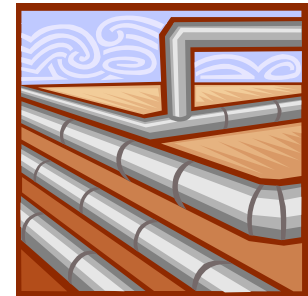




NW Natural

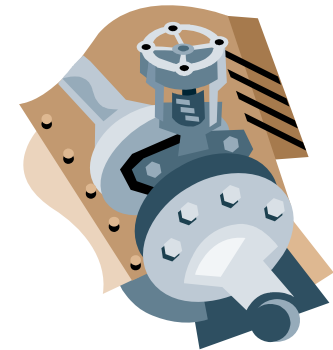
Natural Gas Industry Overview

Presentation to the Greenhouse Gas Reporting Advisory Committee



**Randy Friedman
Director, Gas Supply**

November 16, 2009

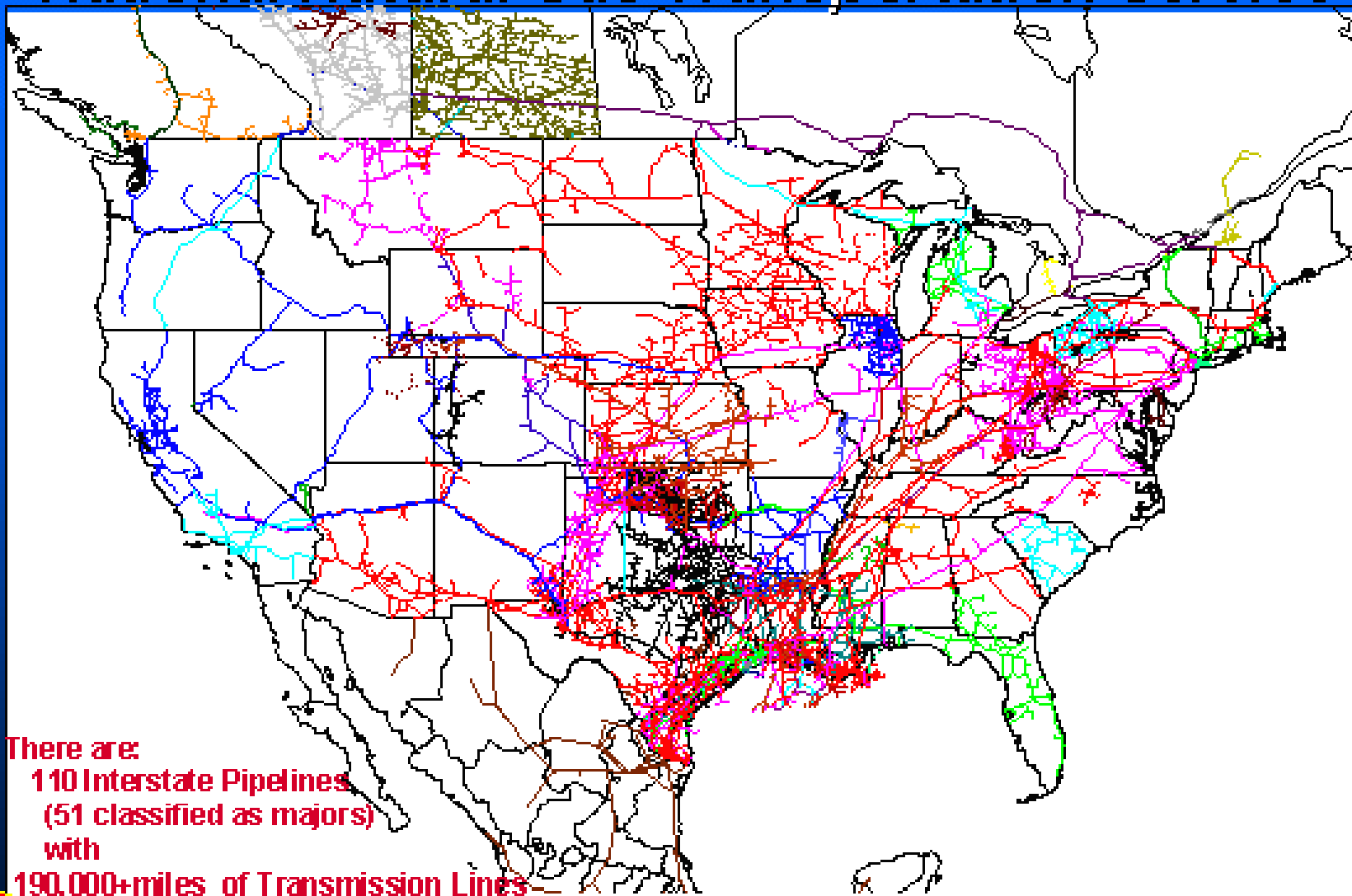




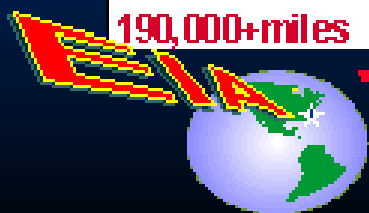
Gas Industry Overview

- ◆ Basics of the Physical System
- ◆ Industry Regulation
- ◆ How We Buy Gas

A Vast Network of Pipelines Provides a National Natural Gas Transportation Service



