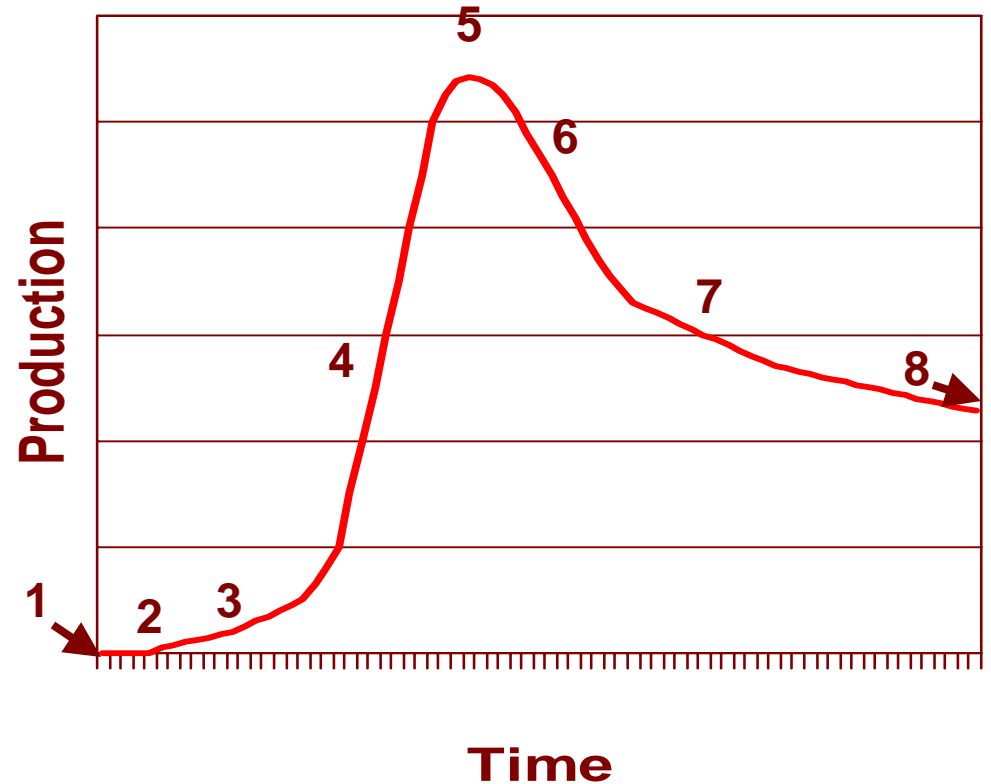
GLOBAL  
FUTURE?

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



# Resource Development Model (RDM) – 8 Stages

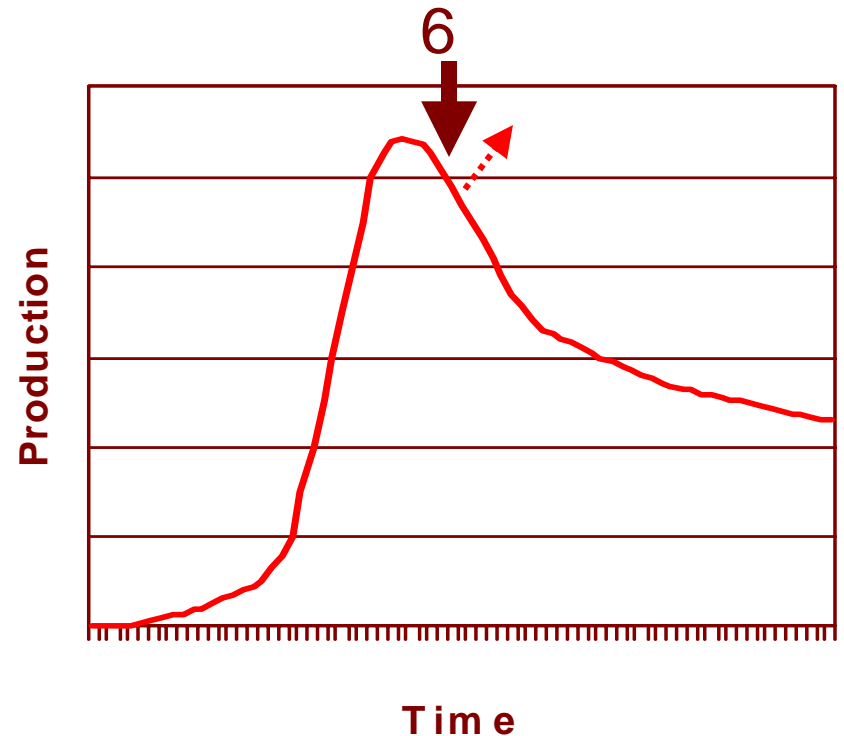
1. Discovery
2. Evaluation
3. Development
4. Growth
5. Peak
6. Decline
7. Reality
8. Abandonment



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**



# Predicting the future

Resource Development Model

+

Current Production\*

+

Decline Analysis\*

+

Investment/Exploration/Drilling/Technology trends

=

Accurate prediction of future production

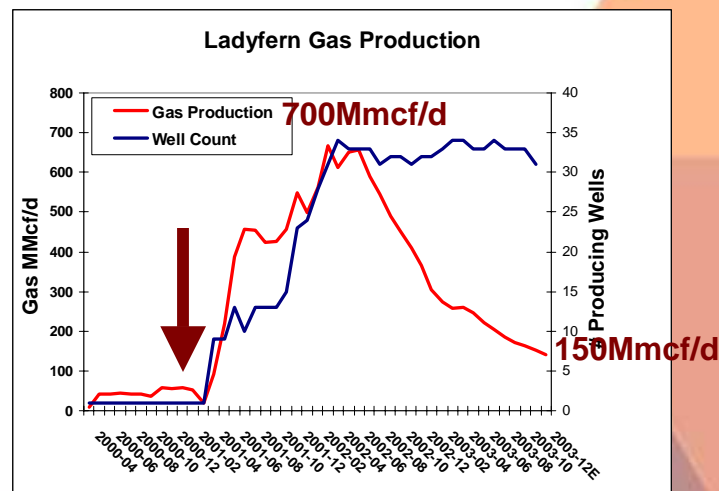
\* Data from PetroCube a new product from AJM Petroleum Consultants



