Prospects for Canadian Coalbed Methane Production

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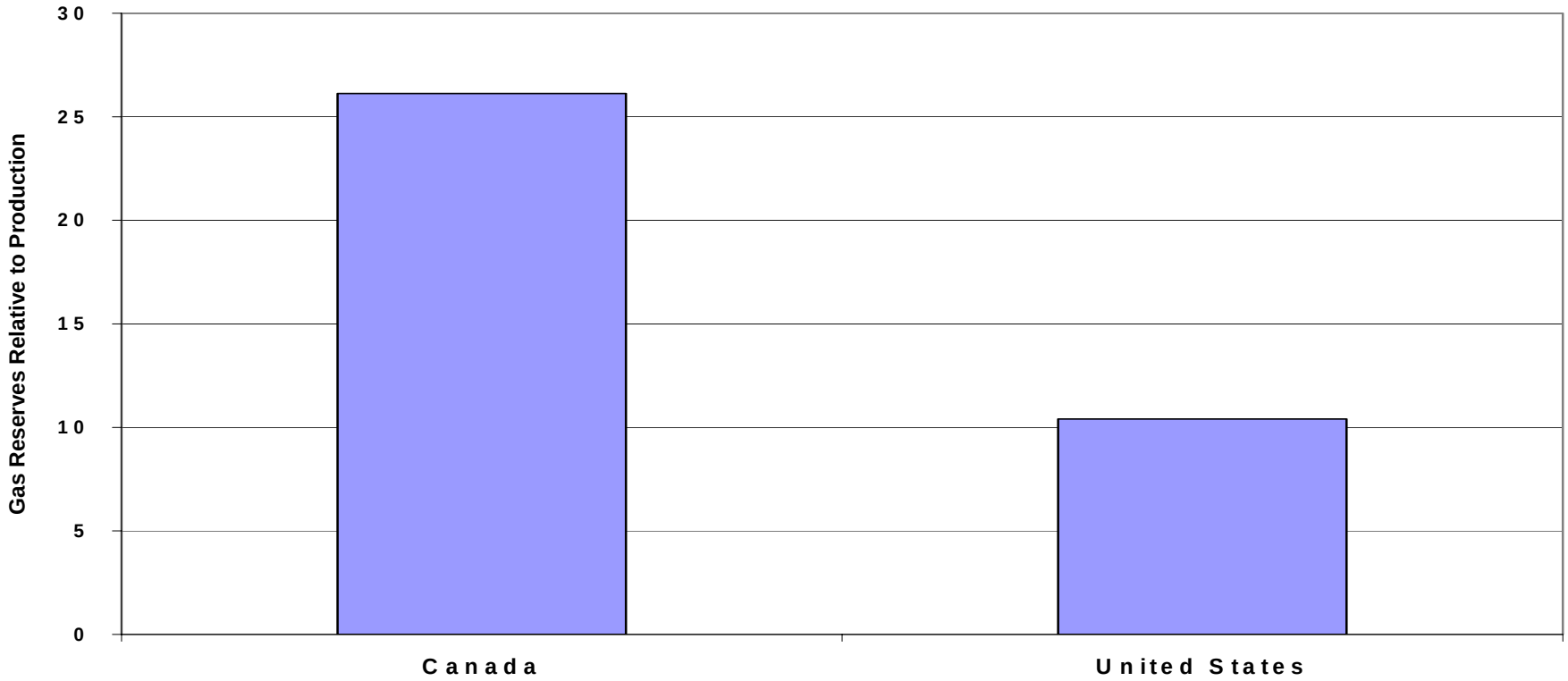
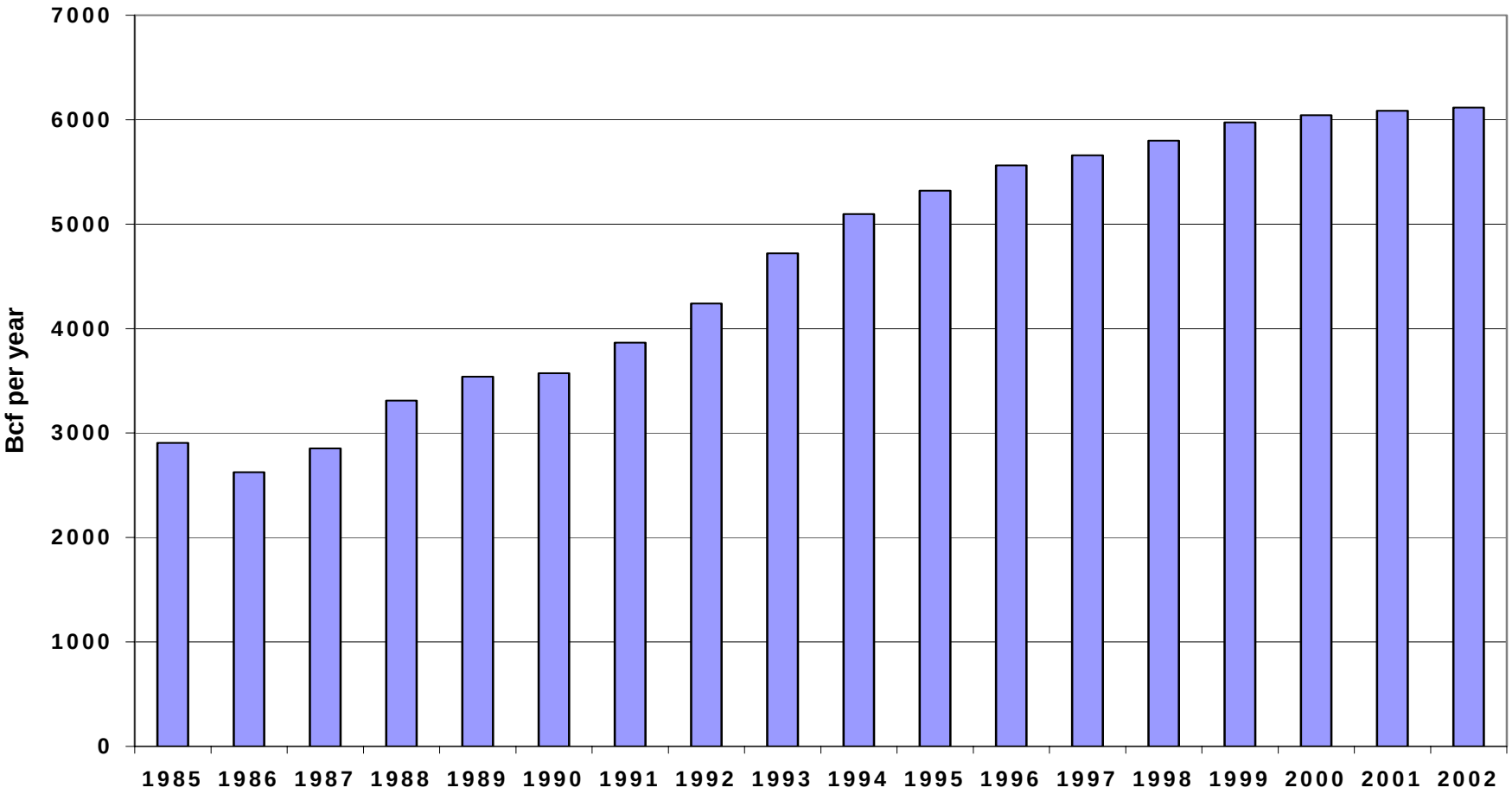
Background

Gas Reserves Relative to Production 1985: Canada vs. U.S.