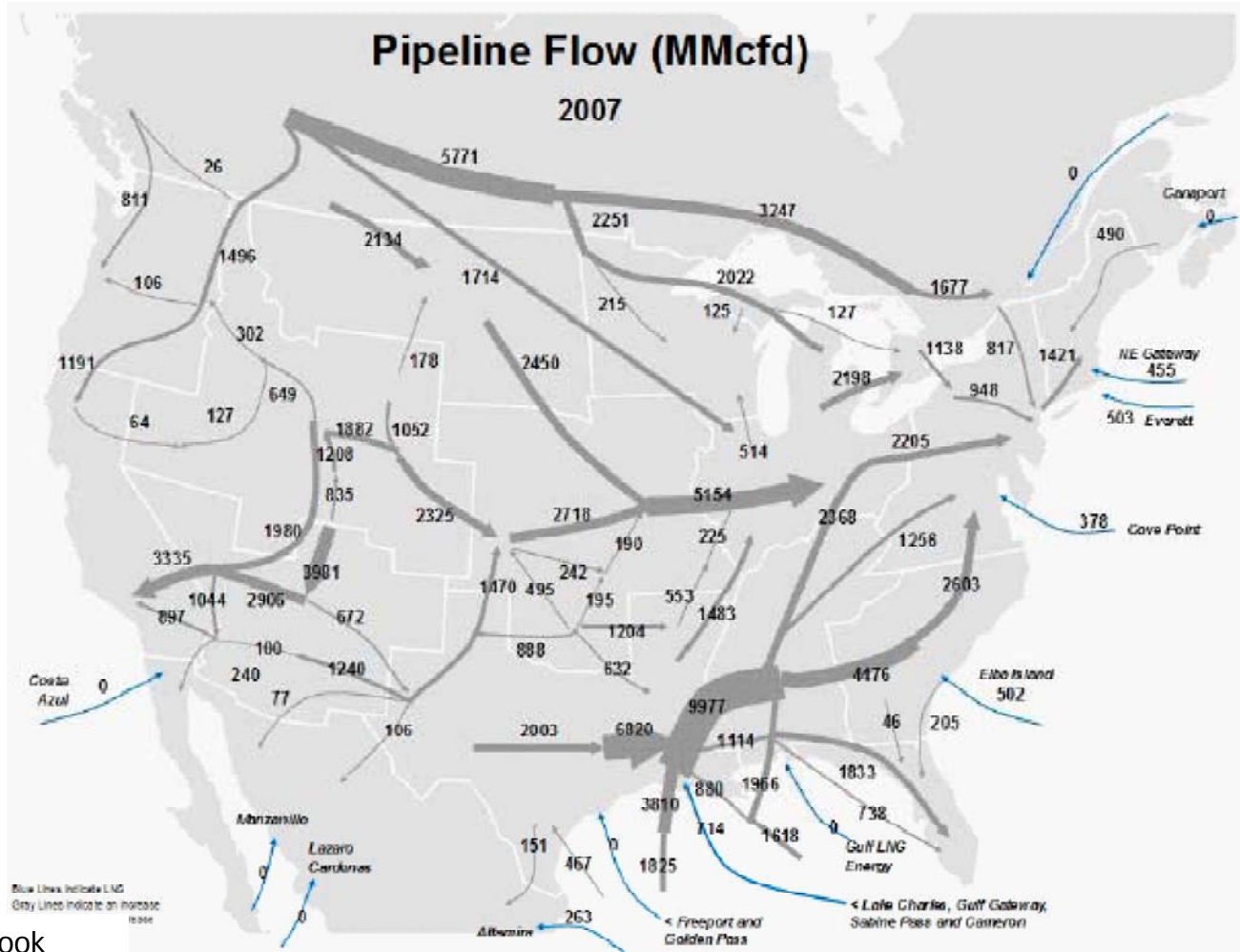
There are:
110 Interstate Pipelines
(51 classified as majors)
with
190,000+ miles of Transmission Lines