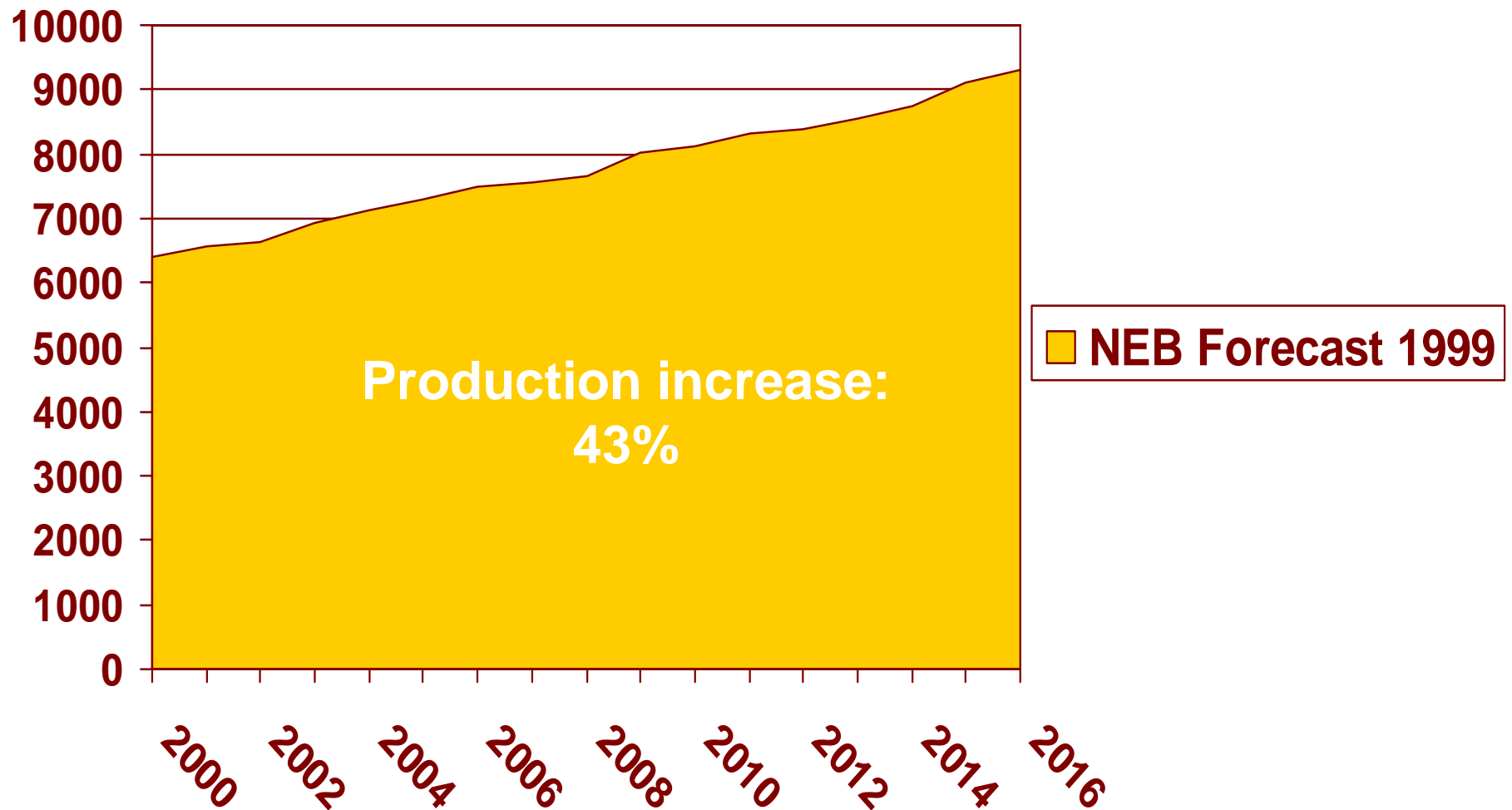
# **The Future According to the NEB**

# The importance of up-to-date information

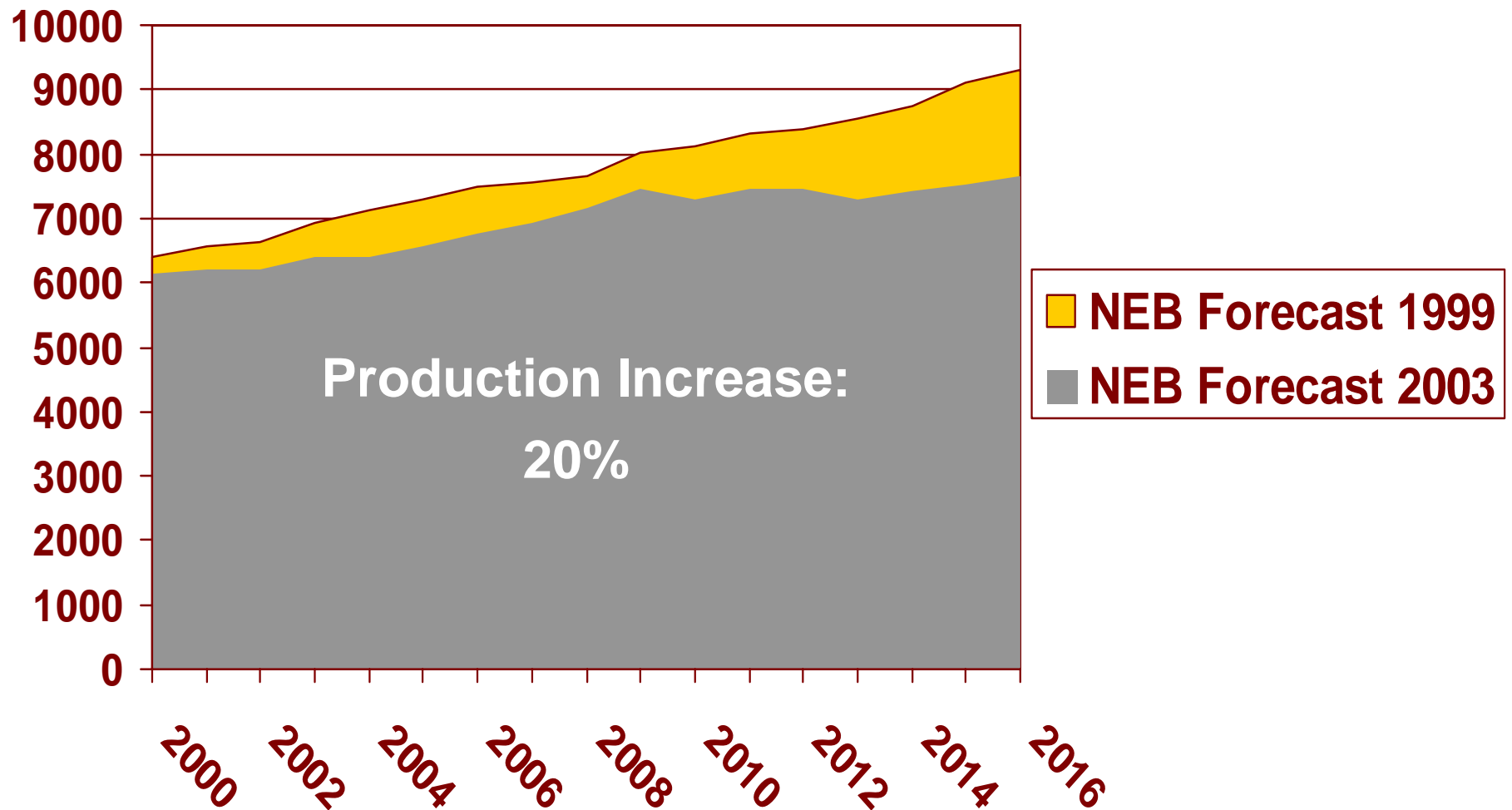
- NEB recently published a resource estimate based on year end 2000 data.
- Since that time:
  - Over 55,000 wells have been drilled
  - Over 23Tcf of gas has been produced
  - Ladyfern had one well on Production!