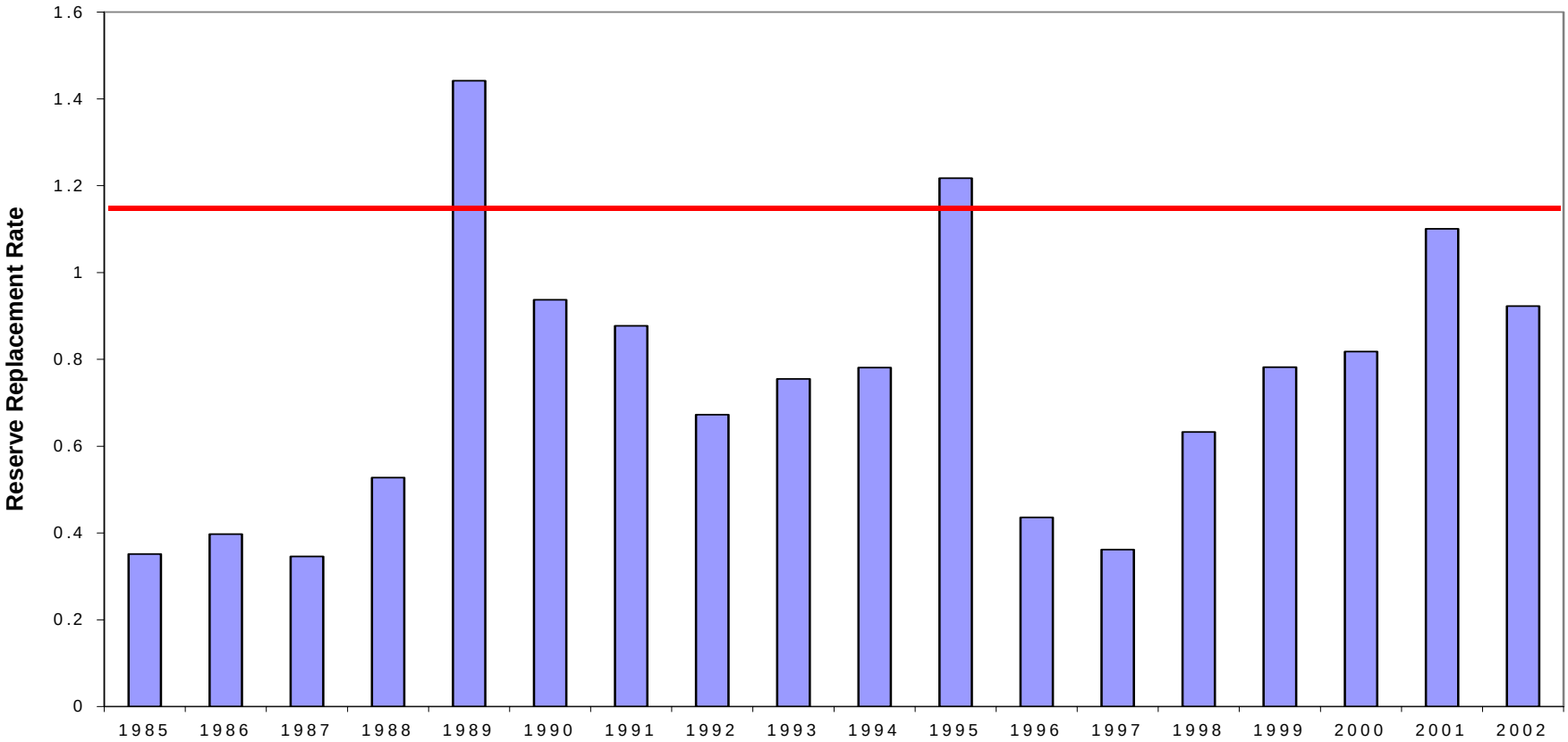


Conventional Natural Gas Production in the WCSB, 1986-2002



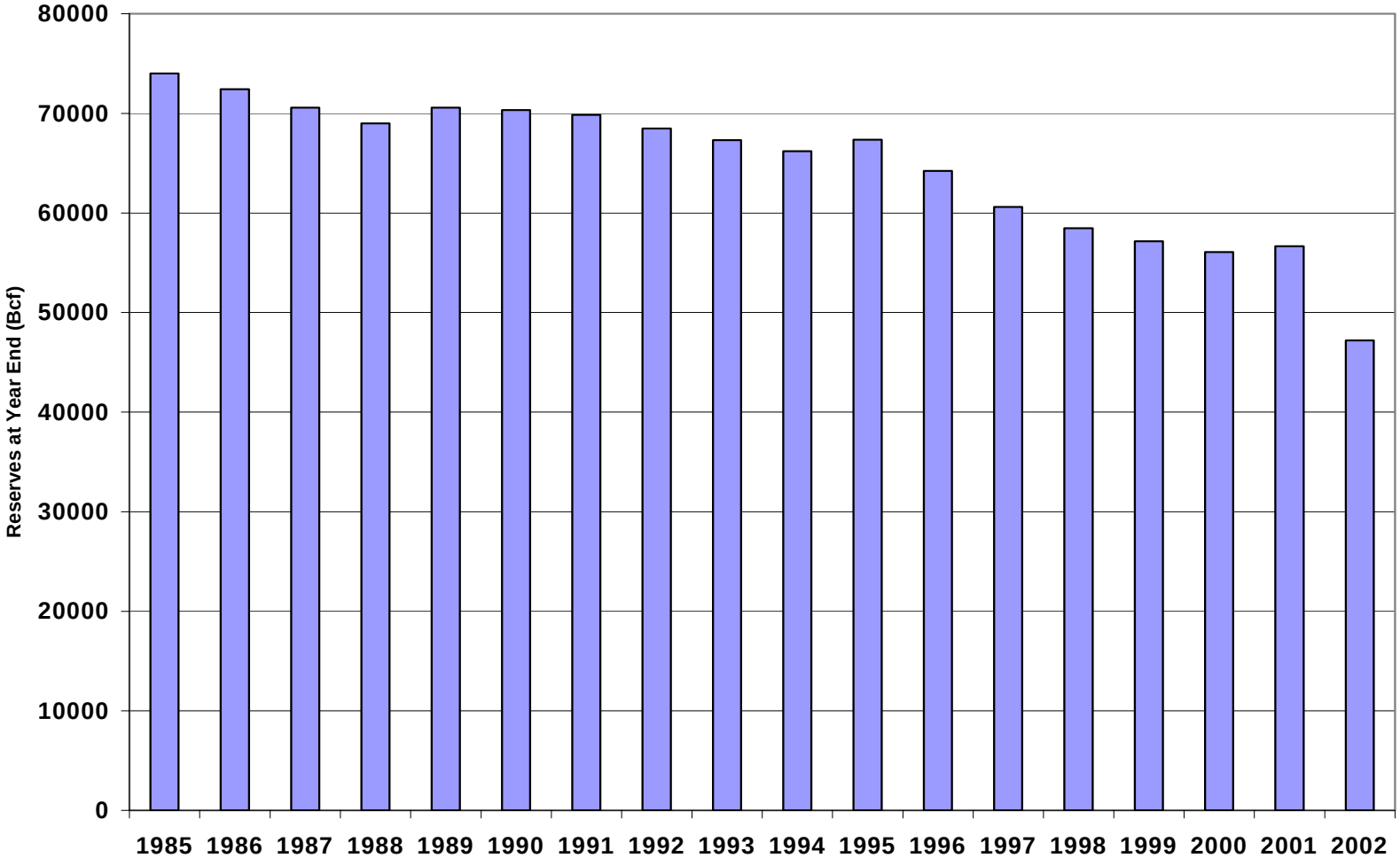
Conventional natural gas production more than doubles from 1986 to 2002.

