



# Canadian Natural Gas – An important part of North American supply, now and in the future

National Energy Modeling System  
Annual Energy Outlook 2003 Conference

**Greg Stringham**  
March 23, 2004

- **A snapshot of Canada's oil and gas and the US Market**
- **Key Elements of the North American Energy Economy**
  - Secure and efficient access to markets
  - Reasonable and timely access to resources
  - Global competitiveness of industry

# Canada's Crude Oil and Natural Gas Industry



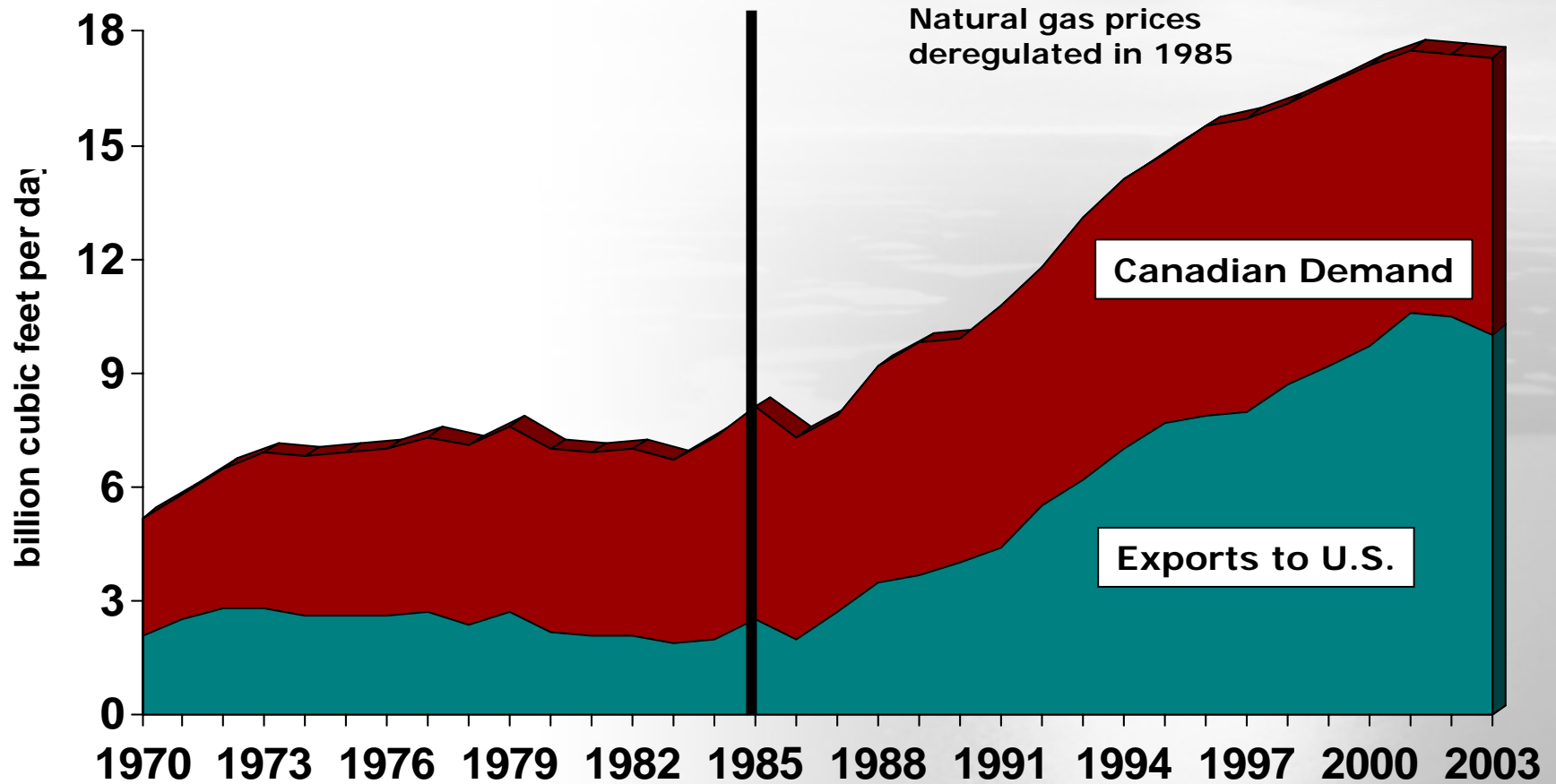
- **Canada is the world's 3rd largest natural gas producer**
- **Canada is the world's 9th largest crude oil producer**
- **Oil and gas accounts for 57% of Canada's trade surplus**
- **Employment near 500,000 in Canada**
- **Invested close to US \$20 billion in 2003**
  - Largest single private sector investor in Canada

- **Canada is the largest supplier of energy to the United States**
- **Canada's place in U.S. oil and gas picture:**

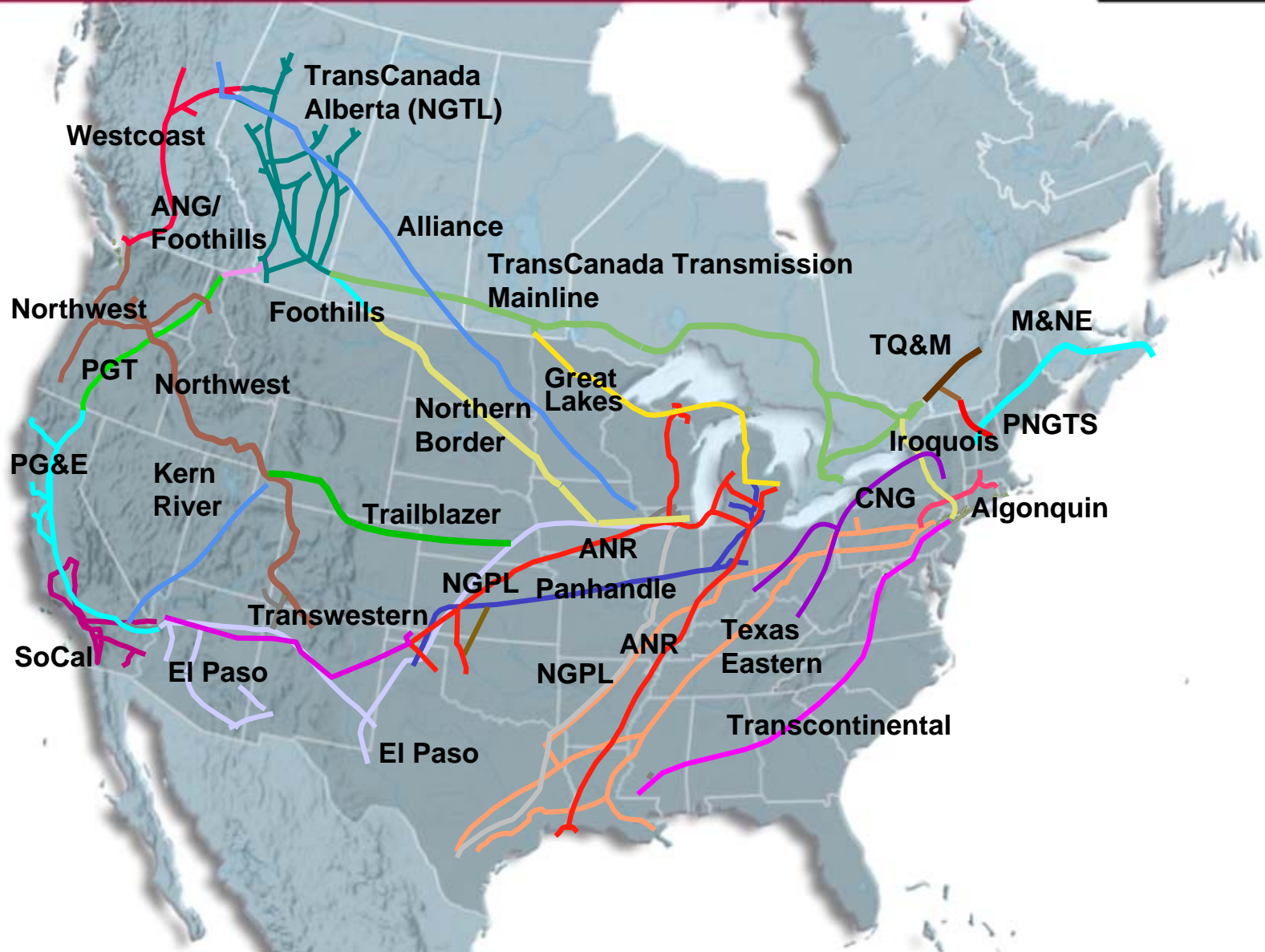
|                              | Canadian Natural Gas | Canadian Petroleum* |
|------------------------------|----------------------|---------------------|
| Ranking of importers to U.S. | <b>#1</b>            | <b>#1</b>           |
| Share of U.S. consumption    | <b>17%</b>           | <b>9%</b>           |
| Share of U.S. imports        | <b>94%</b>           | <b>17%</b>          |

\* Includes crude oil & refined products.