# Canadian Gas Supply NEB Forecast 1999 (Bcf/Yr)

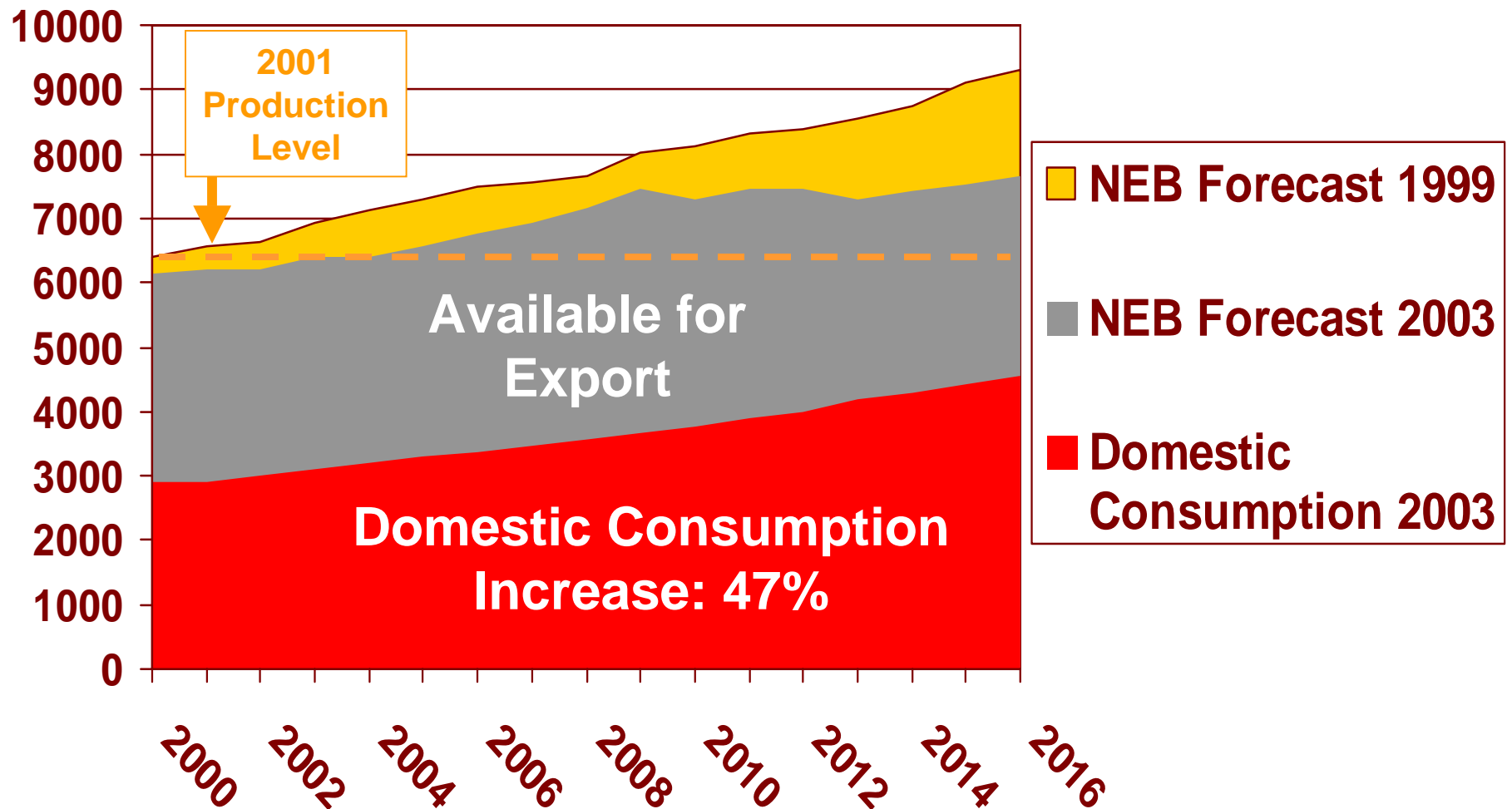


# Canadian Gas Supply NEB Forecast 2003 (Bcf/Yr)



Note: includes some LNG imports by 2008