Gas Markets are Interconnected

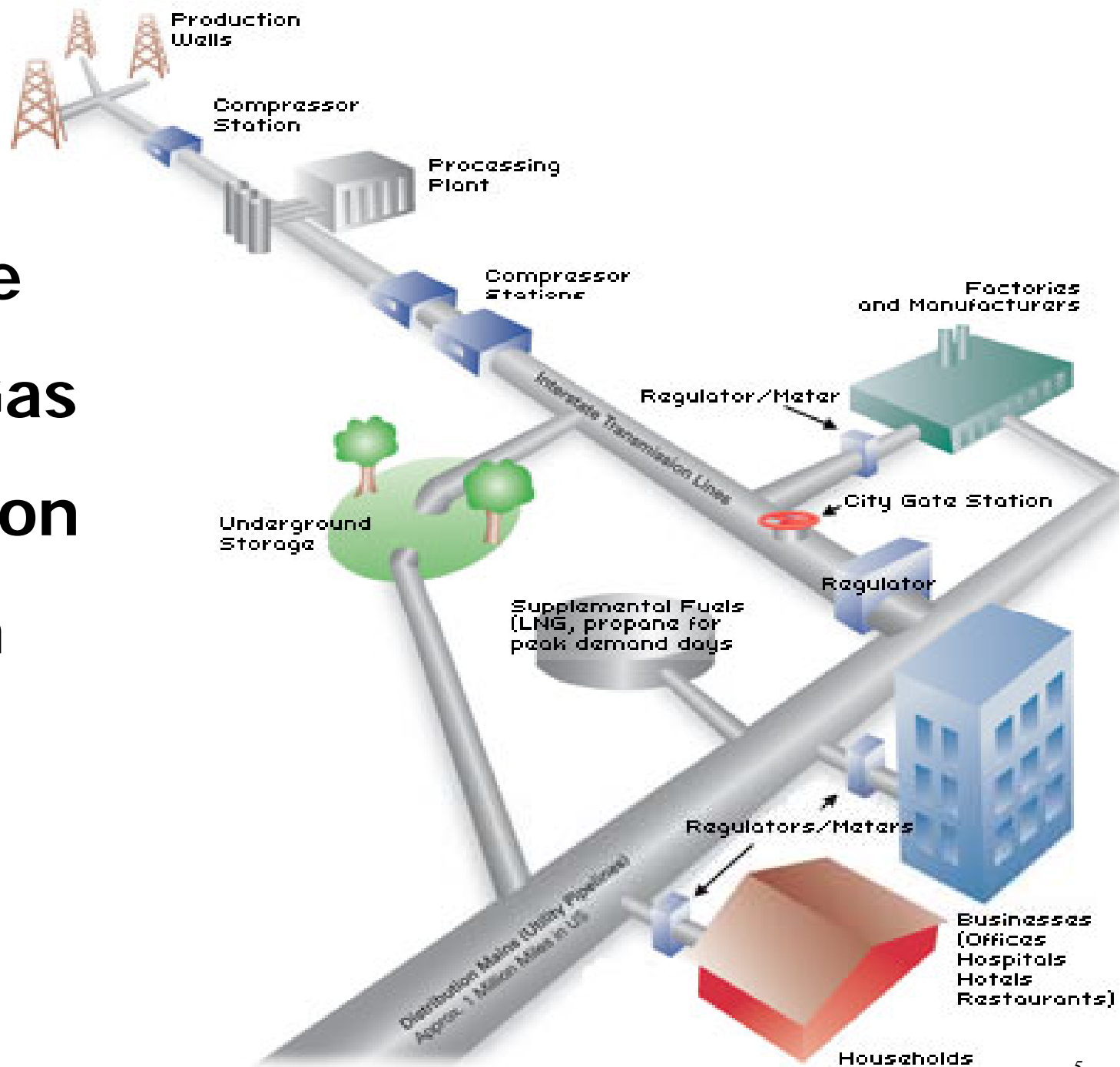
15% of U.S. gas supplies come from Canada

NWN gets 60% of its gas supplies from Canada



Source: NWGA 2008 Gas Outlook

How the Natural Gas Distribution System Works

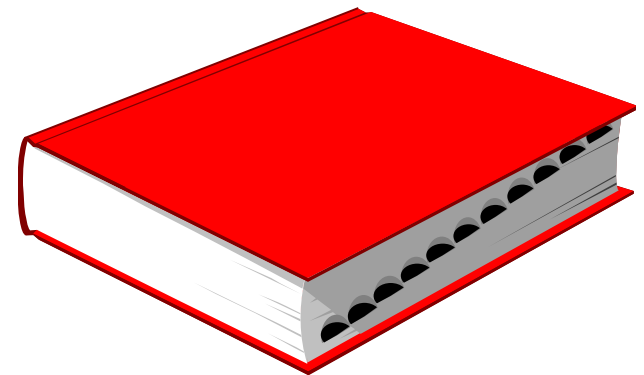


Source: NWGA website



Gas Industry Standards

- ◆ Suppliers/Pipelines use Dekatherms or MMBtu
1 Dth = 10 therms = 1 million Btus = 1 MMBtu
- ◆ LDCs use therms
1 therm = 100,000 Btus
- ◆ Engineers use cubic feet
1 Mcf = 1,000 cubic feet
1 Mcf \approx 1 Dth
- ◆ Canadians use GJs and 10^3m^3
1 Dth = 1.055056 GJ
1 10^3m^3 = 35.3 Mcf





