



North American Natural Gas Markets

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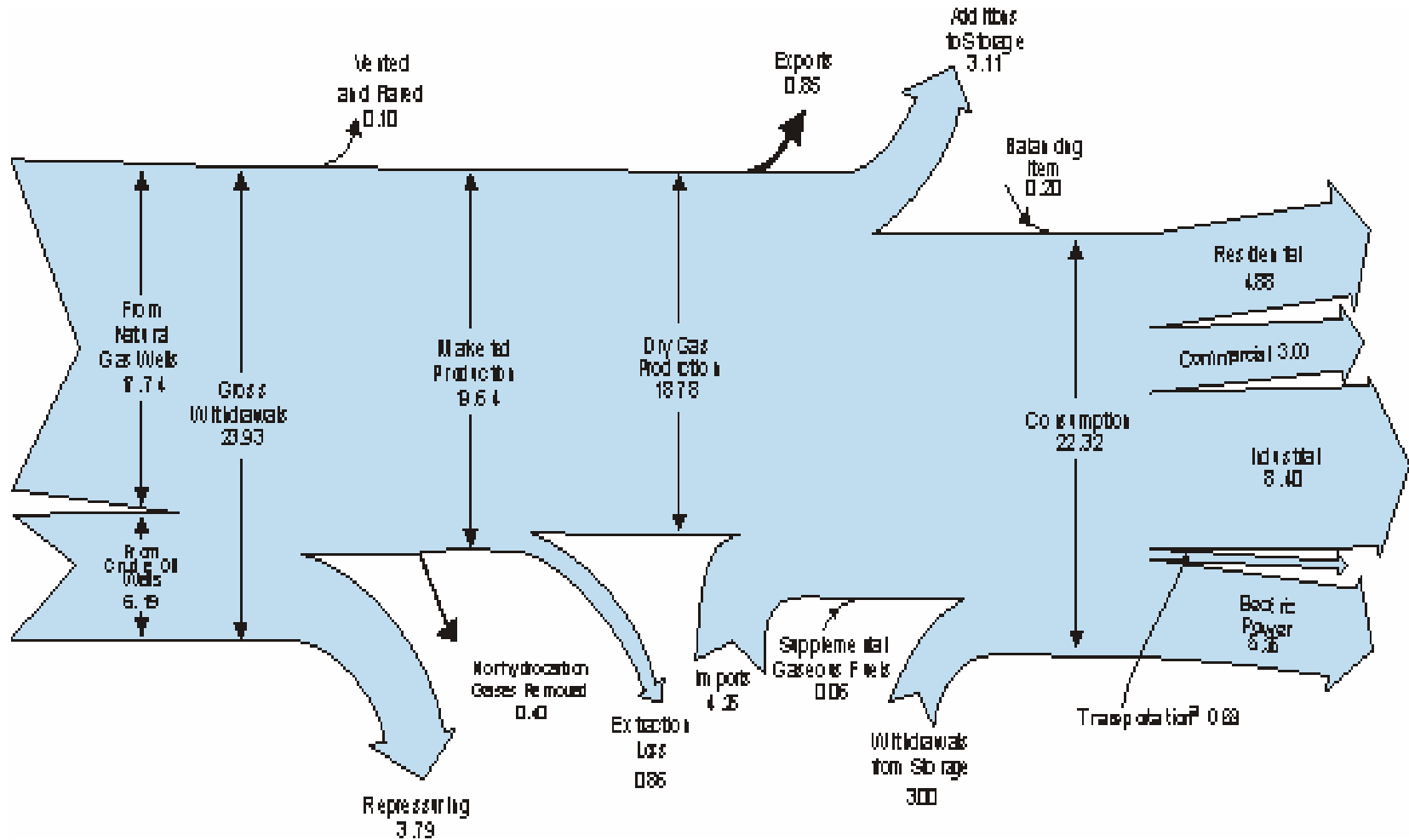
Presentation to International Seminar on Natural Gas
Rio de Janeiro, Brasil - 31 Julho 2006