# Canadian Gas Supply NEB Forecast 2003 (Bcf/Yr)

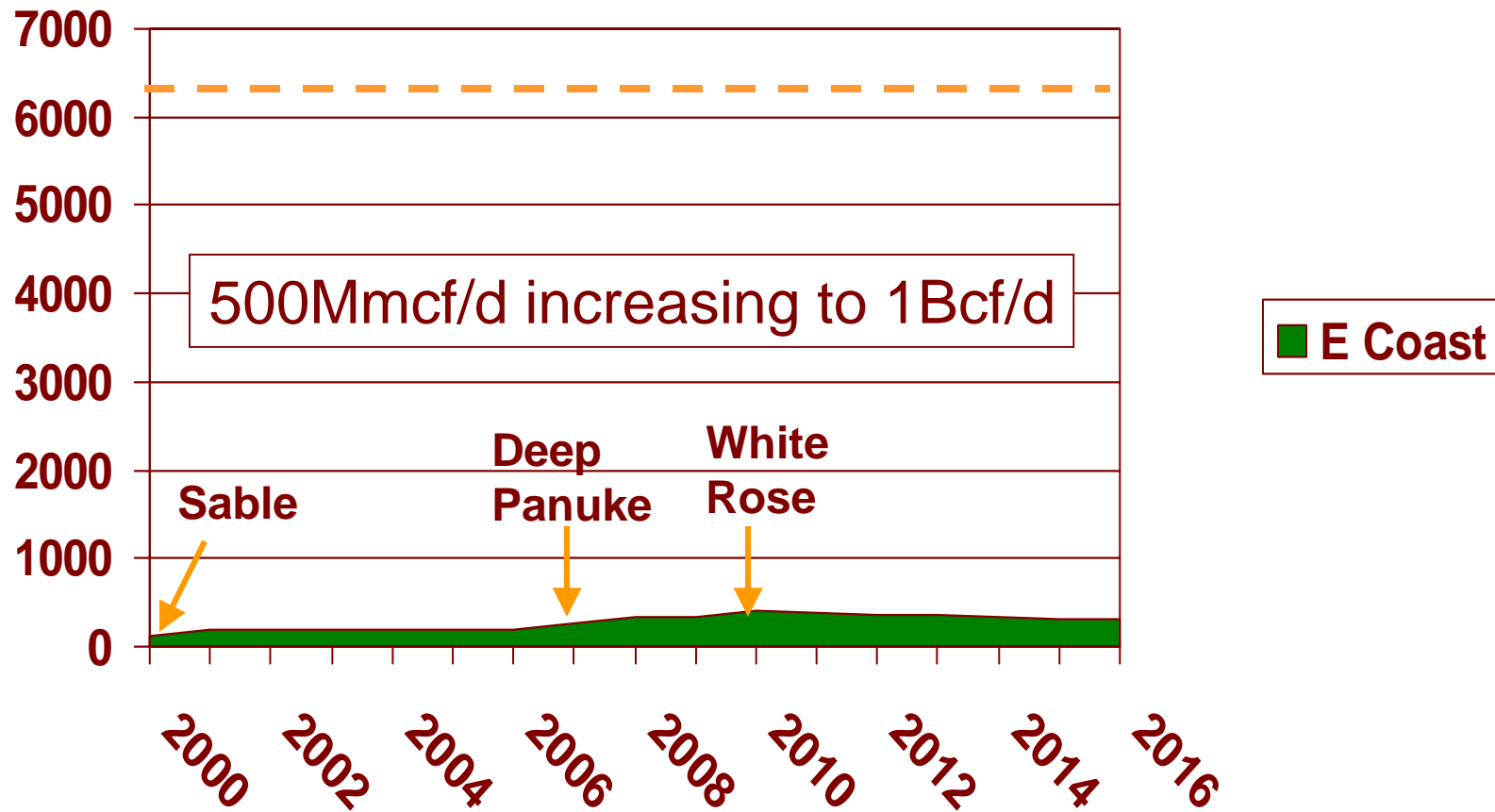


Note: includes some LNG imports by 2008