Reserve Replacement in the WCSB, 1985-2002



The average reserve replacement rate over the 1985-2002 period was 76.4%

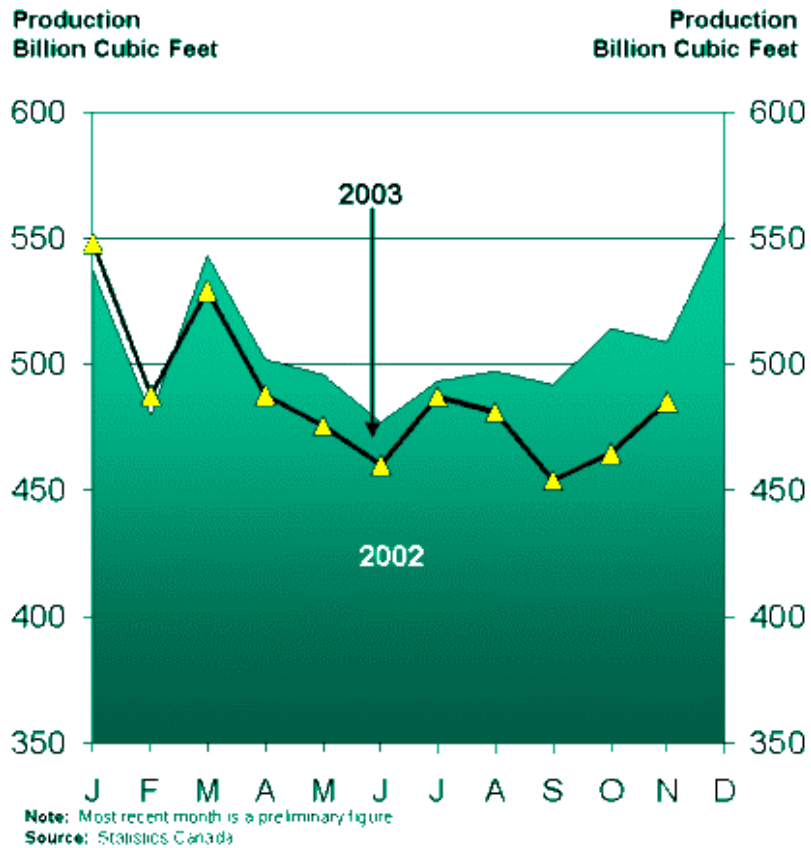
Reserves in the WCSB, 1986-2002



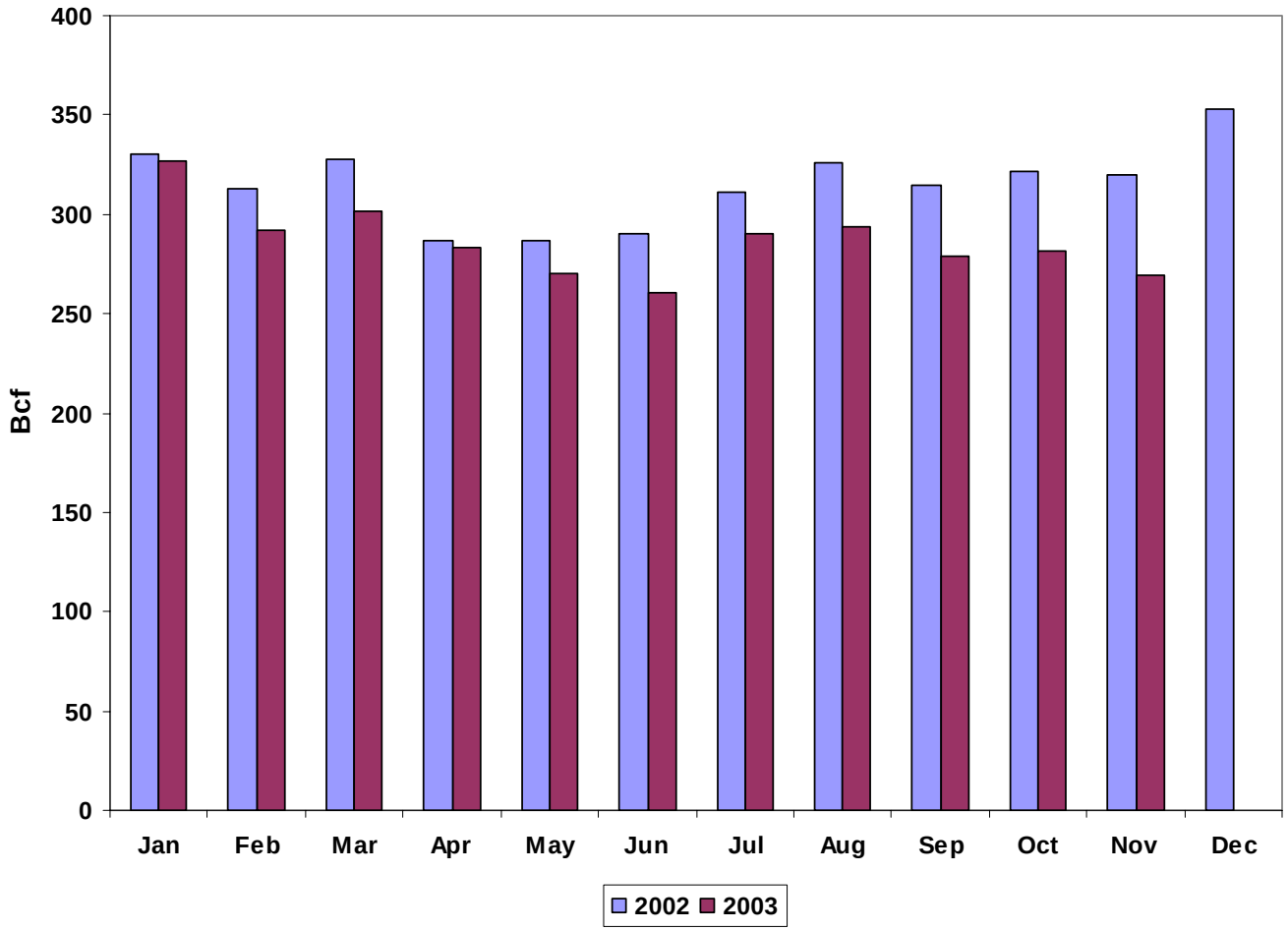
Reserves declined by 25% from 1986 to 2002.