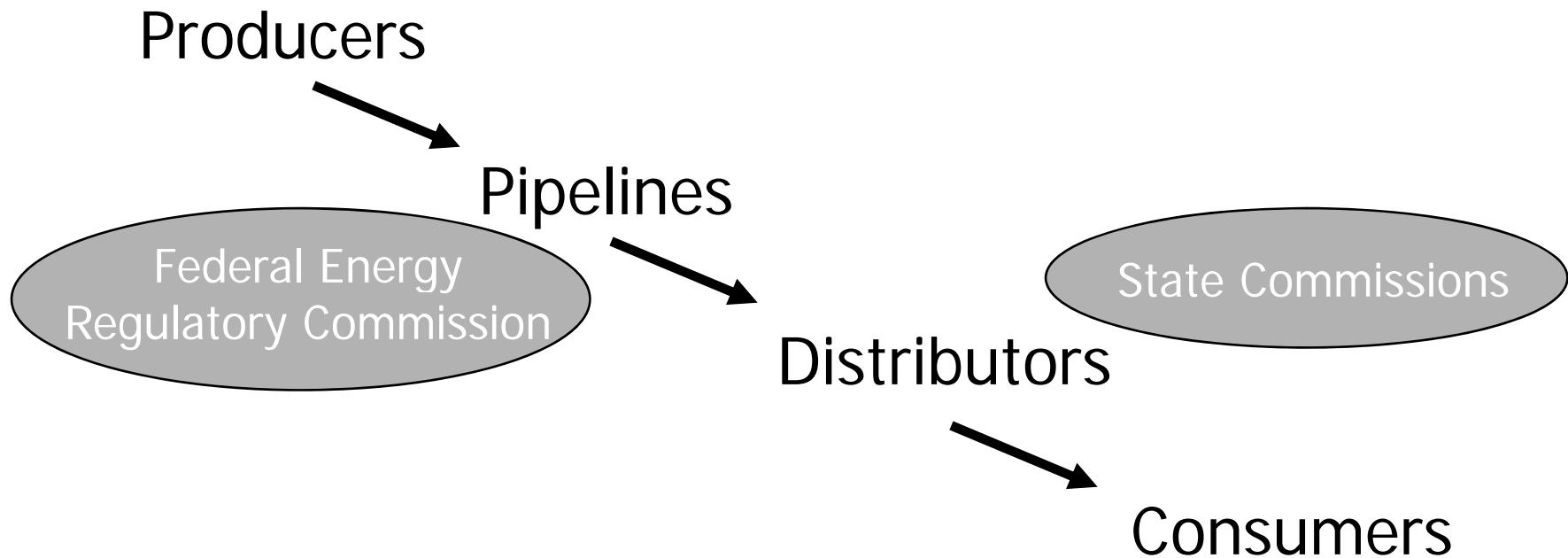
Regulation - The "Before" World

- **1938: Natural Gas Act**
- **1973: 1st OPEC Oil Embargo**
- **Regulatory Lag - Interstate vs. Intrastate**
- **1977/78: Gas "Shortages" Hit**
- **Pipelines Sign Take-or-Pay Contracts**
- **1979: 2nd OPEC Oil Embargo**



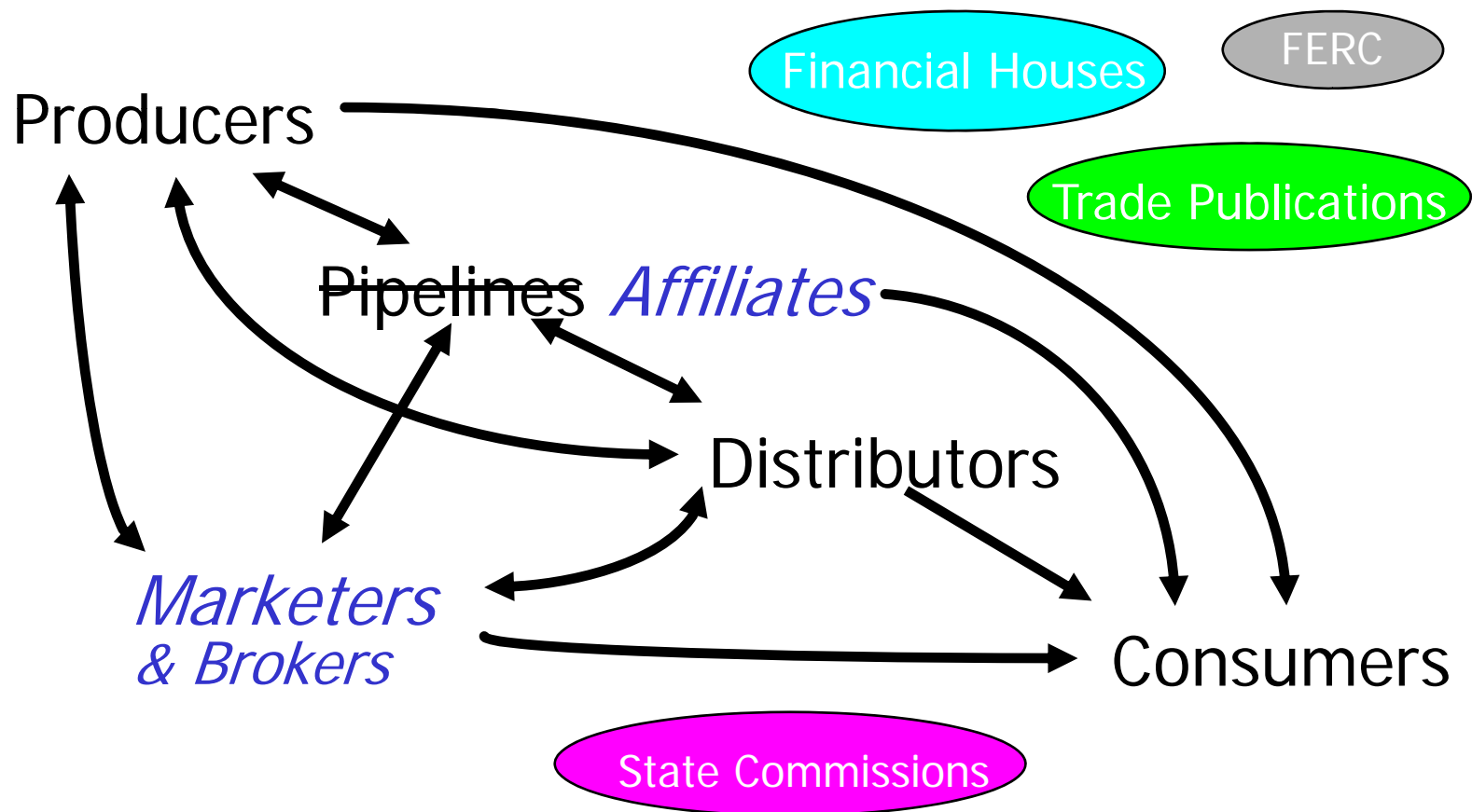
Gas Industry Evolution

"Before"