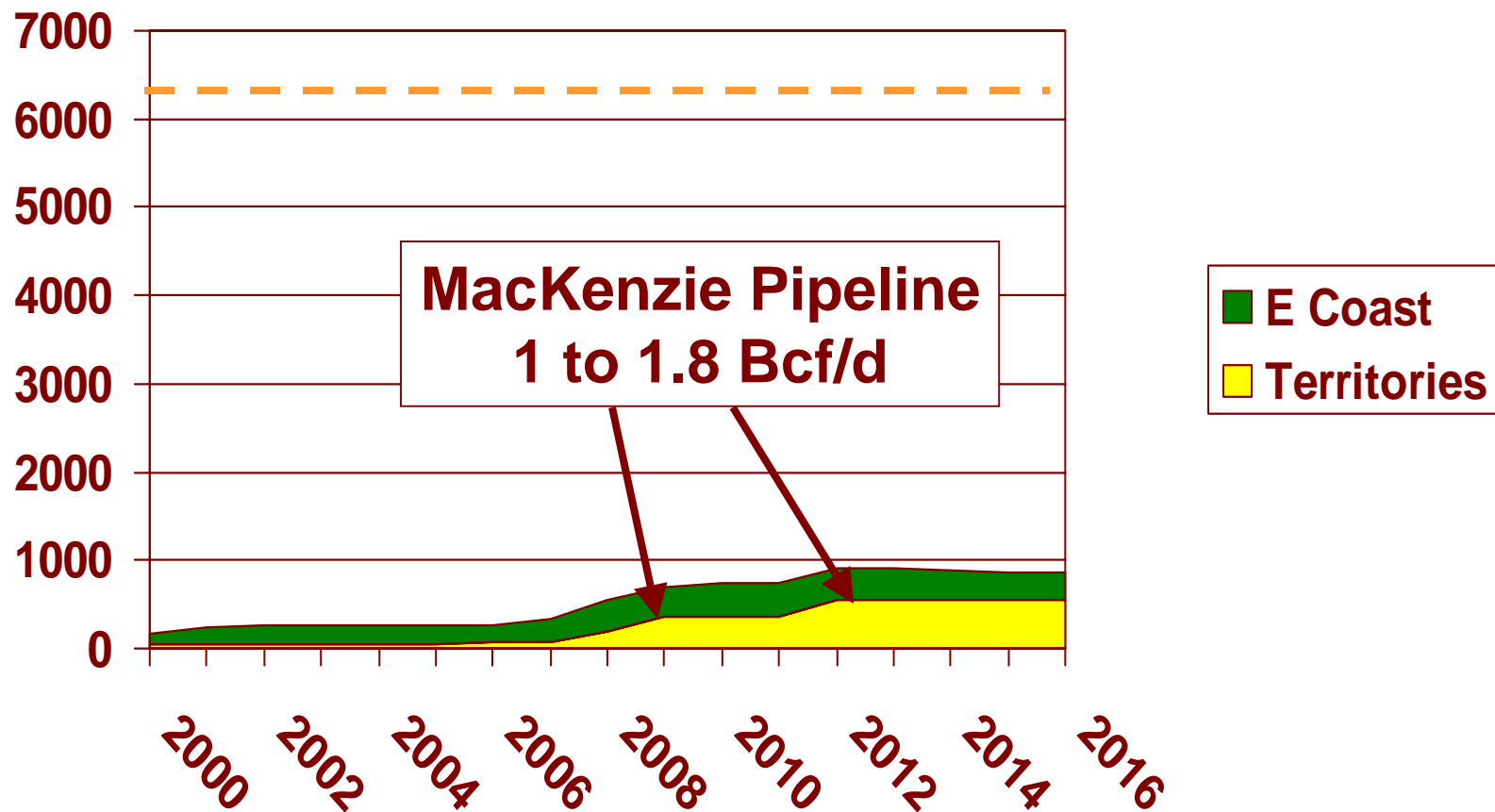


# **My View of Gas Supply**

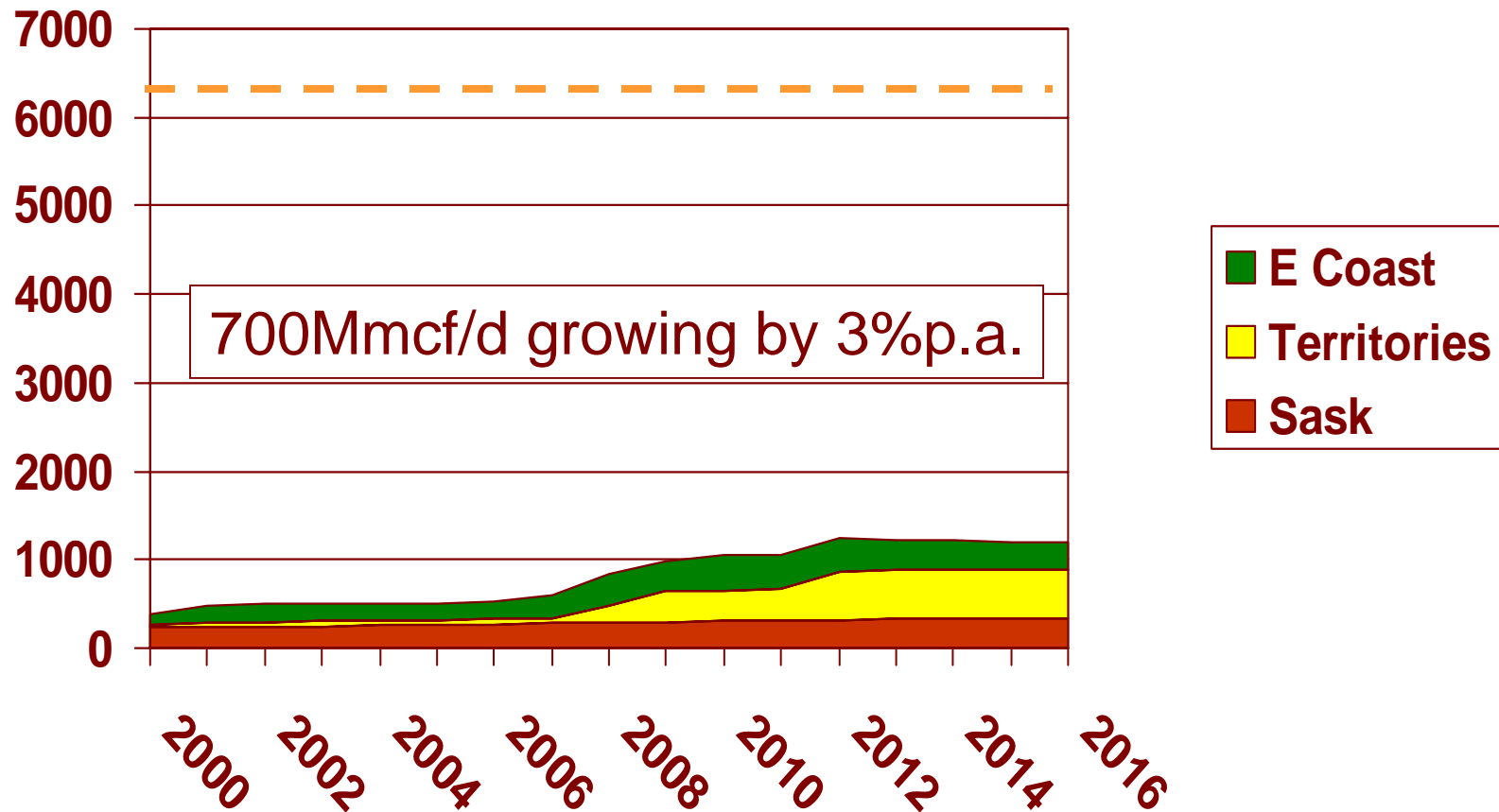
# Future Marketable Gas: East Coast Conventional (Bcf/Yr)