# Canadian Natural Gas Canadian Demand and Exports to U.S.



# Canadian and U.S. Natural Gas Pipelines



# Ultimate Potential of Natural Gas in Canada Trillion Cubic Feet



■ Remaining  
■ Produced

North of 60  
175

Other Frontier\*  
89  
includes other regions offshore  
east coast & west coast

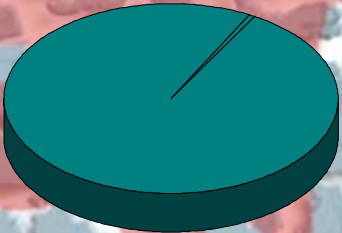
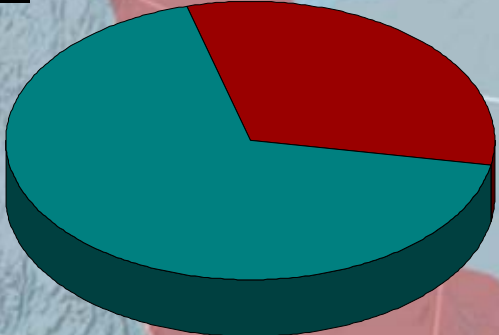
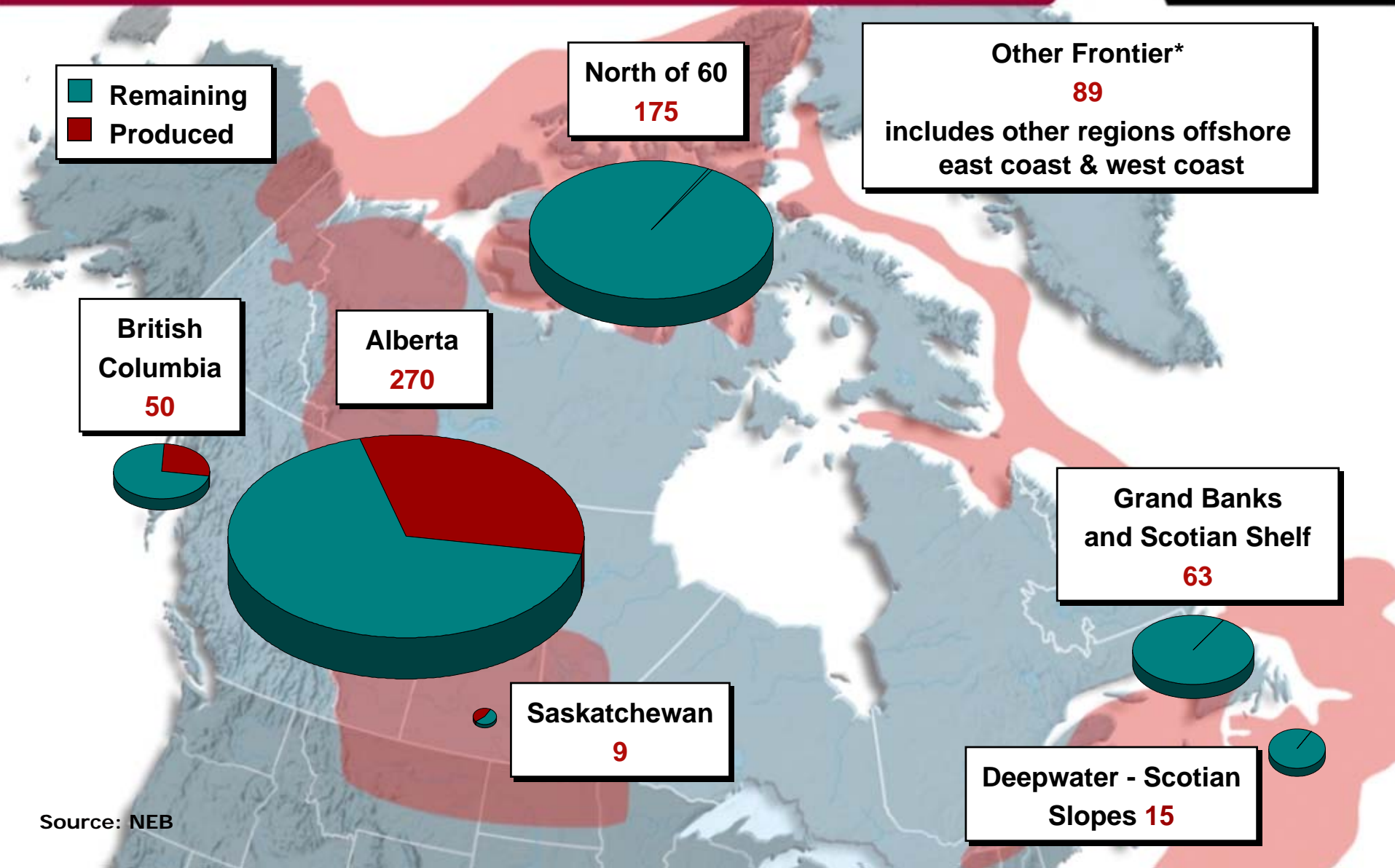
British  
Columbia  
50