Gas Industry Evolution

"After"





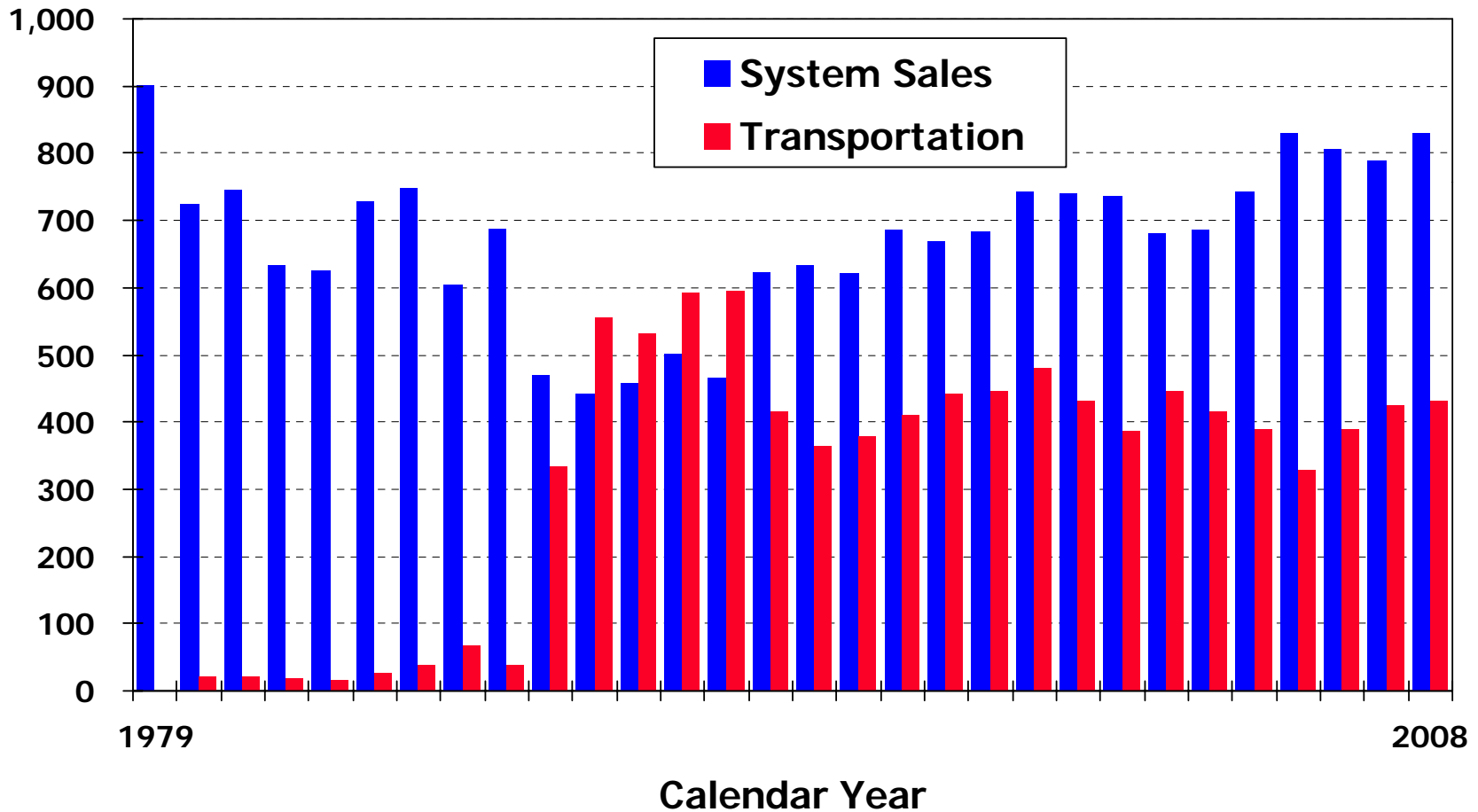
From "Before" to "After"

- **1978: Project Independence**
 - NGPA, PURPA, et al
- **1981: Gas Bubble Forms**
- **1984-1990: FERC Orders 380, 436, 451, 500**
- **1989: Natural Gas Wellhead Decontrol Act**
- **1990: NYMEX Gas Futures**
- **1992: FERC Order 636**