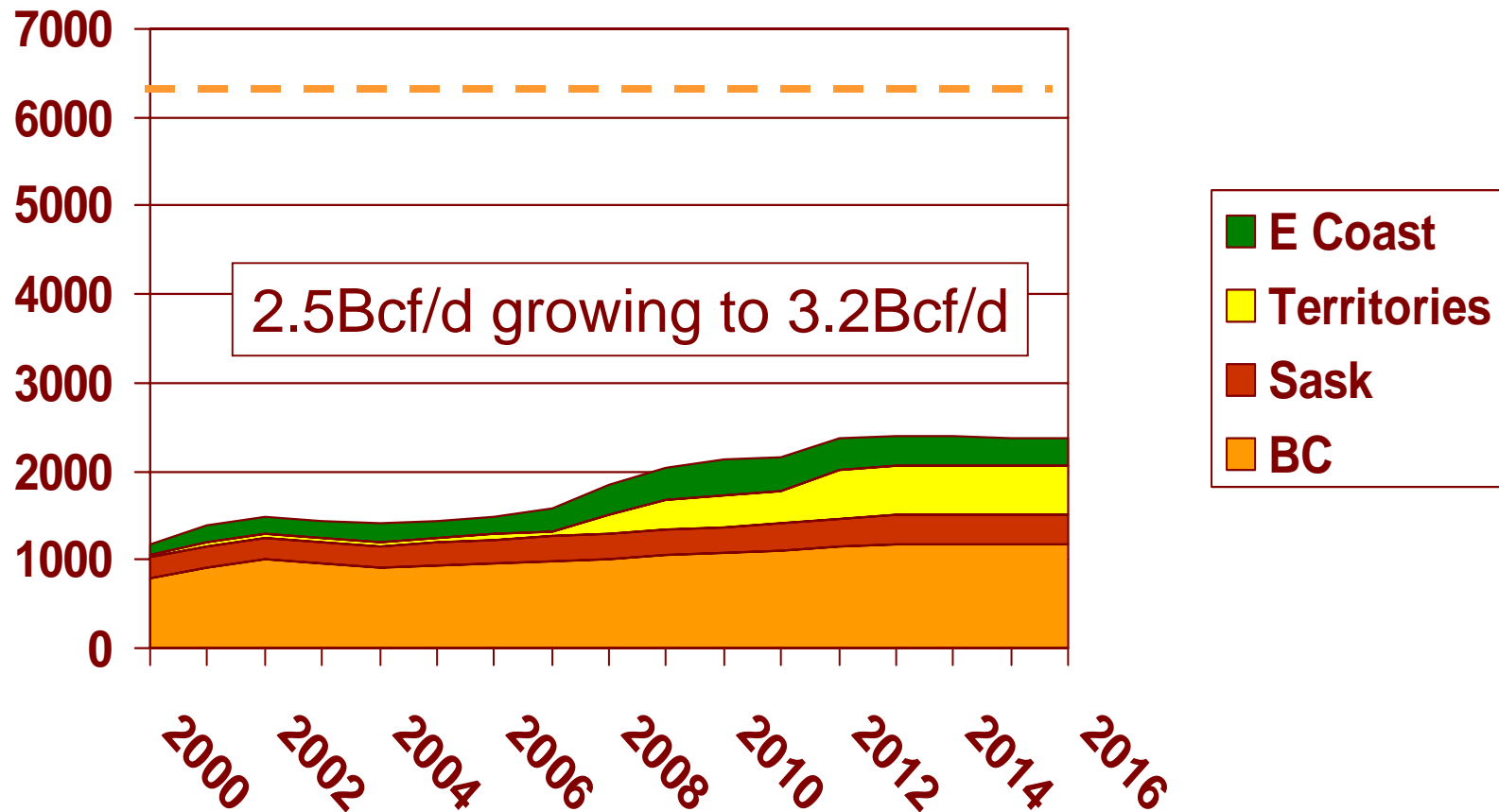
# Future Marketable Gas: Territories Conventional (Bcf/Yr)



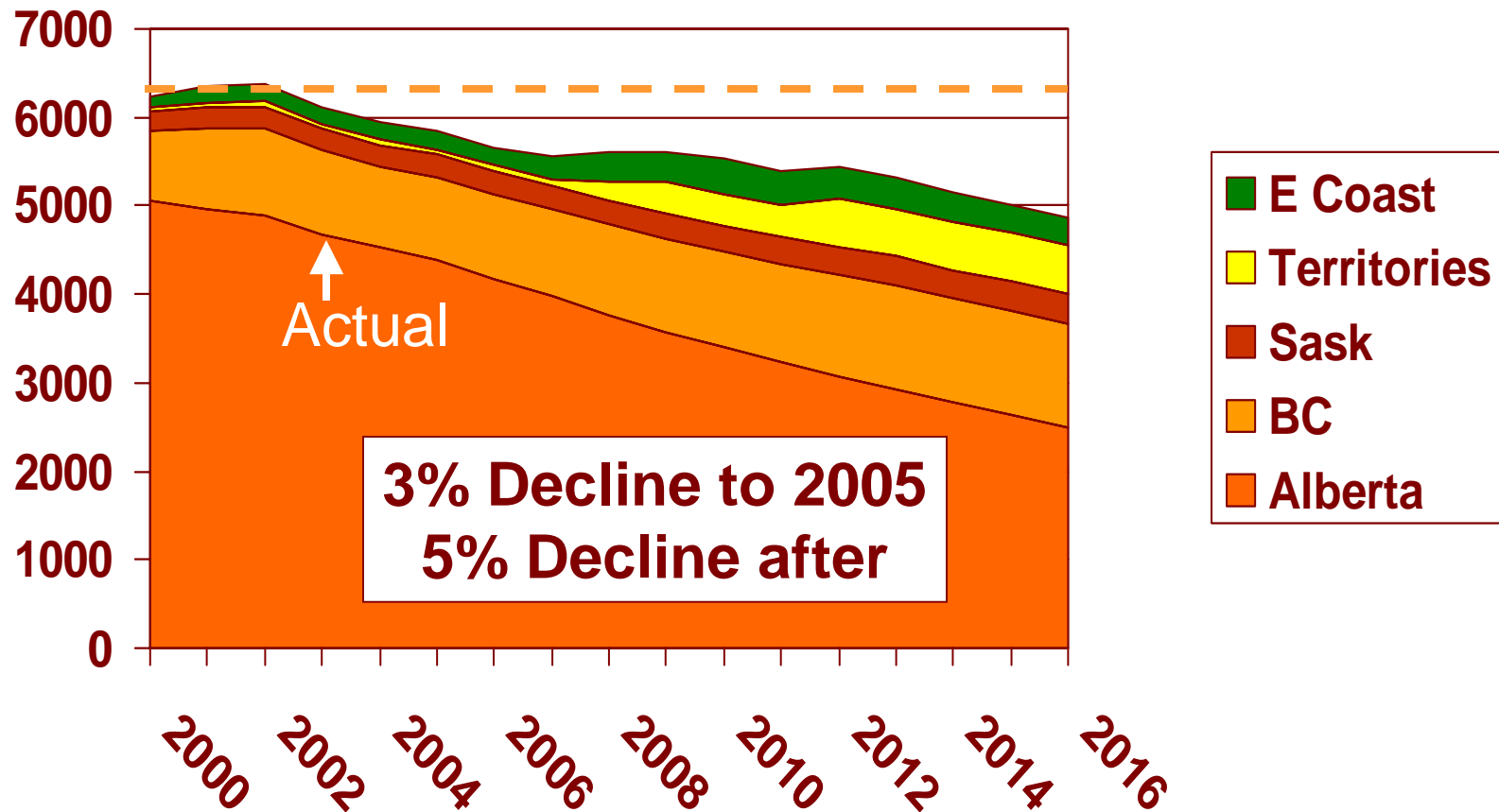
# Future Marketable Gas: Sask. Conventional (Bcf/Yr)