Alberta  
270

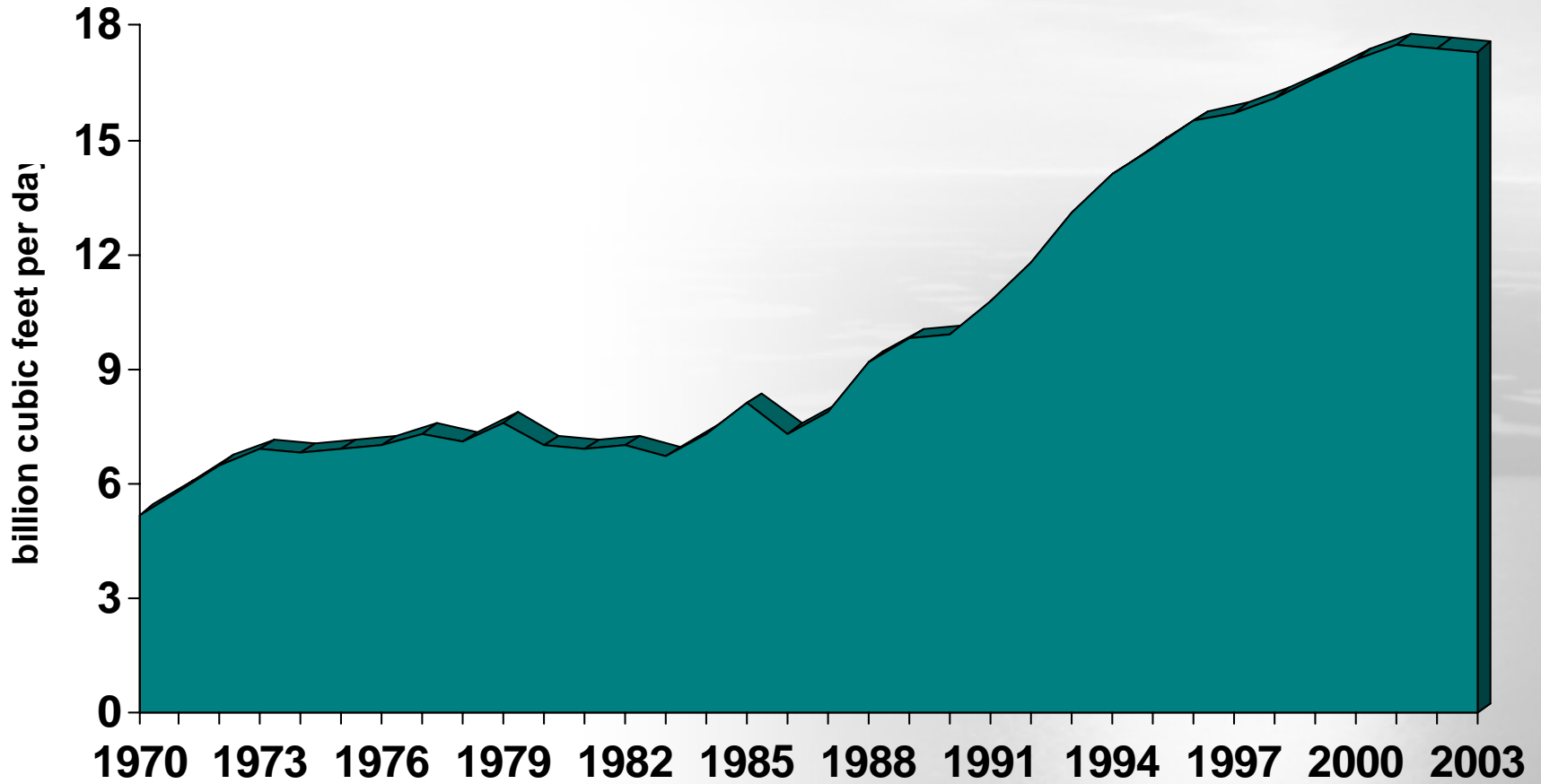
Grand Banks  
and Scotian Shelf  
63

Saskatchewan  
9

Deepwater - Scotian  
Slopes 15



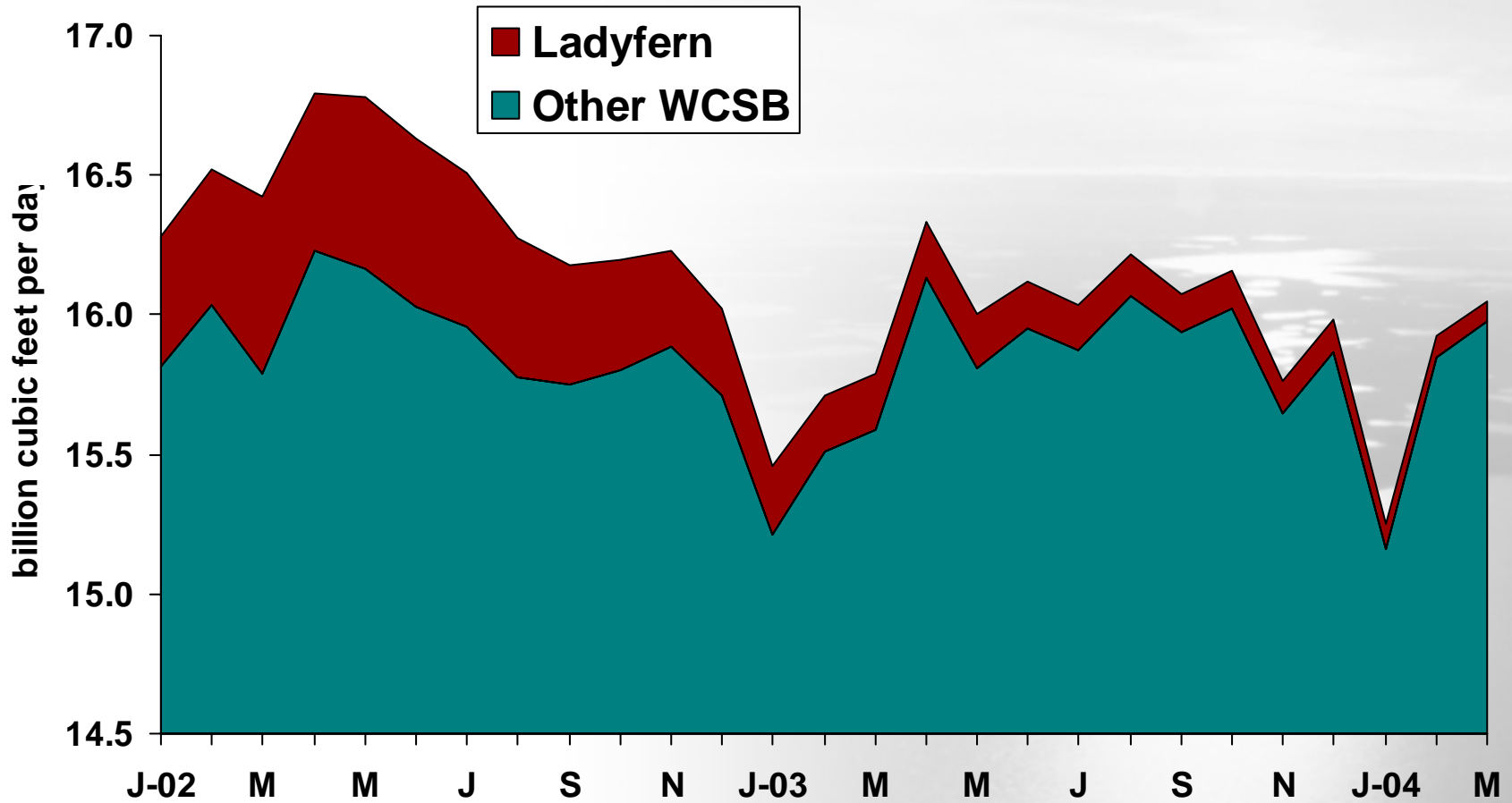
# Canadian Natural Gas Production



Source: CAPP Statistical Handbook



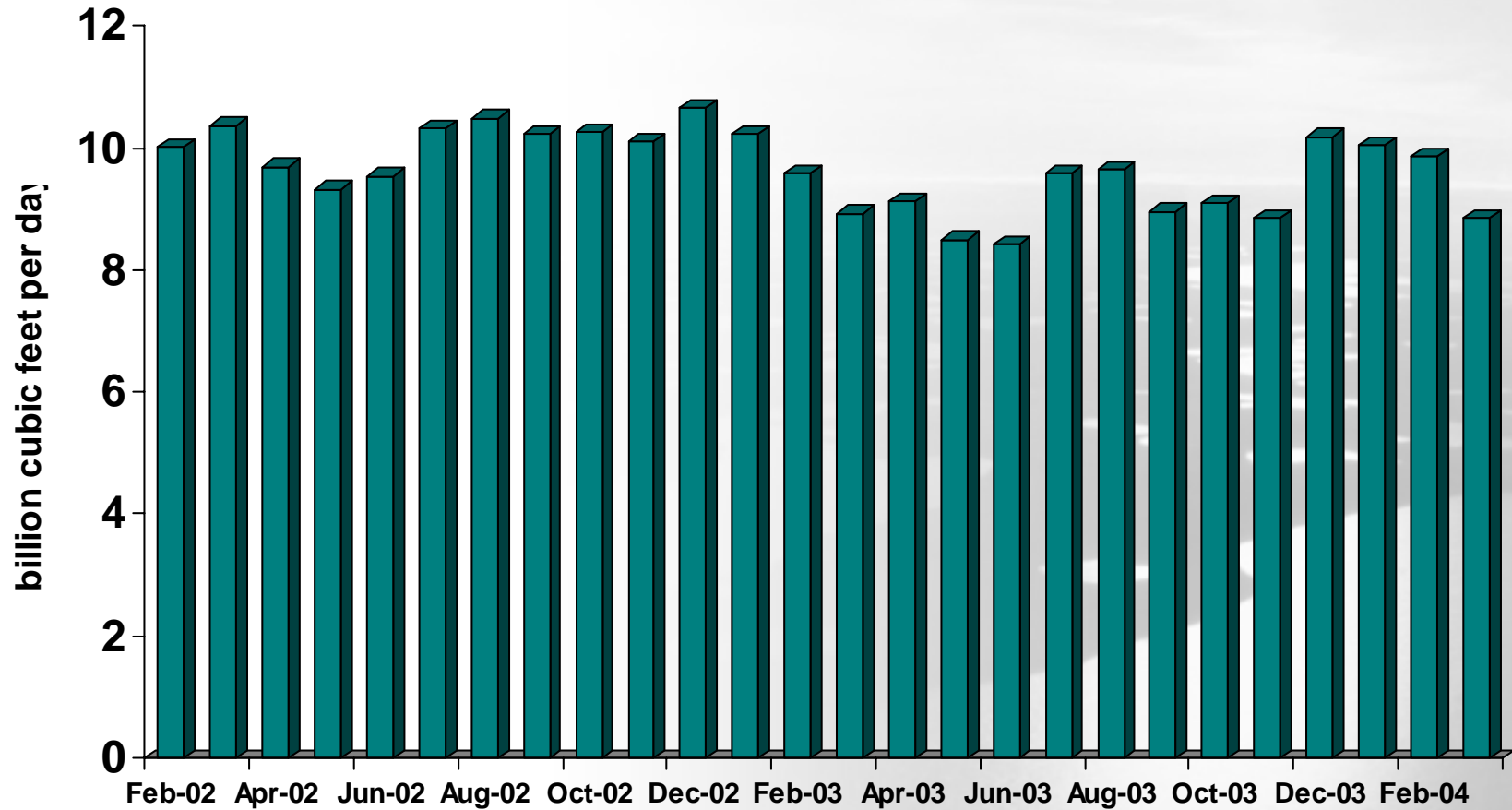
# Western Canada Natural Gas Production Ladyfern & Other WCSB