As a result of these trends, both conventional production and exports to the United States were lower in 2003 as compared to 2002.

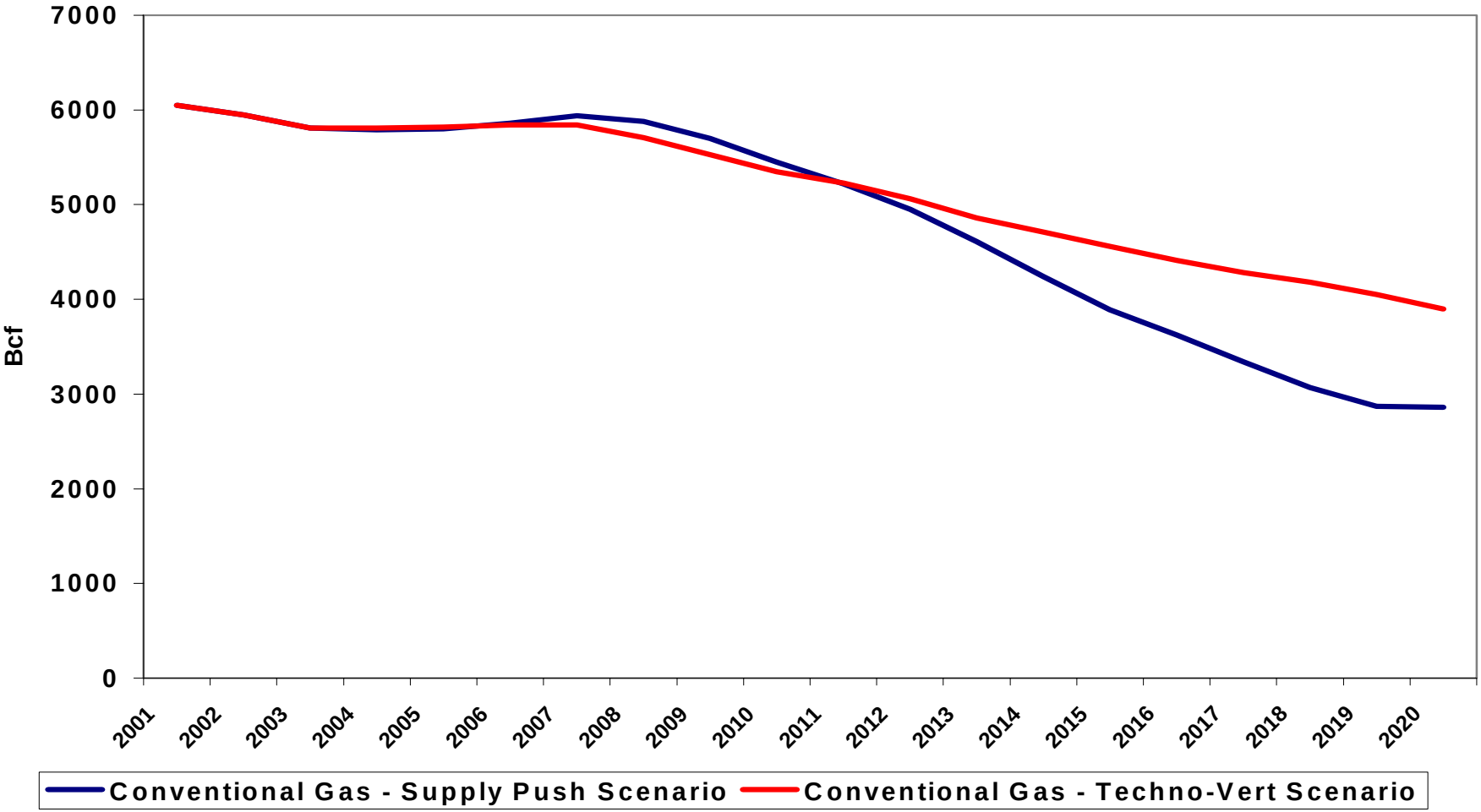
Marketable Natural Gas Production in Canada: 2003 vs 2002