NW Natural's Changing Obligations

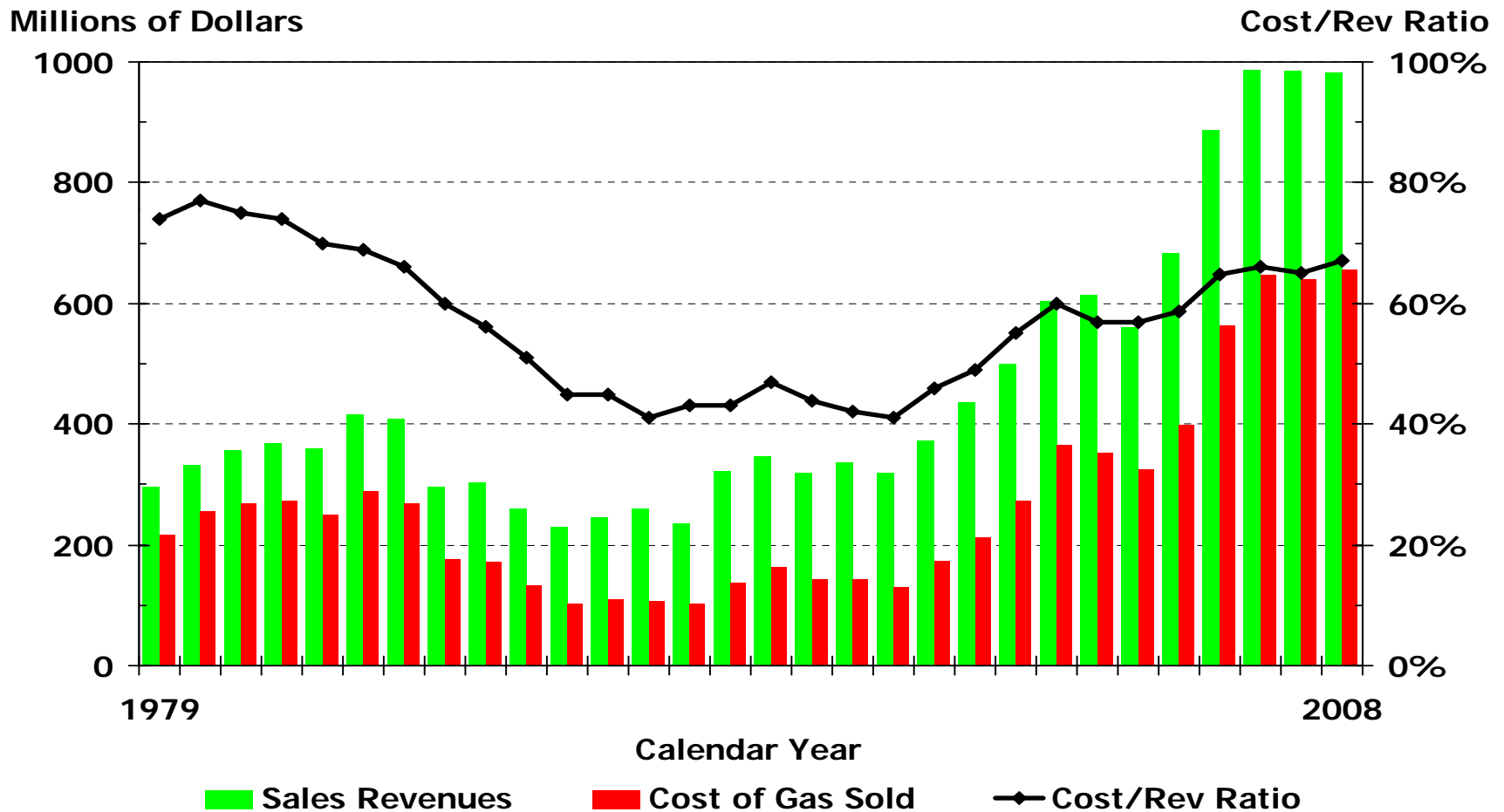
Millions of Therms



Source: NW Natural Annual Reports

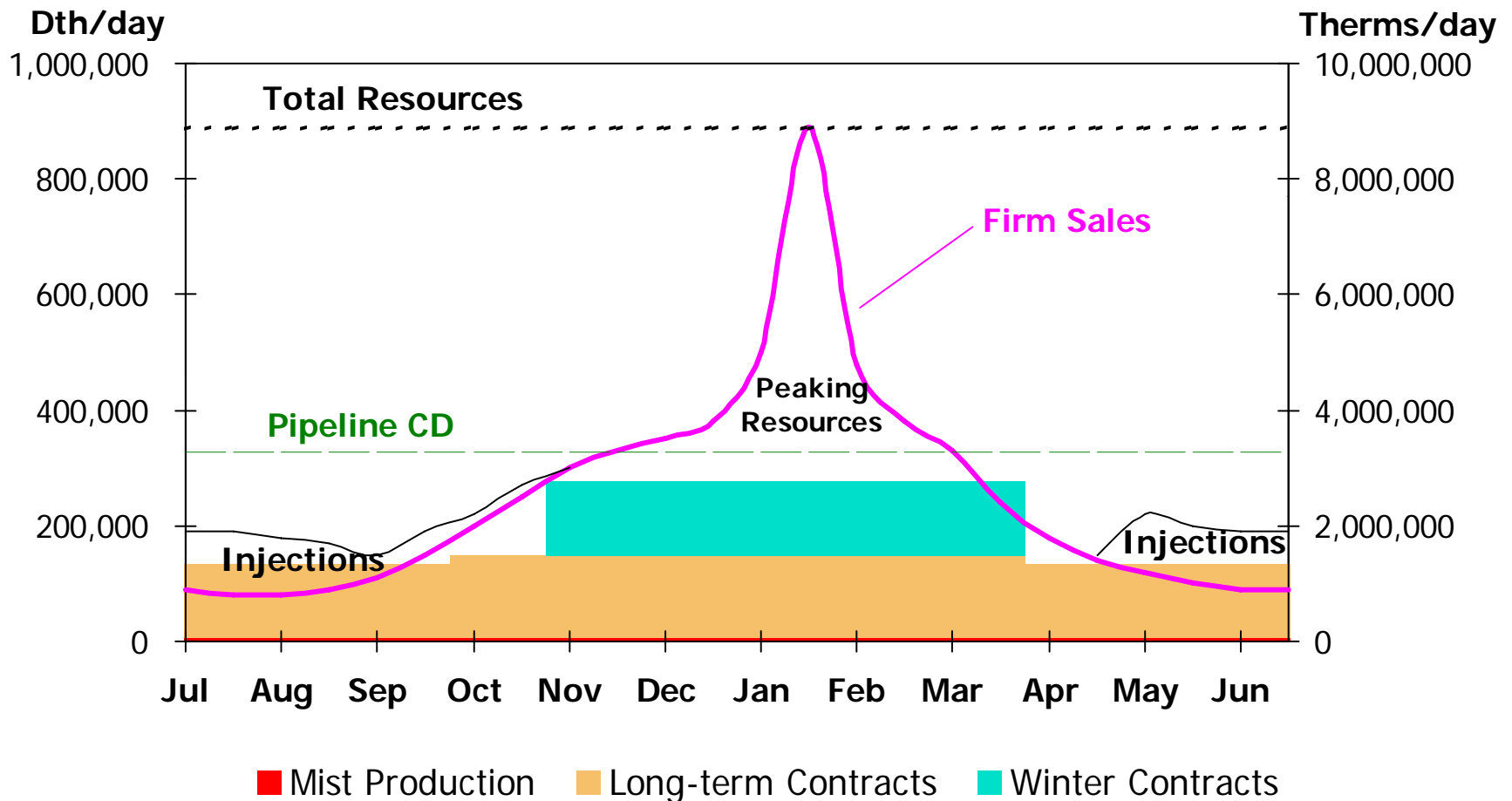


Buying Gas – The Stakes are Large