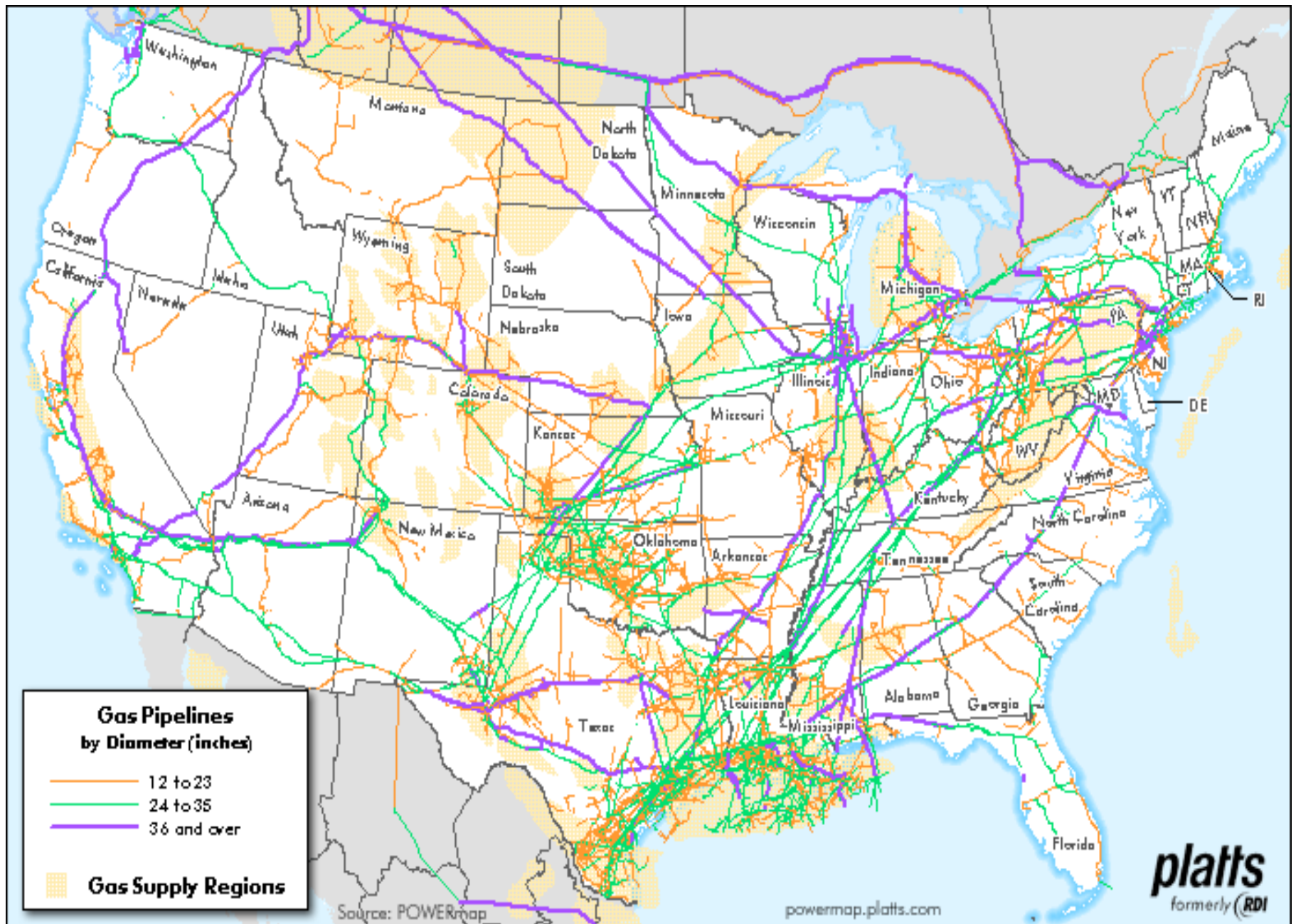
Overview

- Some basics of North American natural gas markets
- U.S. natural gas prices: Do oil prices matter?
- Deliverability and regional natural gas pricing in the United States
- Outlook for North American markets