Canadian Natural Gas Exports to the United States: 2003 vs 2002

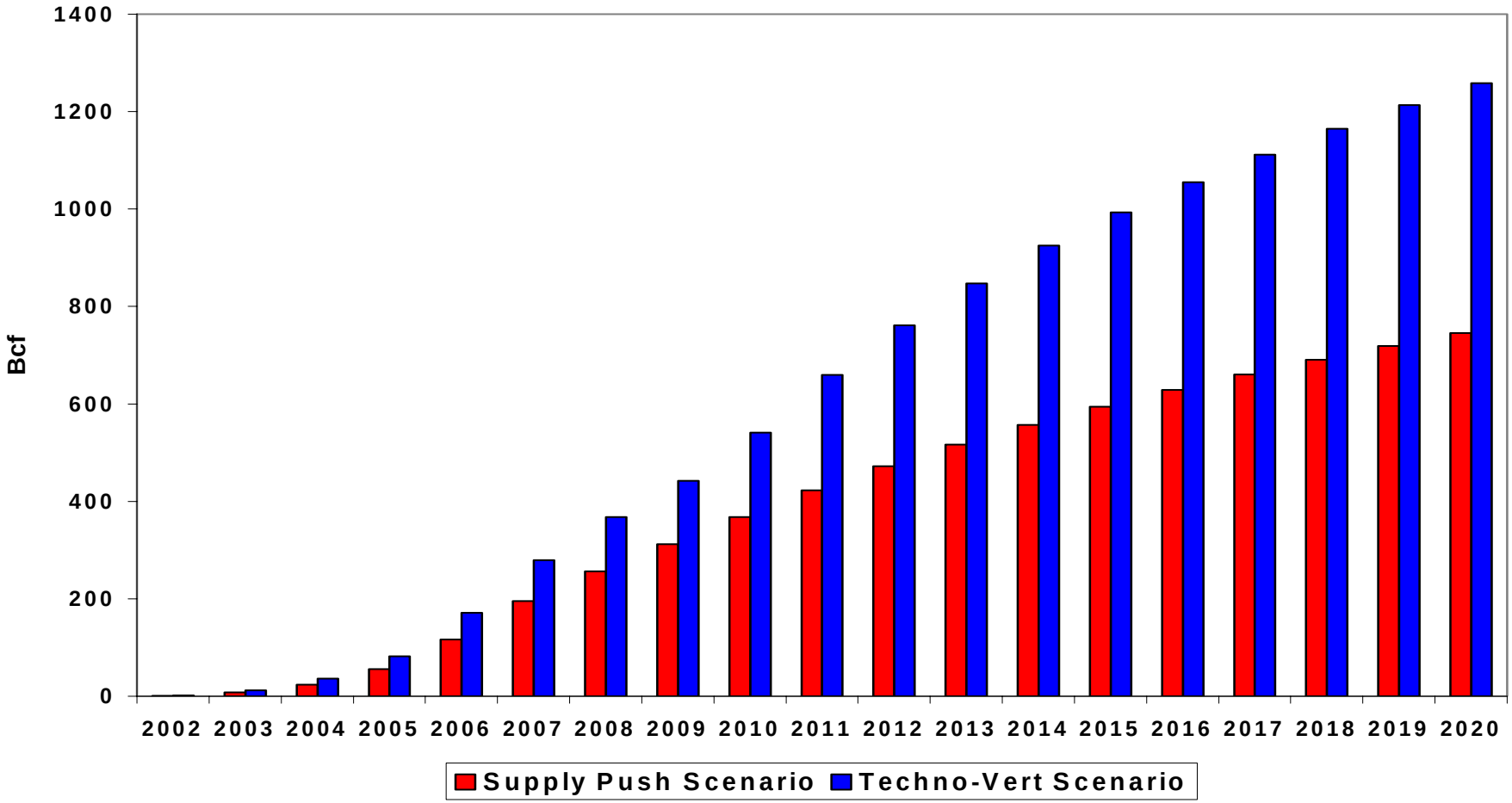


Conventional Gas Supply Outlook for the WCSB, National Energy Board (NEB), July 2003

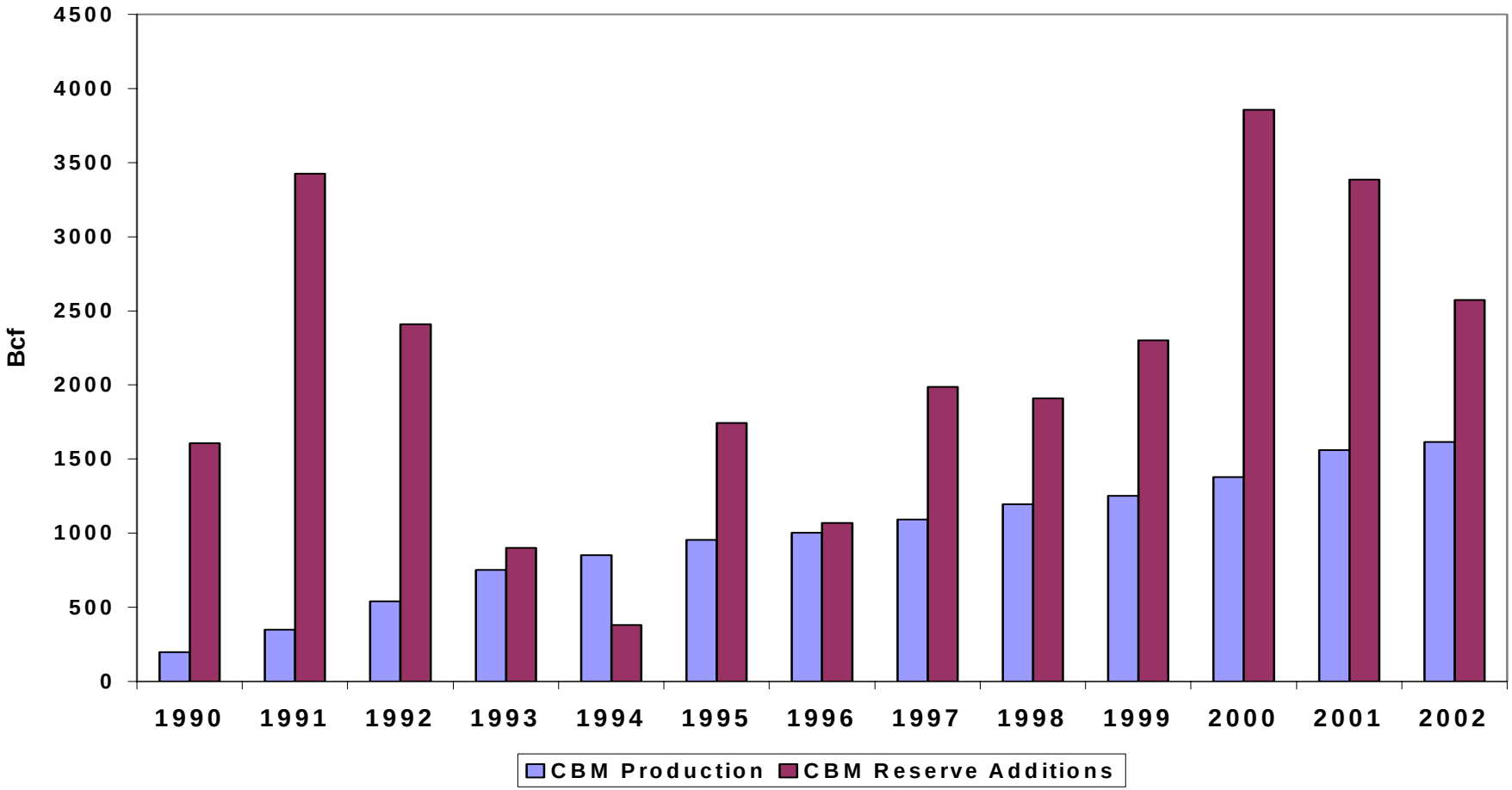


The NEB projects that conventional gas supplies will decline by roughly 33% to 50% from current levels by 2020.

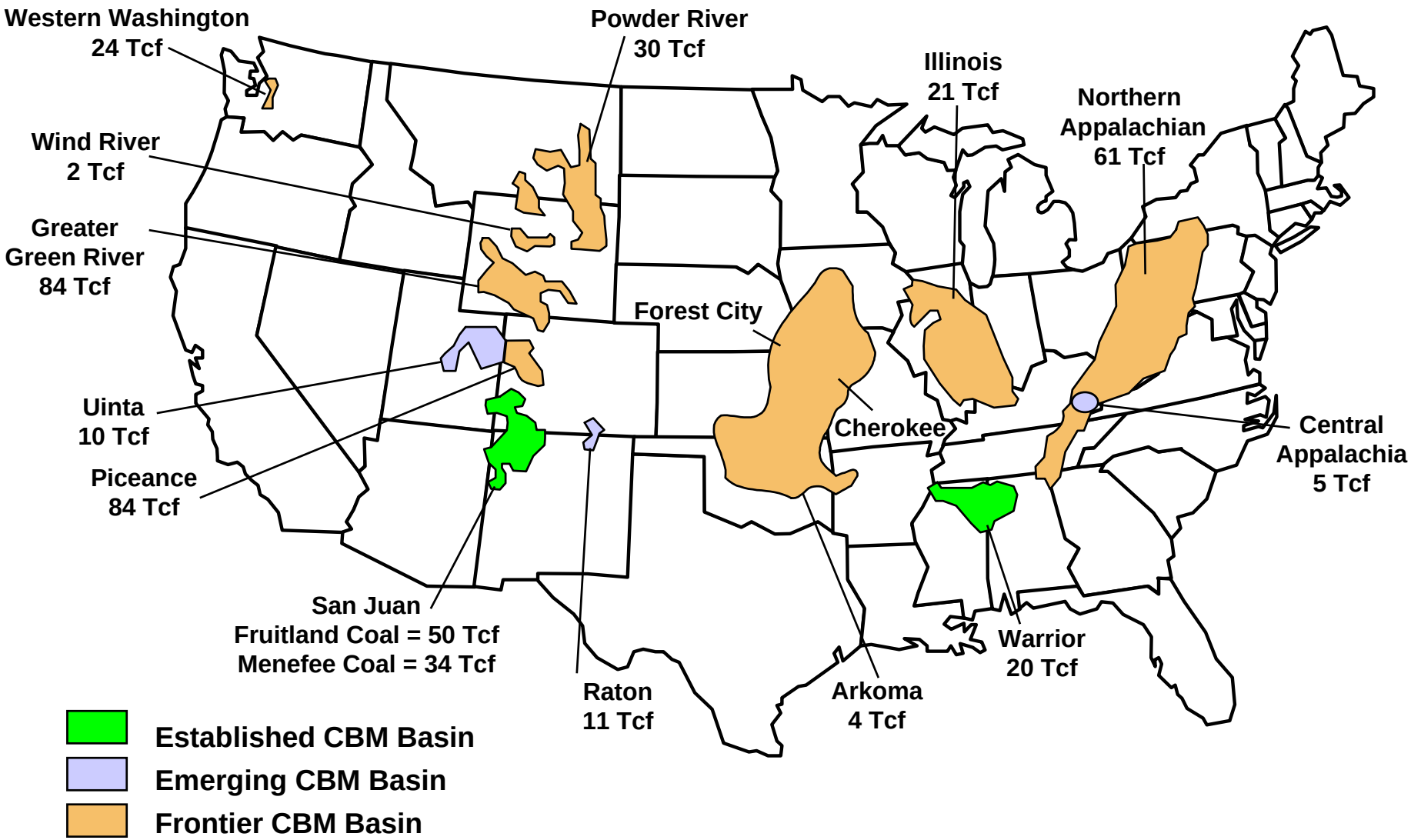
The NEB projects that some of this decline will be offset by Rising CBM production