Source: NW Natural Annual Reports

Designing a Supply Portfolio



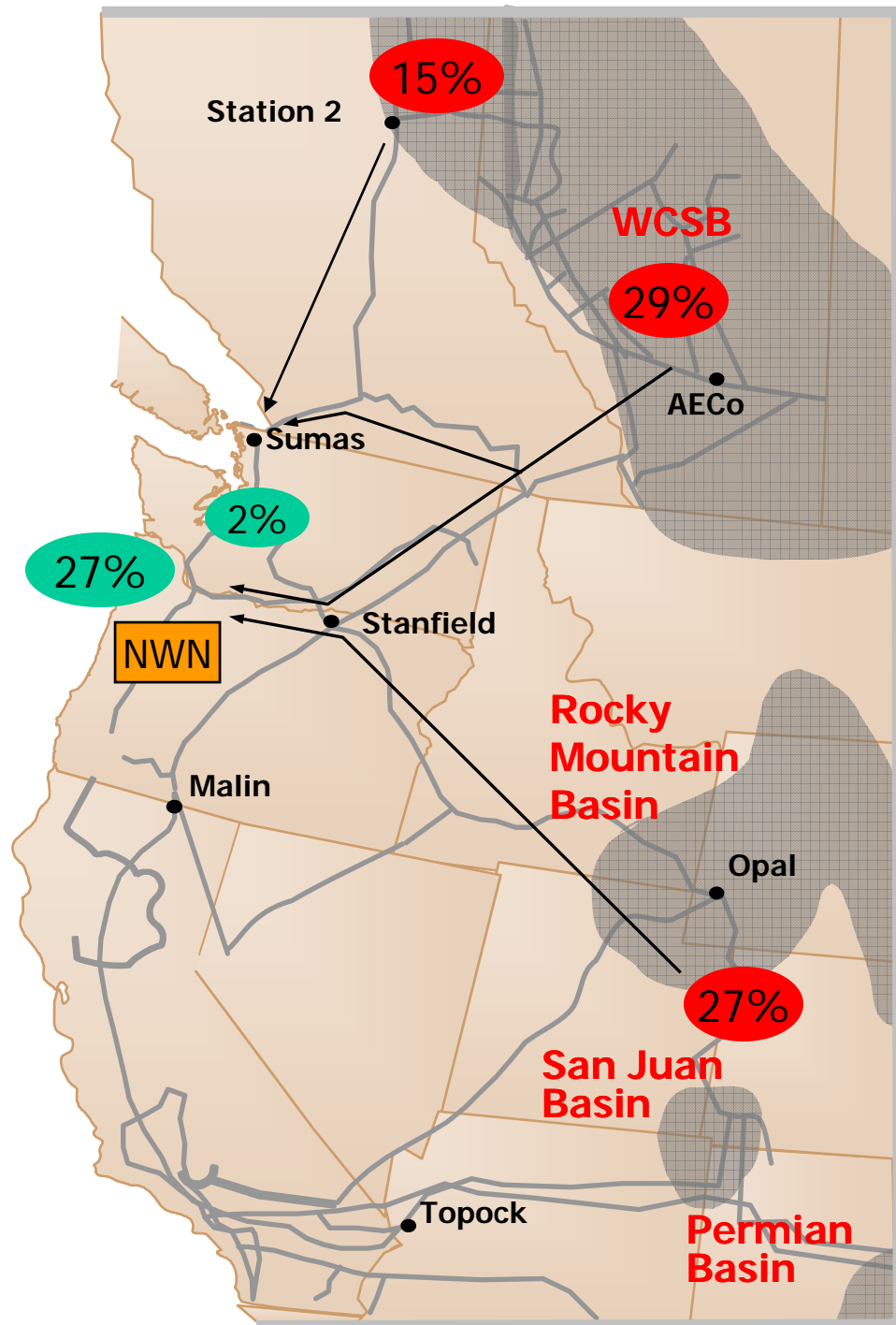
NW Natural Average Winter Day

- Flowing Supplies
- Storage

Avg. Day Winter Supply Volumes (MMBtu)