Source: FirstEnergy Capital

# Natural Gas Net Exports from Canada

## Exports less Imports

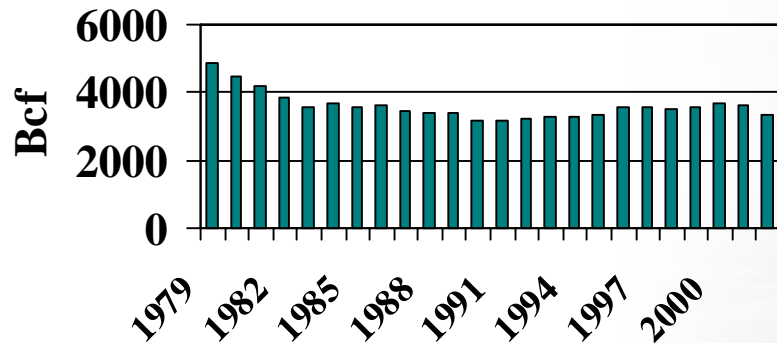


Source: Gilbert Lausten Jung

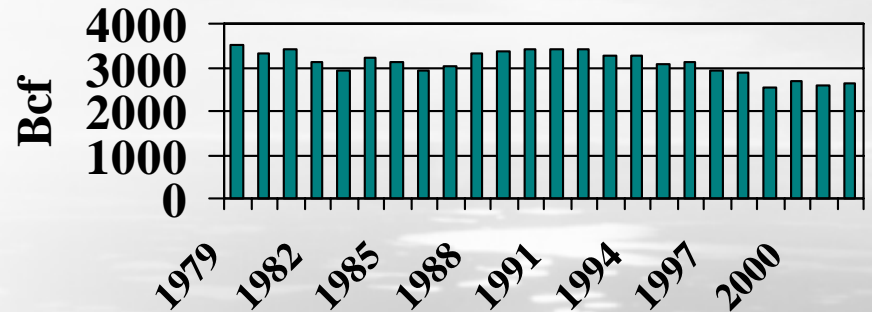
# North American Basin Performance Natural Gas Production