CBM Reserve Additions and Production in the United States



Major Coalbed Methane Basins in the U.S.



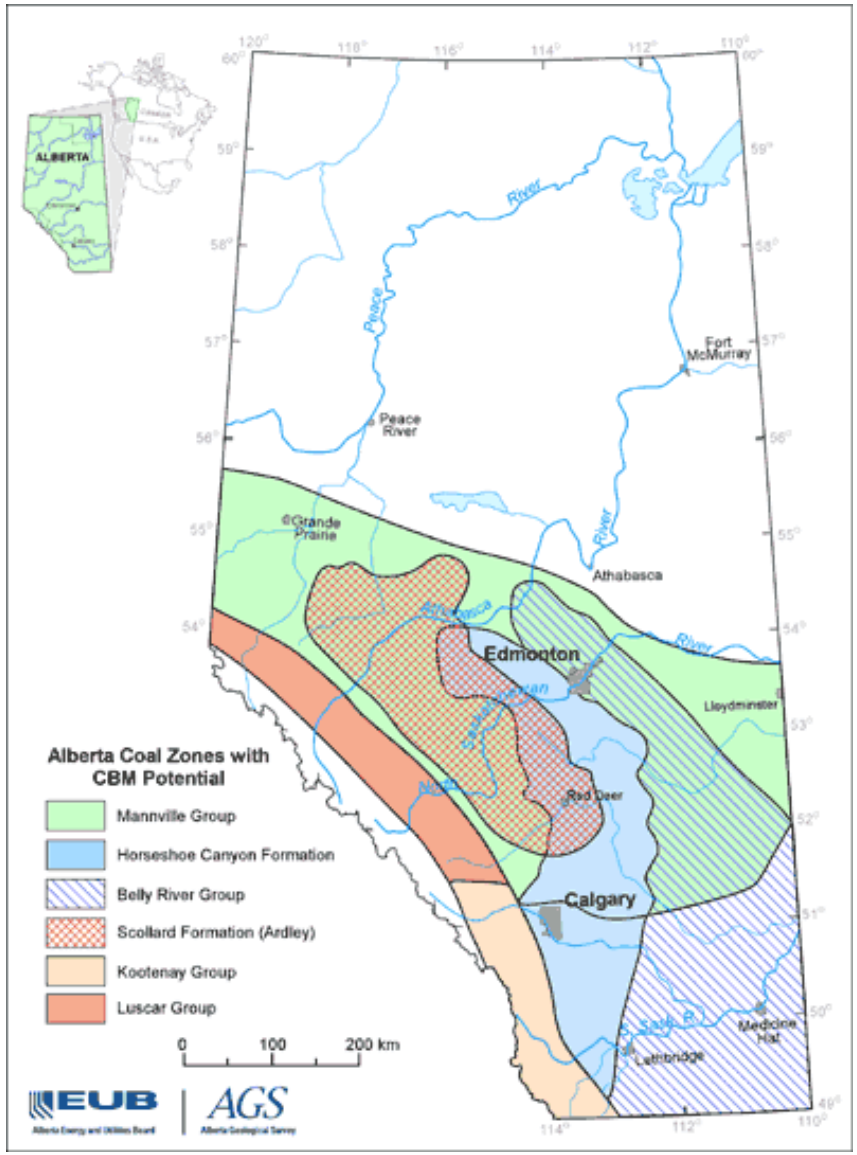
Canada's CBM Resources

- **Alberta Geological Survey estimates that the gas-in-place for the Plains and Foothills regions of Alberta are greater than 500 Tcf.**
- **Alberta Research Council estimates 250-300 Tcf of recoverable CBM resources.**
- **NEB estimates 60- 80 Tcf of recoverable resources.**

Current CBM Activity

- **Up through 2003 about 800 coalbed methane wells had been drilled in Alberta.**
- **Production at the end of 2003 was around 25 million cubic feet per day.**
- **The results so far in 2004 are quite different. The Alberta Energy and Utilities Board issued 79 coalbed methane well permits in January 2004, compared with just four in January 2003.**
- **According to *Nickle's Daily Oil Bulletin*, at least 1,150 CBM wells will be drilled in 2004**

CBM Activity in Alberta



Active Companies: Encana

- **EnCana has 700,000 acres in southern Alberta that are estimated to contain more than 2 Tcf of recoverable CBM.**
- **In the last half of 2003, EnCana commenced the drilling of a 200-well program.**
- **EnCana expects to drill another 300 wells in 2004, taking production to about 30 MMcf/d by year-end 2004.**
- **Over the next five years, EnCana expects to increase CBM production to more than 200 MMcf/d.**

Active Companies: MGV

- **MGV has drilled close to 200 CBM wells in Alberta over the past three years**
- **In 2003 MGV booked 131 Bcf of CBM reserves, up 256 % from 2002.**
- **MGV is currently producing sales gas from coal seams in the Horseshoe Canyon and Belly River Formation**
- **The company's CBM production in Canada last year amounted to 2.1 Bcf.**