U.S. Natural Gas Flow, 2004

Quadrillion Btu





Washington

Montana

North Dakota

Minnesota

Wisconsin

New York

VT

NH

MA

CT

RI

Oregon

California

Nevada

Idaho

Wyoming

South Dakota

Nebraska

Iowa

Michigan

PA

NY

MA

CT

RI

Utah

WV

Colorado

Kansas

Missouri

Illinois

Indiana

Ohio

MD

VA

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Oklahoma

Arkansas

Tennessee

Kentucky

WV

Virginia

North Carolina

South Carolina

Texas

Louisiana

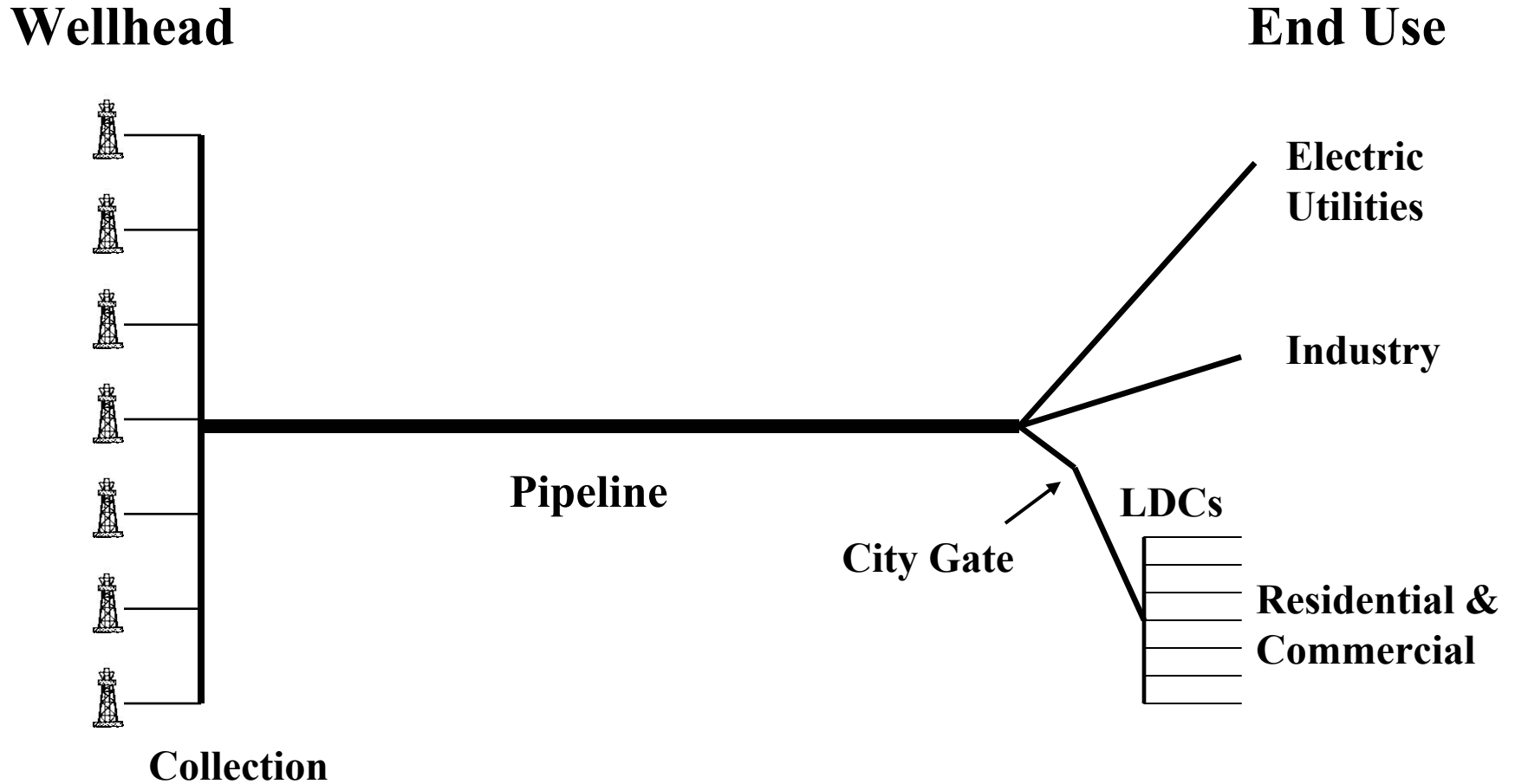
Mississippi

Alabama

Georgia

Florida

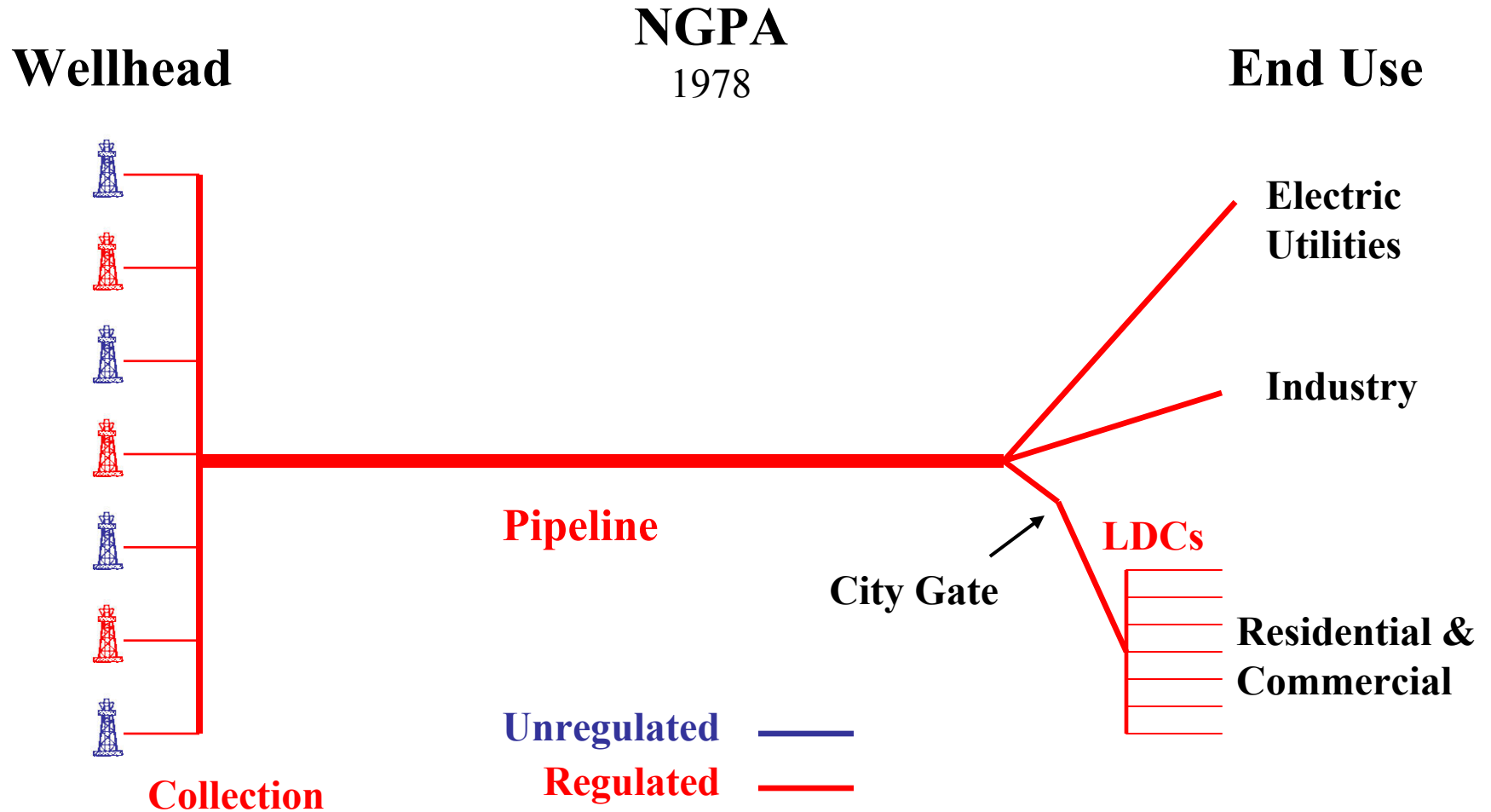
U.S. Natural Gas Markets



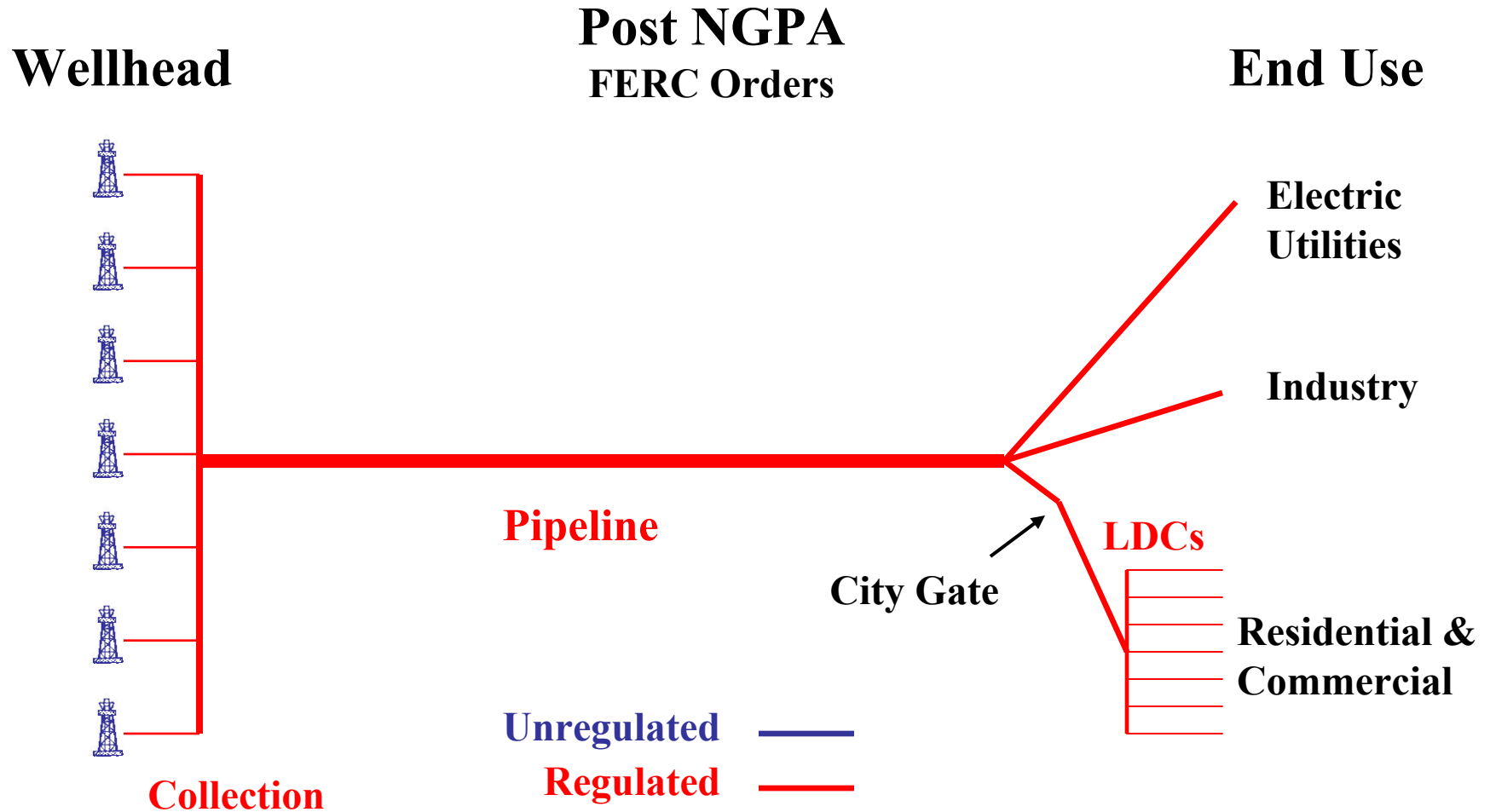
Natural Gas Policy Act (1978)

- Brought all domestically produced natural gas under wellhead price controls
- Created more than 20 pricing categories
- Provided for the eventual decontrol of most sources of natural gas, some immediately
- Some gas to remain under price controls indefinitely
- Unregulated categories of gas clear market