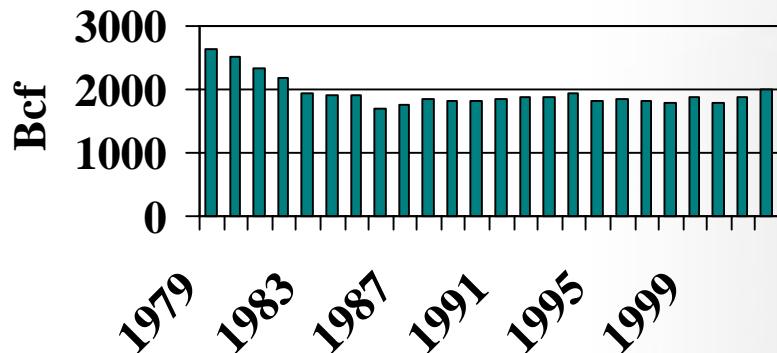
### Gulf Coast Onshore



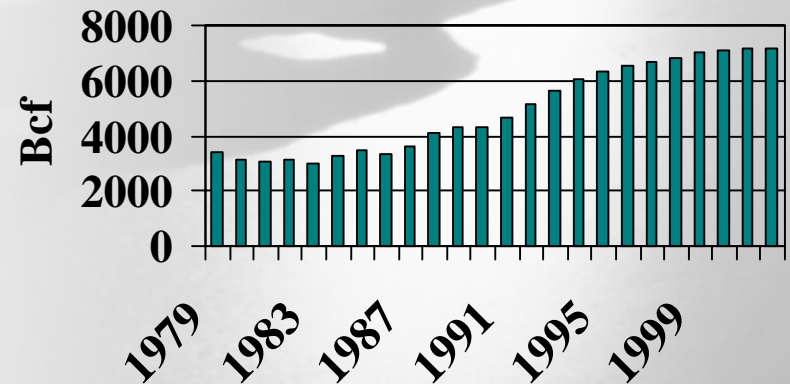
### Anadarko Basin



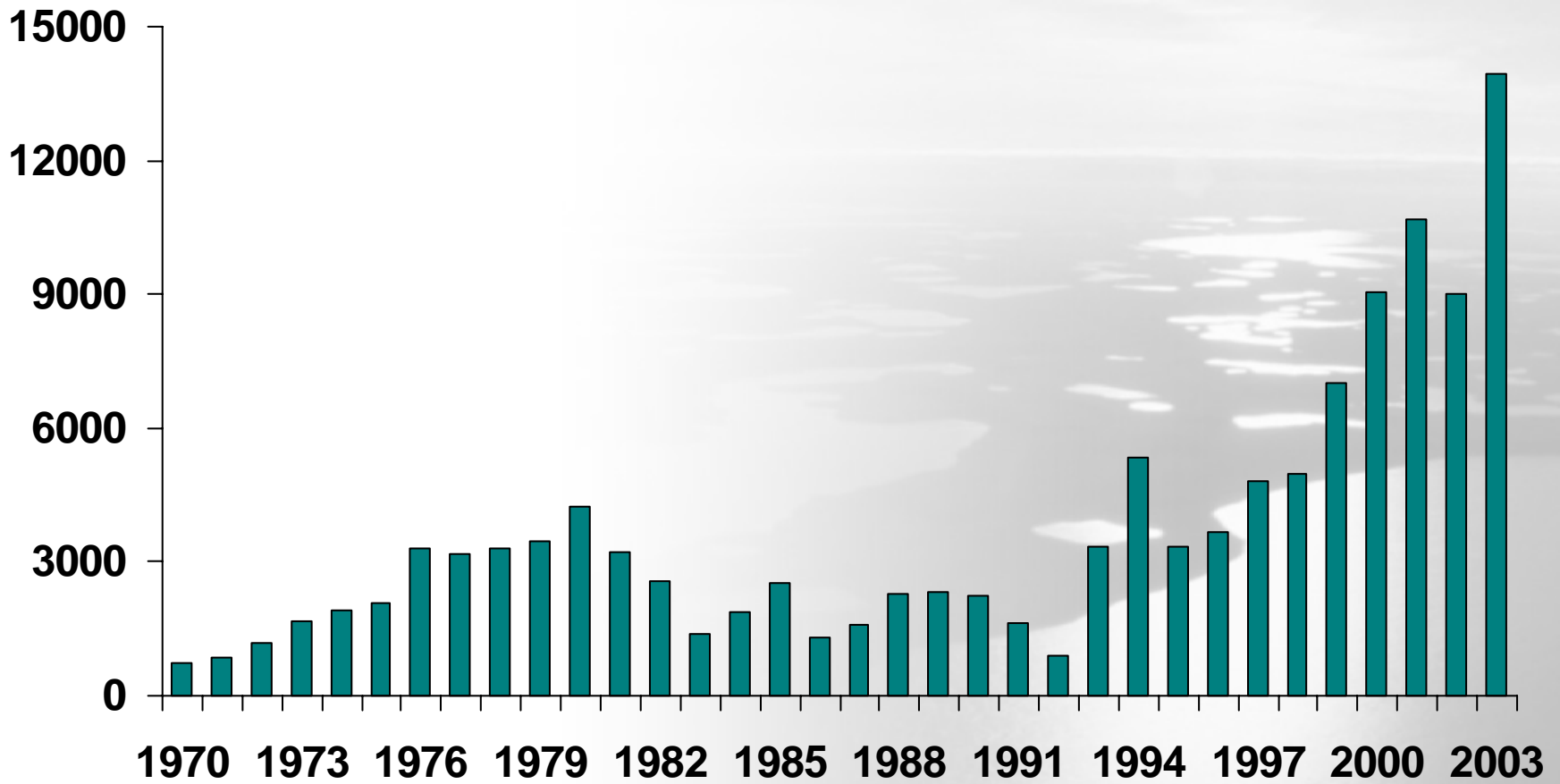
### Permian Basin



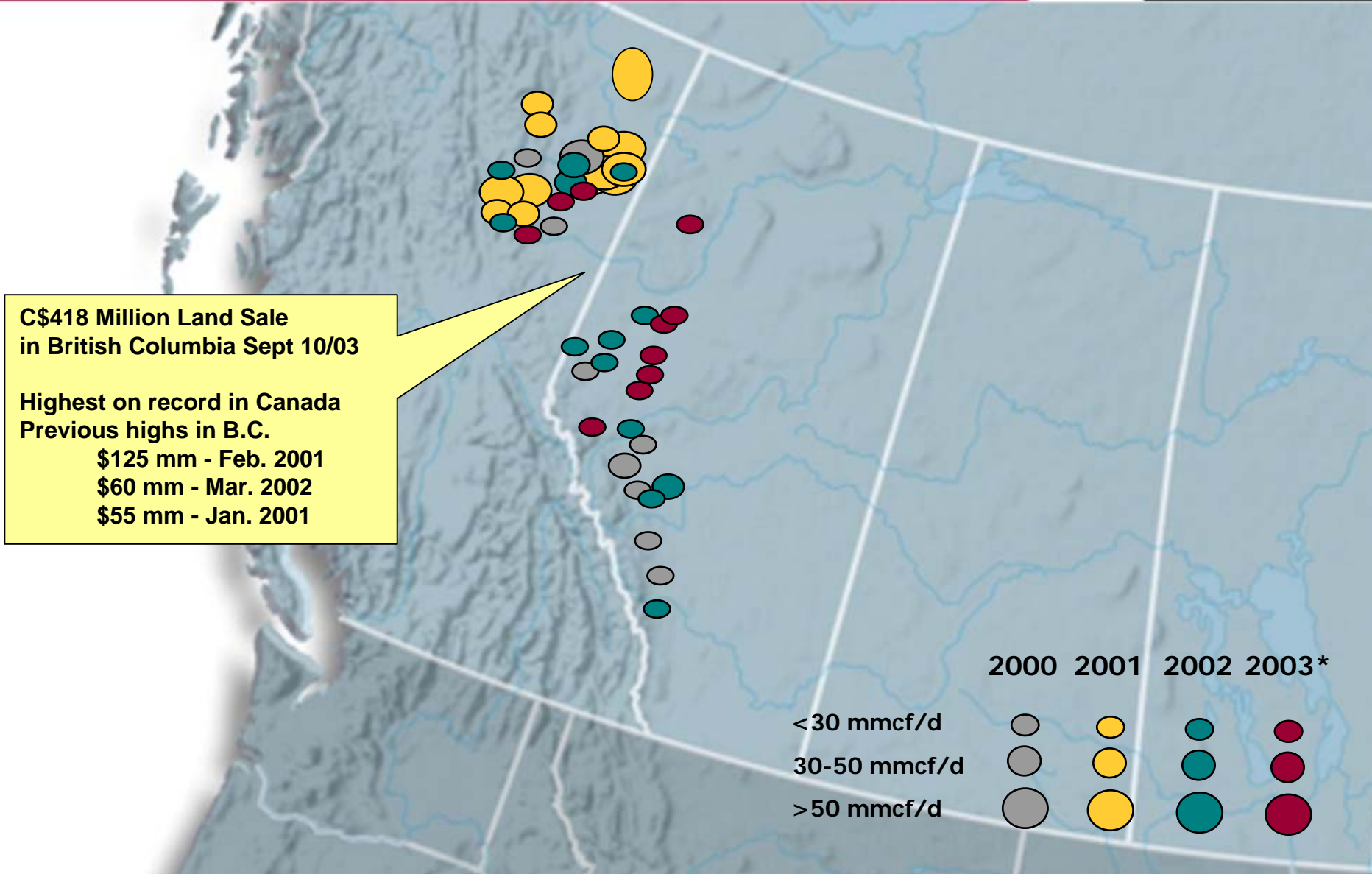
### Western Canada



# Natural Gas Wells Drilled in Western Canada



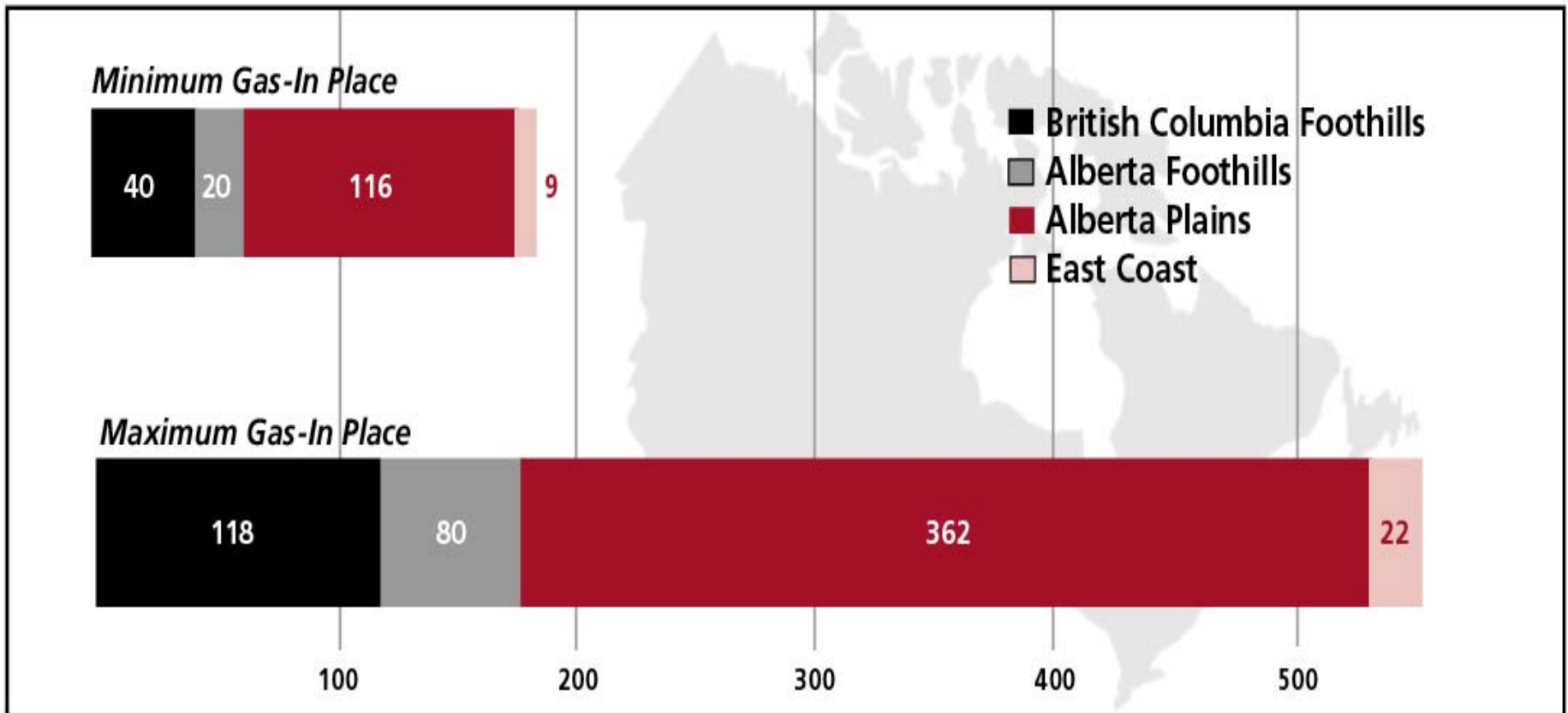
# Top Natural Gas Wells Drilled 2000 - 2003