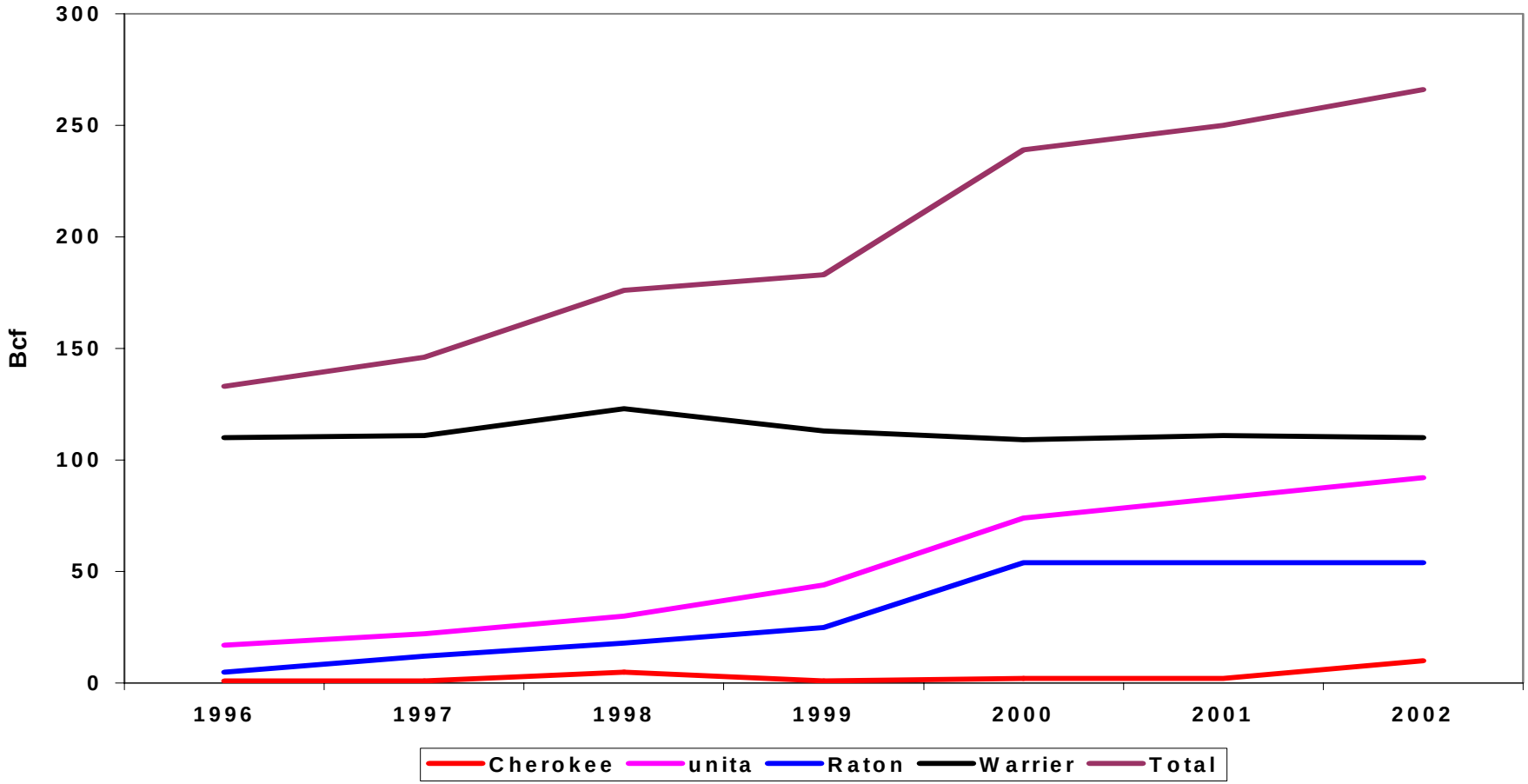
Other Active Companies

- **Thunder Energy Inc.** has announced plans to spend $70 million drilling about 125 wells in 2004. Fifty of these wells will target the coals in Horseshoe Canyon
- **EOG Resources Inc.** has announced plans to drill 100 (80 net) CBM wells in 2004, targeting mainly Horseshoe Canyon.

Current Activity

- **Horseshoe Canyon** (Alberta Plains). These coal zones appear to be dry**.** This is welcome news since water disposal is a major issue for the CBM industry in the United States. According to Seidle (2003) this basin is analogous to the Cherokee Basin in the U.S
- **Ardley/Coalspur** (Plains/Foothills) According to Seidle (2003) this basin is analogous to the Warrier Basin in the U.S.
- **Mannville** (Alberta Plains) According to Seidle (2003) this basin is analogous to the Unita or possibly the Raton Basin in the U.S.
- **Mist Mountain** (Foothills/ Mountains) According to Seidle (2003) this basin is analogous to the Raton Basin in the U.S.

CBM Production From U.S. Basins Similar to those in Canada



Forecasting Canadian CBM Production Using Maple-C

- **Maple-C is Natural Resources Canada's new Model for the Analysis of Policies Linked to Energy-Canada**
- **Maple-C is being developed by essentially converting NEMS to reflect Canadian Supplies, Demands, and Institutions.**
- **The conversion is being undertaken by SAIC. Over 40,000 person-hours over the past 2.5 years have gone into the project.**

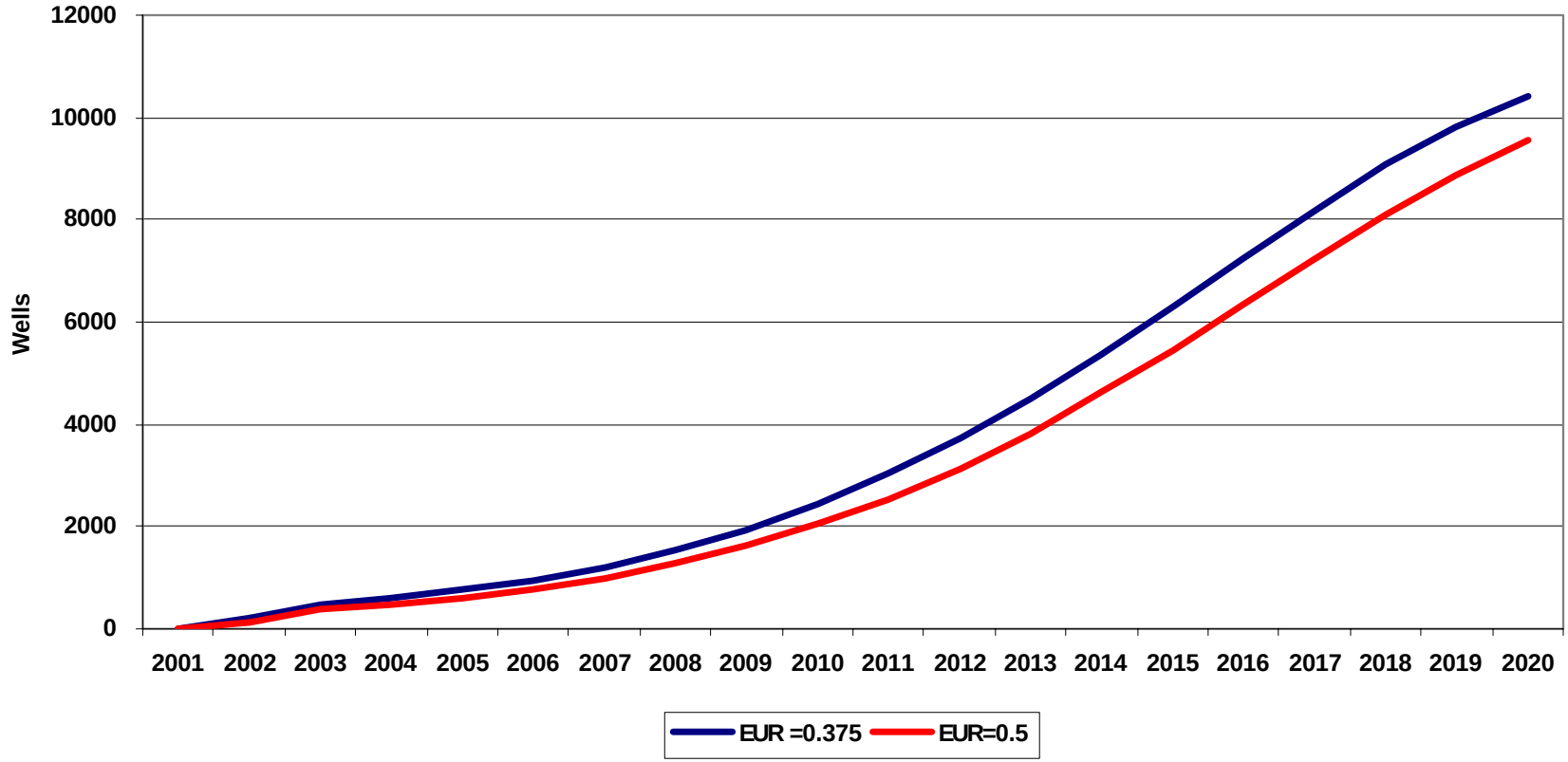
Maple-C (Cont'd)