British Columbia (Stn 2)	58,000
Alberta	115,000
Rockies	110,000
Jackson Prairie	10,000
Mist Storage	107,000
Portland LNG	0
Newport LNG	0
<u>Plymouth LNG</u>	<u>0</u>
Total	400,000

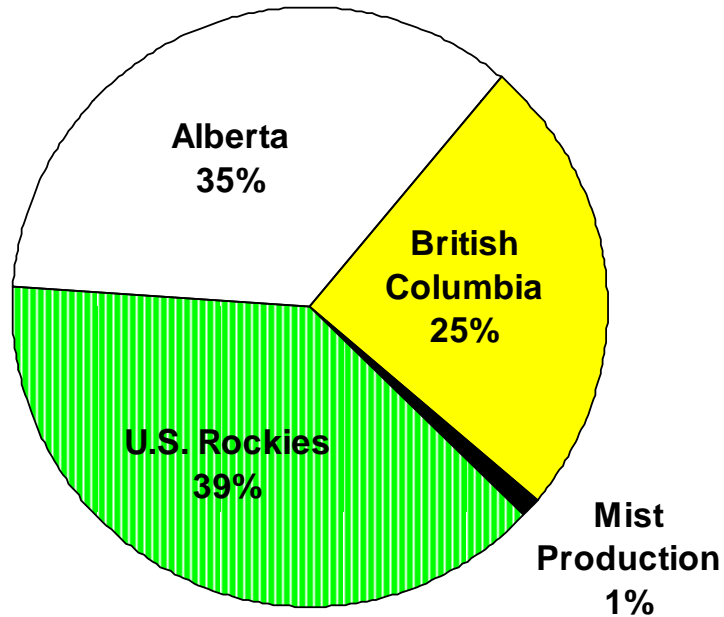
Assumes that storage is 100% full on Nov 1.



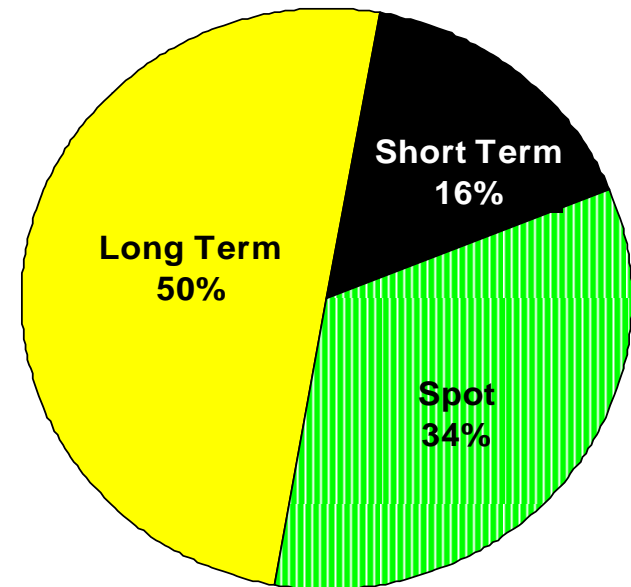


Historical Gas Buying Pattern

SUPPLY SOURCE



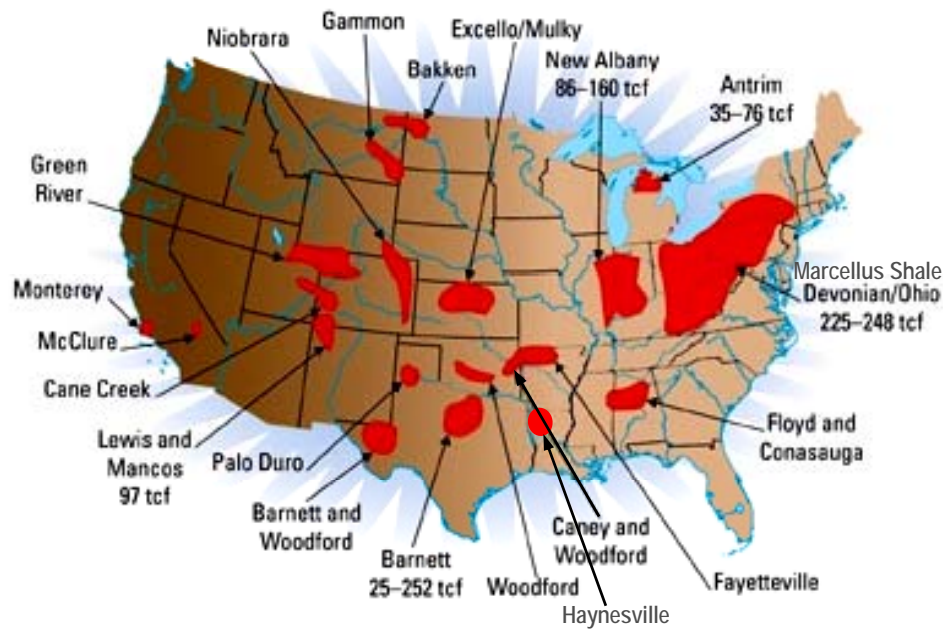
CONTRACT LENGTH



Total Purchases for Calendar Year 2008 = 831 million therms

Shale Dominates Current Planning

US Shale Gas Supply Areas



Gas shale deposits appear in basins from the east to the west coast across the United States. Although recovery percentages are low, total volumes are high. (Map from epmag.com, courtesy of Schlumberger)

BC Shale/Tight Gas Supply Areas