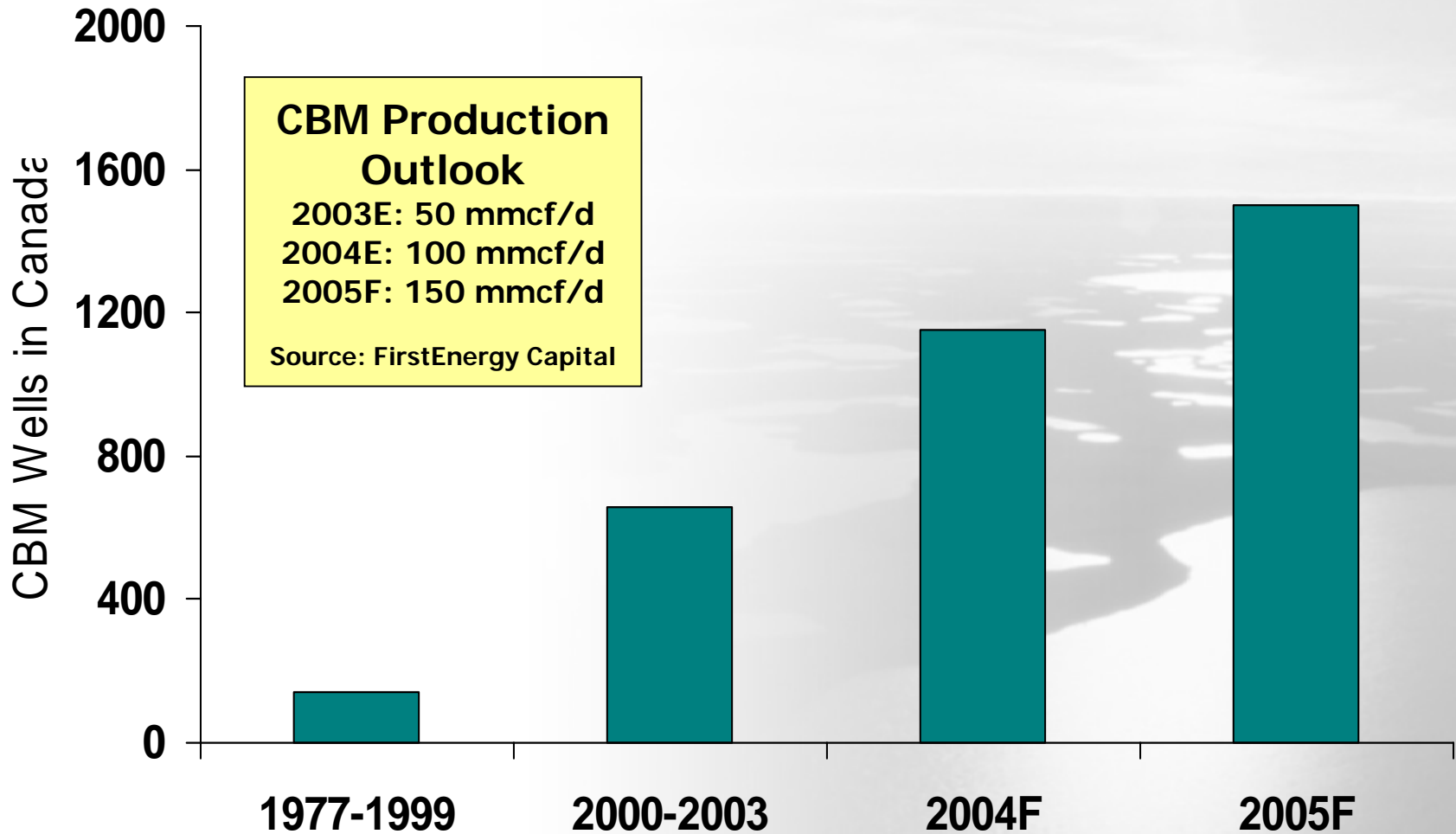
# Natural Gas from Coal Resources in Canada Trillion Cubic Feet



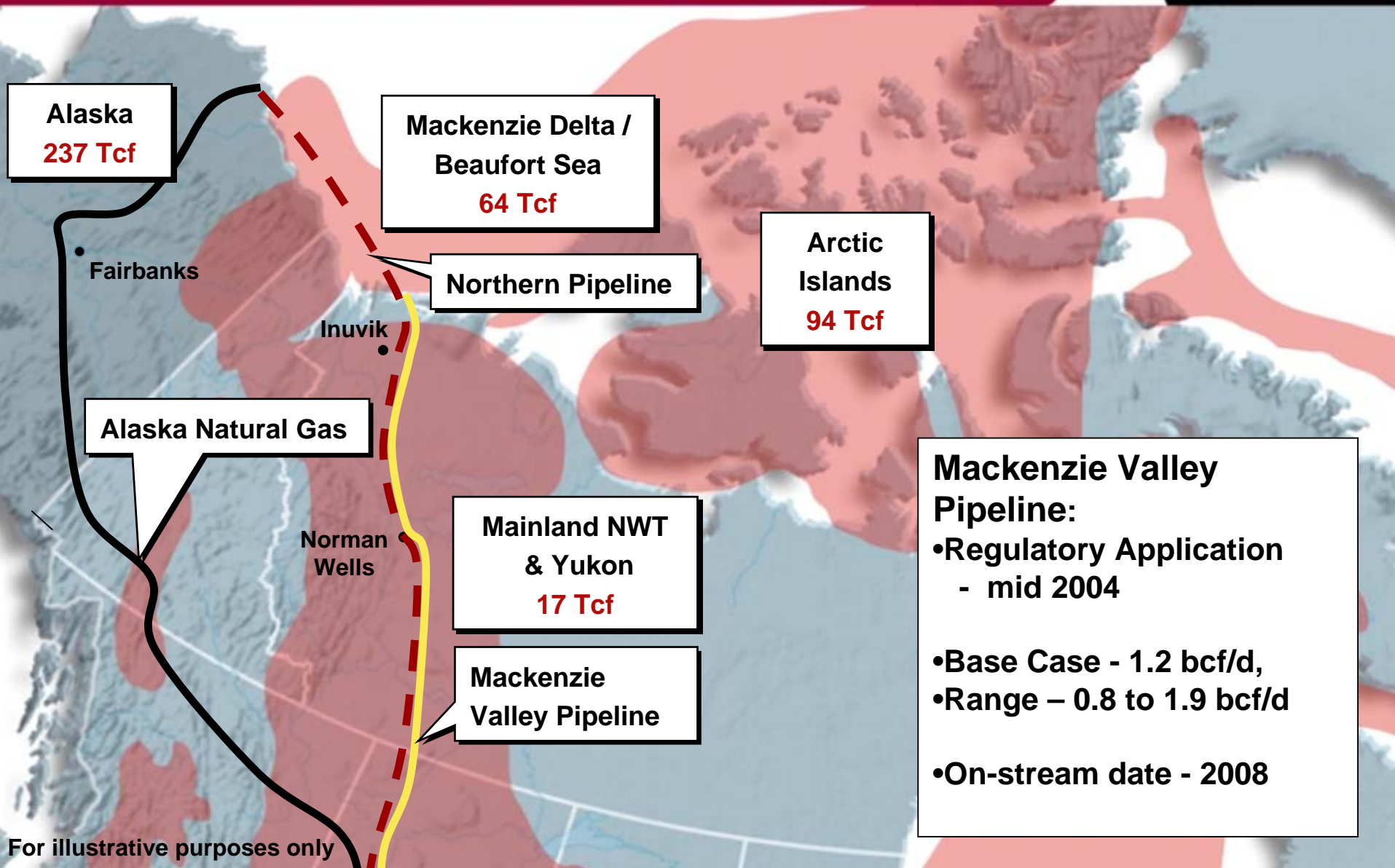
## Natural Gas from Coal – Technology Unlocks a New Resource