- **To reflect the reality that the Canadian and U.S. natural gas markets are integrated, Maple-C includes the OGSM and NGTDM as two-country models. Specifically, Maple-C includes the full original NGTDM/OGSM representations of the U.S., as well as a full representation of Canada.**
- **EIA is currently working on integrating these same 2-country modules into the AEO 2005 version of NEMS.**
- **The development of the 2-country NGTDM/OGSM modules is being jointly funded by EIA and NRCan, and they are planning to share these modules going forward.**
- **Like NEMS, Maple-C has an unconventional gas supply module. The equations to forecast CBM drilling are based on U.S. data.**

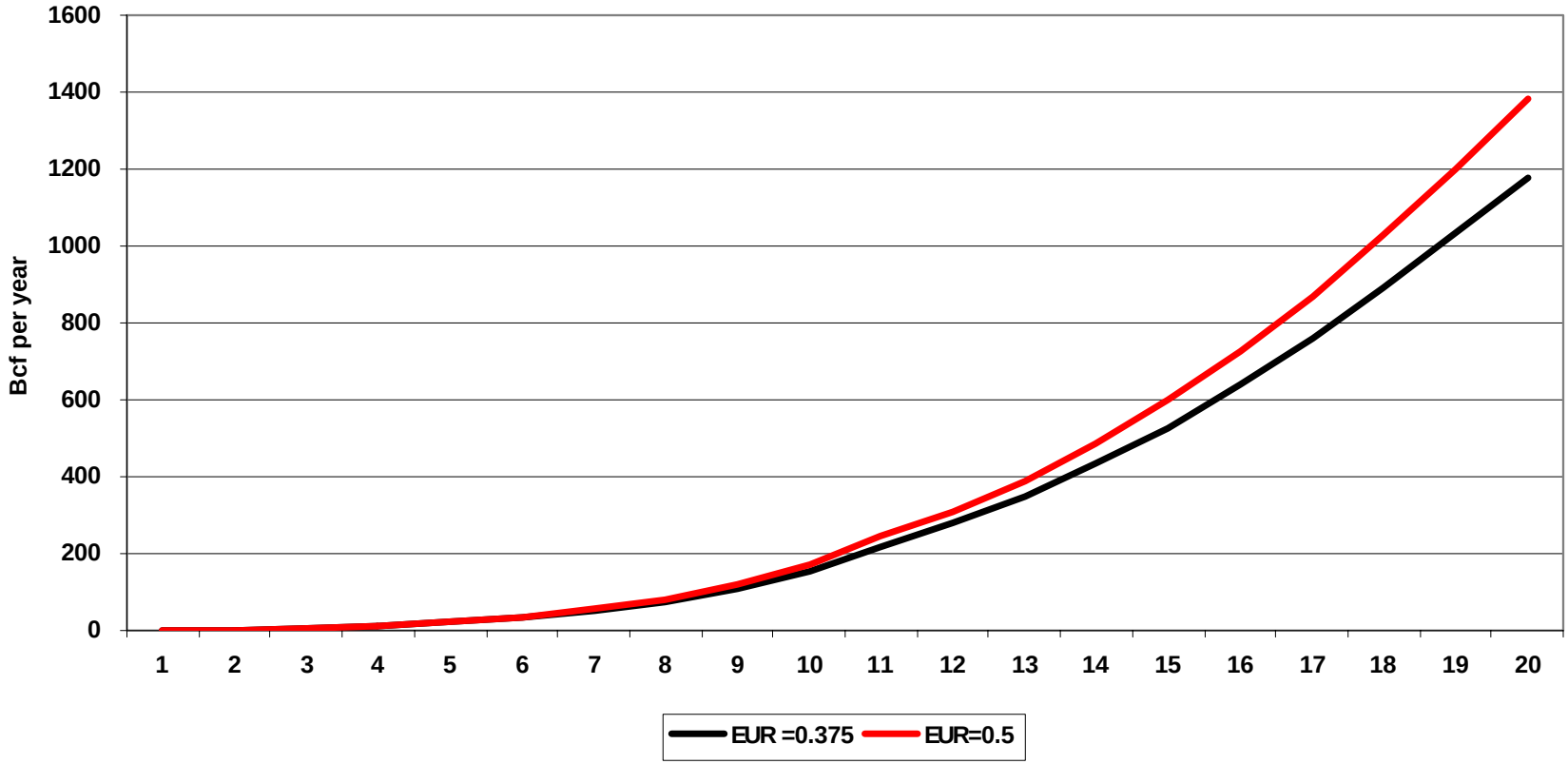
Preliminary Results from a Nonintegrated Run

- **Price was assumed to equal C$ 5.40 (2002 dollars) per mcf. This is about C$0.65 higher than the prices assumed by the NEB**
- **In the first case, the expected ultimate recovery (EUR) is 0.375 Bcf per well. There are no water disposal costs because the coal seams are assumed to be dry.**
- **In the second case, the EUR is 0.5 Bcf per well and there are water disposal costs. The water disposal costs are assumed to be equal to the water disposal costs in the United States.**

Preliminary Results for Alberta: Drilling



Preliminary Results for Alberta: Production



Conclusions

- **By most accounts, conventional natural gas production from Alberta, Saskatchewan, and British Columbia will decline over the next two decades.**
- **According to the NEB, a significant portion of this decline will be offset by CBM production.**
- **The result of this MAPLE-C analysis indicates that CBM production may be higher than what the NEB projects.**

Acknowledgements

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