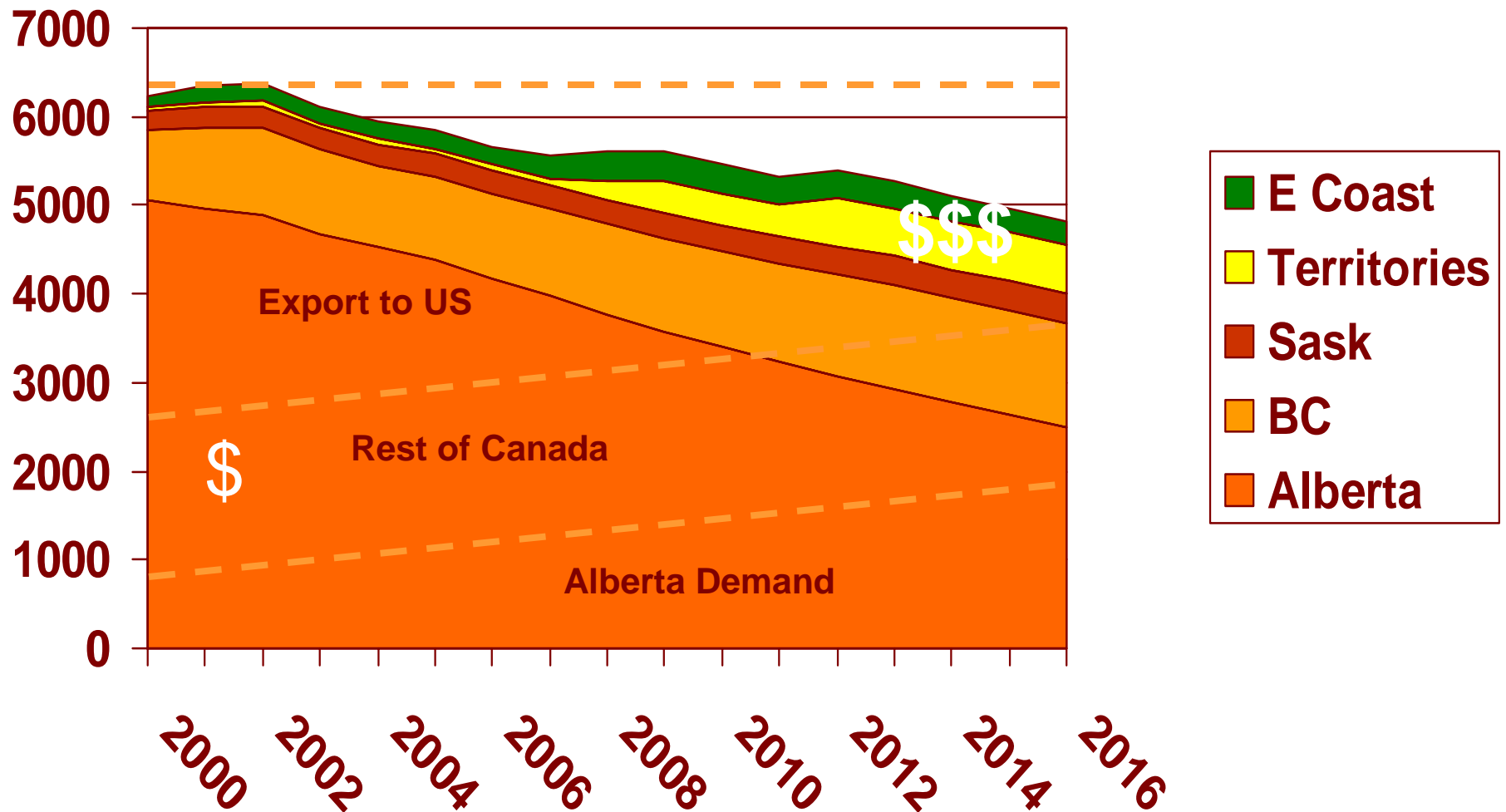
# Future Marketable Gas: BC Conventional (Bcf/Yr)