# Coalbed Methane Wells (NGC) Drilled in Western Canada



# Northern Natural Gas: Ultimate Potential and Proposed Gas Routes



**Alaska**  
**237 Tcf**

**Mackenzie Delta /  
Beaufort Sea**  
**64 Tcf**

**Arctic  
Islands**  
**94 Tcf**

**Northern Pipeline**

**Mackenzie Valley  
Pipeline:**

- Regulatory Application  
- mid 2004
- Base Case - 1.2 bcf/d,  
•Range – 0.8 to 1.9 bcf/d
- On-stream date - 2008

**Alaska Natural Gas**

**Mainland NWT  
& Yukon**  
**17 Tcf**

**Mackenzie  
Valley Pipeline**

Fairbanks

Inuvik

Norman Wells

For illustrative purposes only



# Atlantic Canada Development



★ Oil fields  
★ Gas fields

St. Anthony Basin

Jeanne d'Arc Basin

Anticosti Basin

St. John's ●



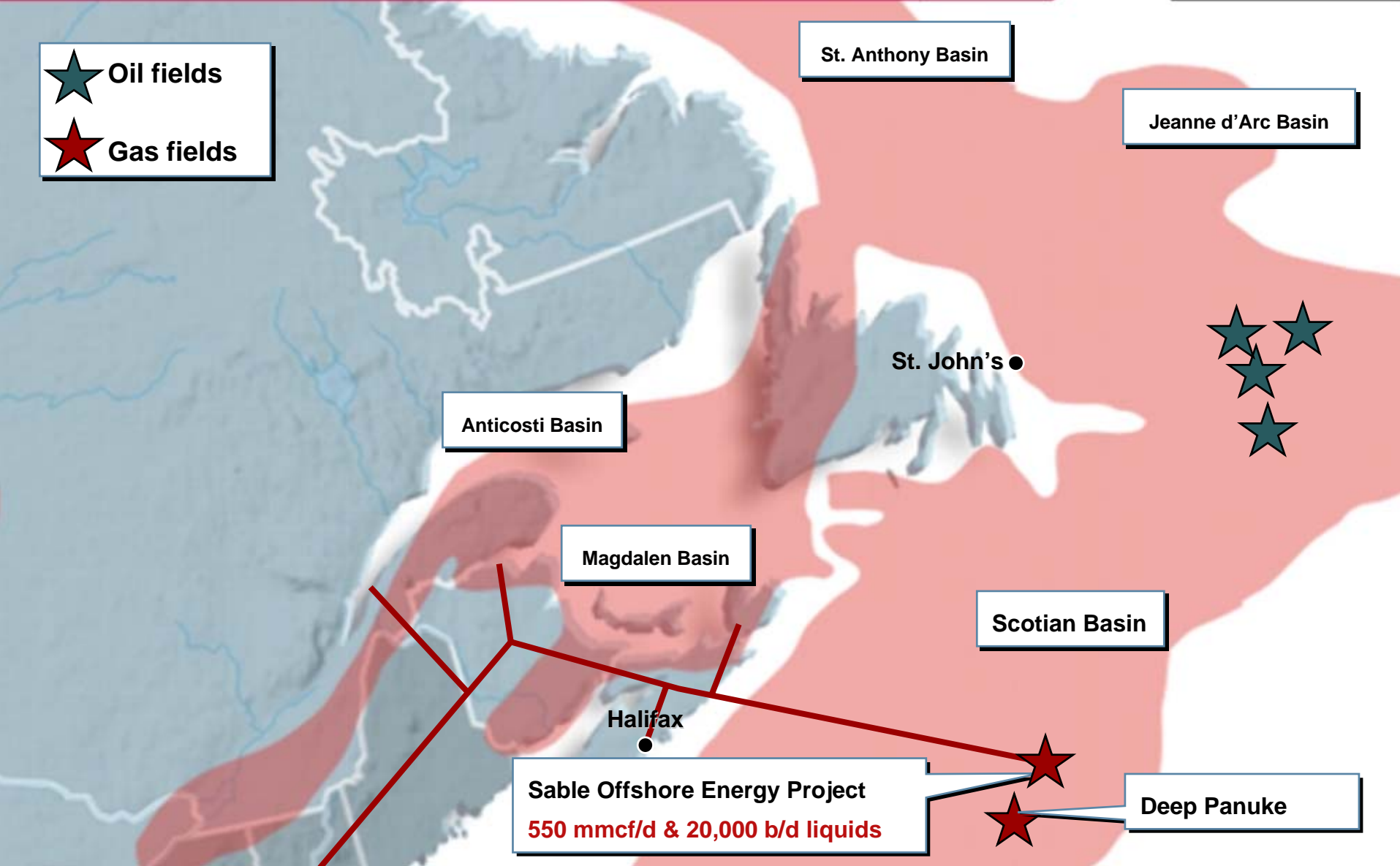
Magdalen Basin

Scotian Basin

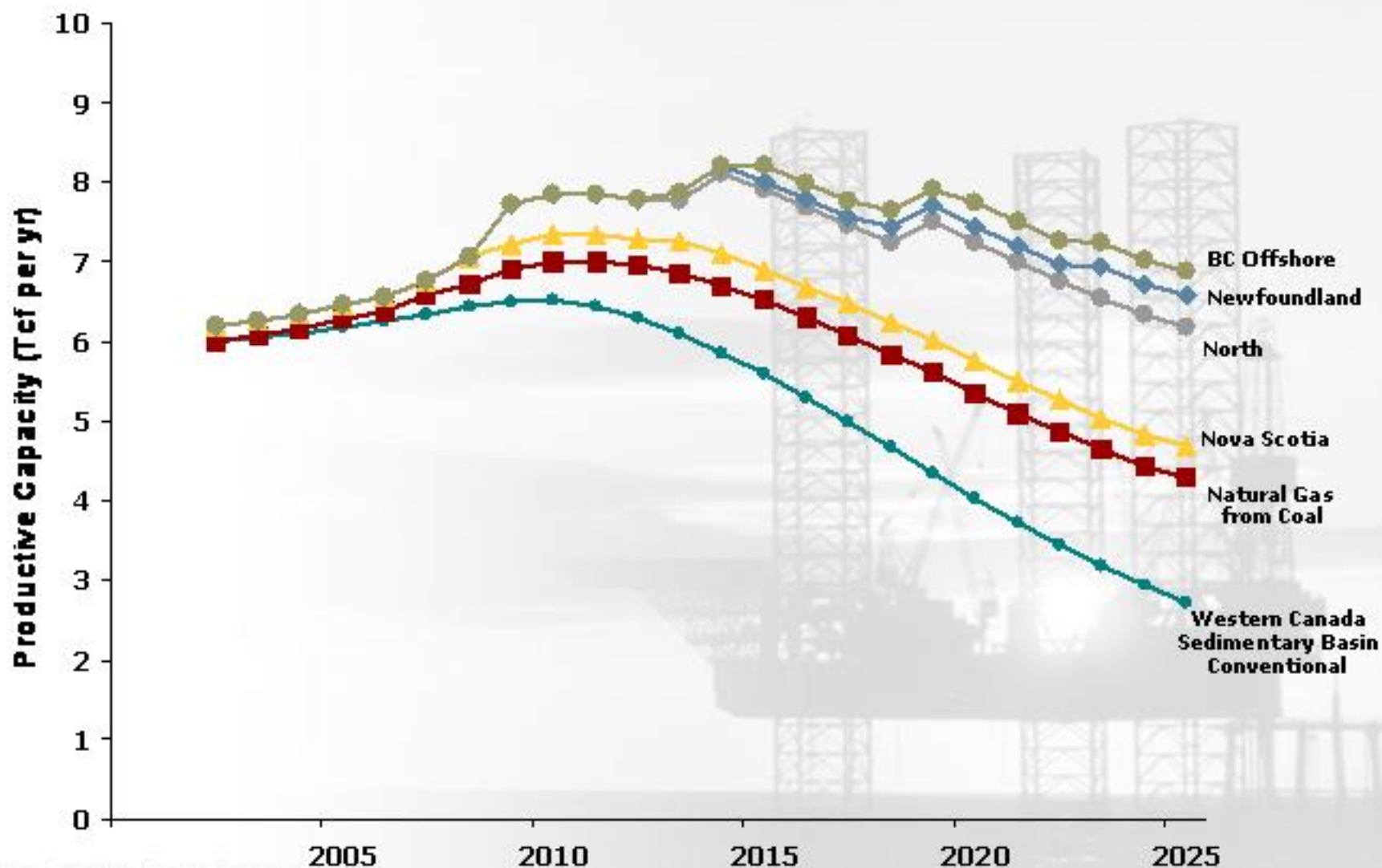
Halifax ●

Sable Offshore Energy Project  
550 mmcf/d & 20,000 b/d liquids

Deep Panuke



# Natural Gas Productive Capacity Forecast CERI Alternate Case



Source: Canadian Energy Forecast

2005

2010

2015

2020

2025

# Oil Sands Production Technologies & Gas Consumption per Barrel Produced

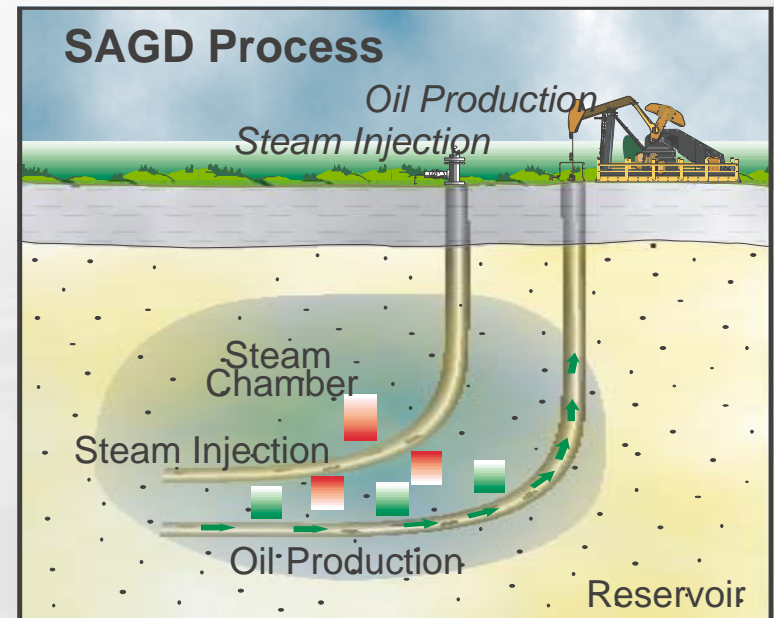


## Mining & Upgrading



Mining = 0.40 to 0.75 mcf gas per bbl bitumen\*

## In-situ



Source: PetroCanada

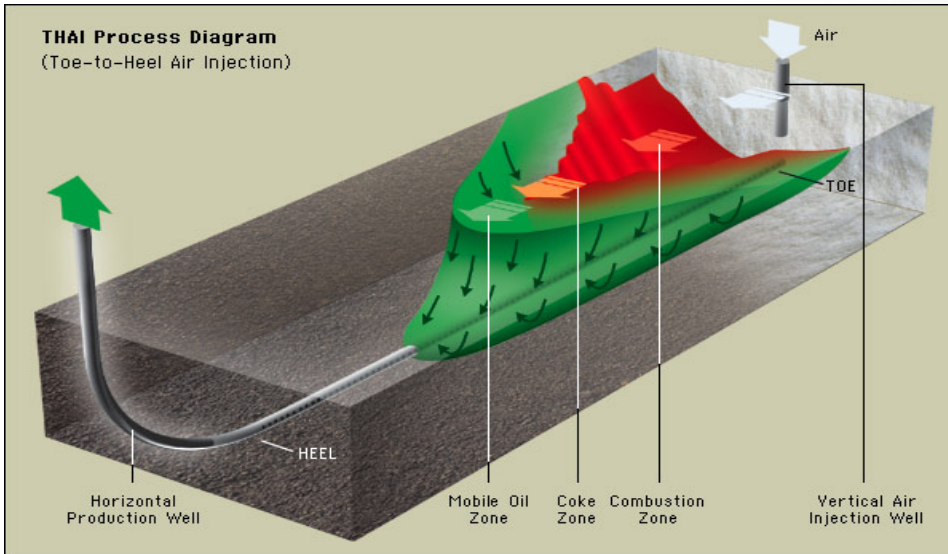
In situ = 1.0 to 1.2 mcf gas per bbl bitumen\*

\* Gas consumption rates from CERI Oil Sands Supply Outlook, March 2004

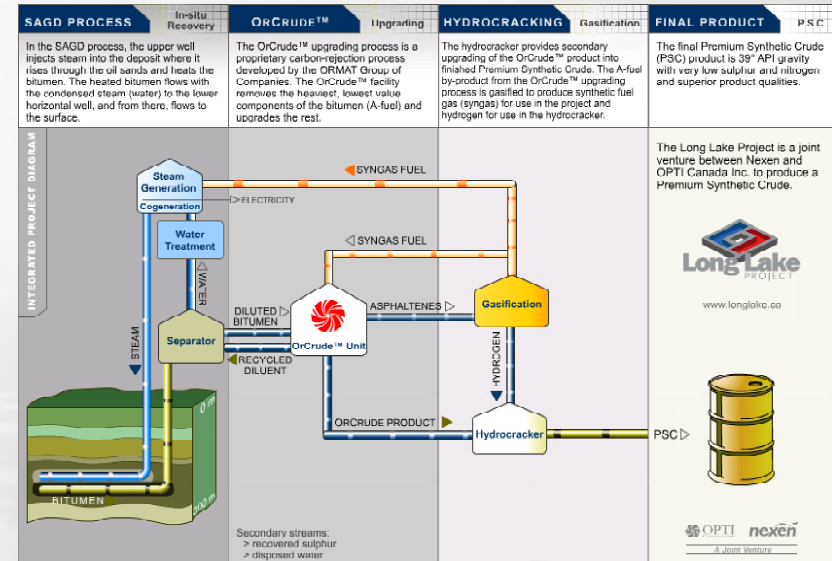
# Oil Sands Production Technologies Alternatives to Natural Gas



## Toe-to-Heel Air Injection – THAI (No gas)



## Long Lake OrCrude Process (No gas)



## Multiphase Superfine Atomized Residue (MSAR)



Others under consideration:  
 VAPEX – steam & pentanes  
 SAGD with solvent instead of steam  
 Bitumen combustion  
 Coke gasification

# Comparison of Western Canadian Gas & LNG (US\$/mcf)



## WCSB Conventional Gas:

*Production costs:*

*F&D Costs - \$0.80-\$1.50*

*Oper. & G&A - \$1.30*

*Royalties - \$0.45*

*Range: \$2.55-\$3.25*

*Transportation: \$0.35-\$1.30*

*Deliv. to Market: \$2.90-\$4.55*

*Converted to US\$ at \$0.75 exchange rate*

## LNG:

*After Regasification*

*Range: \$3.25-\$4.50*

*Transportation - ?*

*Deliv. To Market: ?*

*Source: E.I.A.*

- **Secure and Efficient Access to Markets**
  - Support market based development and open access to markets
  - Use oil and gas as a model of successful trade
- **Access to the Resources**
  - Improve regulatory timelines
  - Reduce federal/provincial (state) overlap
- **Global competitiveness**
  - Recognize increasing cost pressures
  - Competitive tax and royalty regimes
  - Research and innovation strategy – North American