# Future Marketable Gas: Alberta Conventional (Bcf/Yr)



# Future Conventional Marketable Gas Prediction (Bcf/Yr)

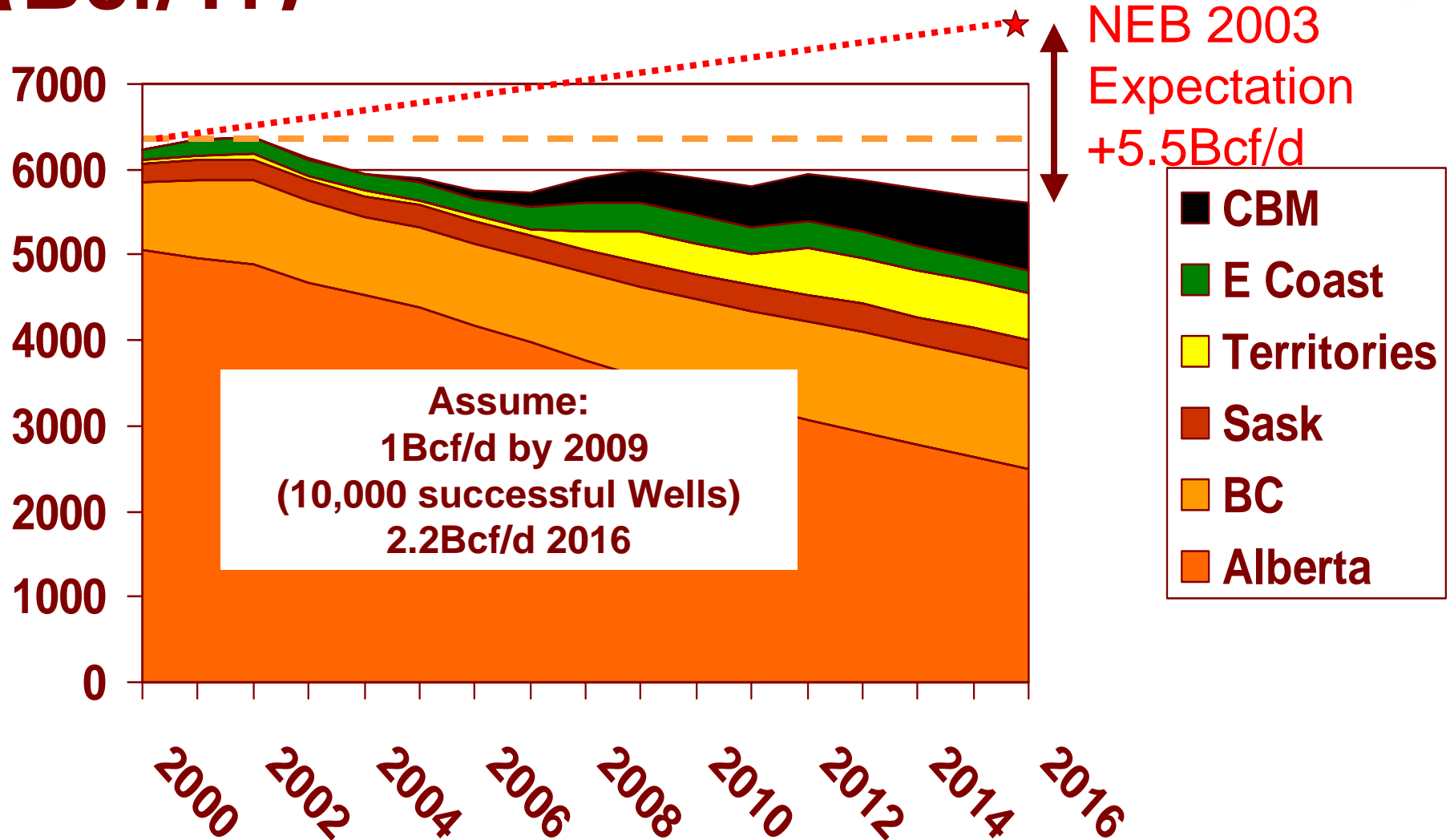


Dave Russum, 2003



**What can you deliver?**

# Future Marketable Gas Prediction (Bcf/Yr)




Dave Russum, 2003

# Gas Prediction 2003 - 2013

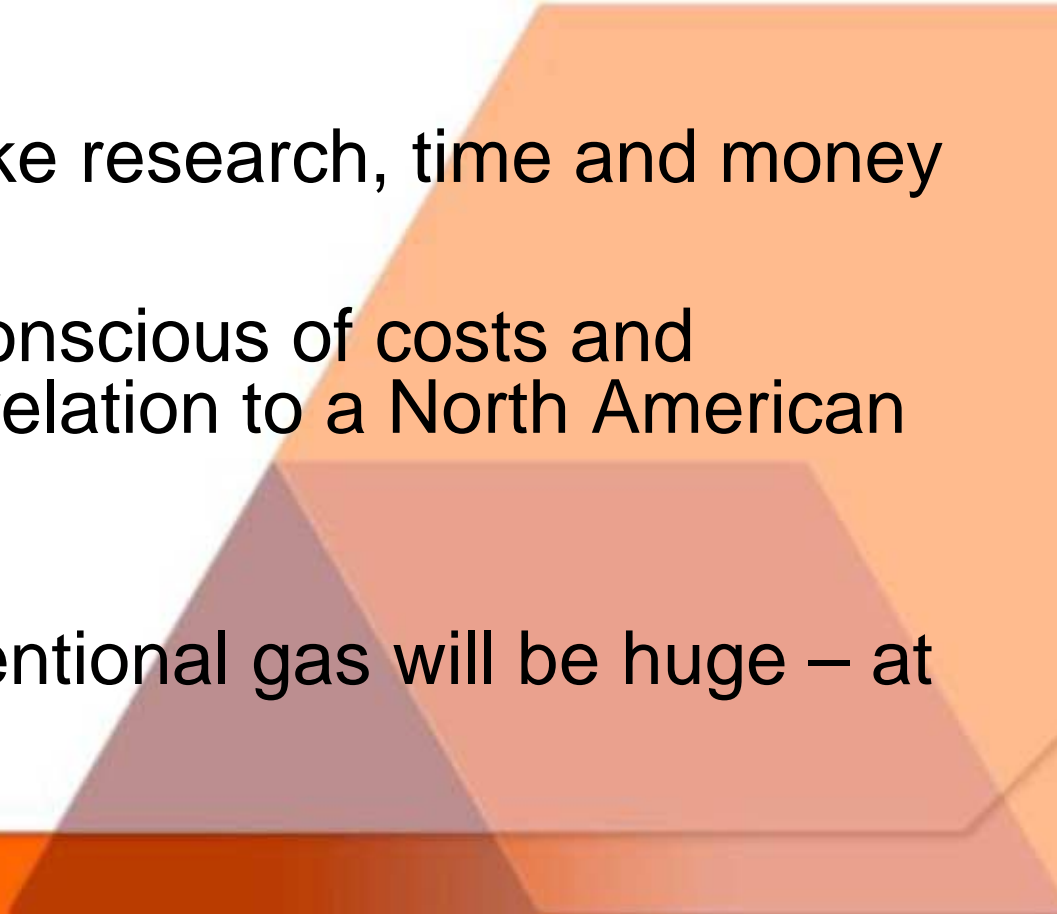
- ◆ Supply will be tight
- ◆ Decade of wildly fluctuating prices
- ◆ Average price will climb steadily
- ◆ Reality of situation will encourage:
  - LNG
  - Development of higher cost gas
  - Conservation
  - Energy alternatives
- ◆ Import of LNG and energy alternatives may be cheaper than Canadian gas in future

Dave Russum, June 2003

# **Our Challenges in Canada:**

- ◆ **‘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 NAFTA**
  - ◆ **Increased demand for energy to extract oil**
- 

# Summary

- ◆ Canada is not running out of gas **resources**
  - ◆ Rapidly depleting our **accessible, low cost gas reserves**
  - ◆ Alternatives exist – take research, time and money
  - ◆ We need to be very conscious of costs and economic viability in relation to a North American and World market
  - ◆ The need for Unconventional gas will be huge – at the right price!
- 

Welcome your feedback

Contact Dave Russum

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More Information:

[www.ajma.net](http://www.ajma.net)

[www.geohelp.net](http://www.geohelp.net)

Thank You