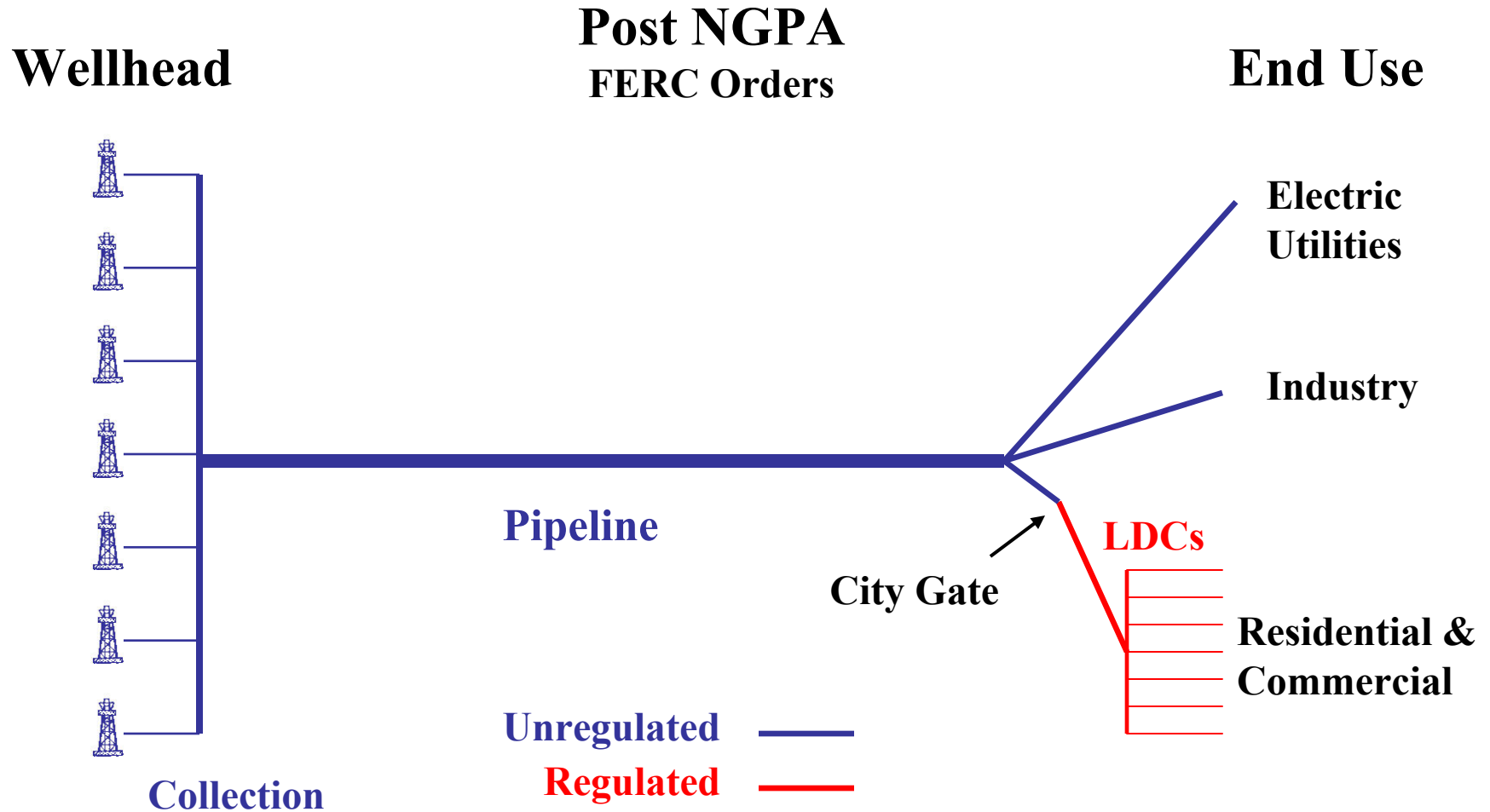
U.S. Natural Gas Markets



U.S. Natural Gas Markets



U.S. Natural Gas Markets



Effects of further deregulation

- Lower delivered prices for natural gas
 - increased production of old gas
 - end of pipeline rents from access to old gas
- Reduced pipeline costs
- Development of abundant supply
- Market bifurcation

Market bifurcation

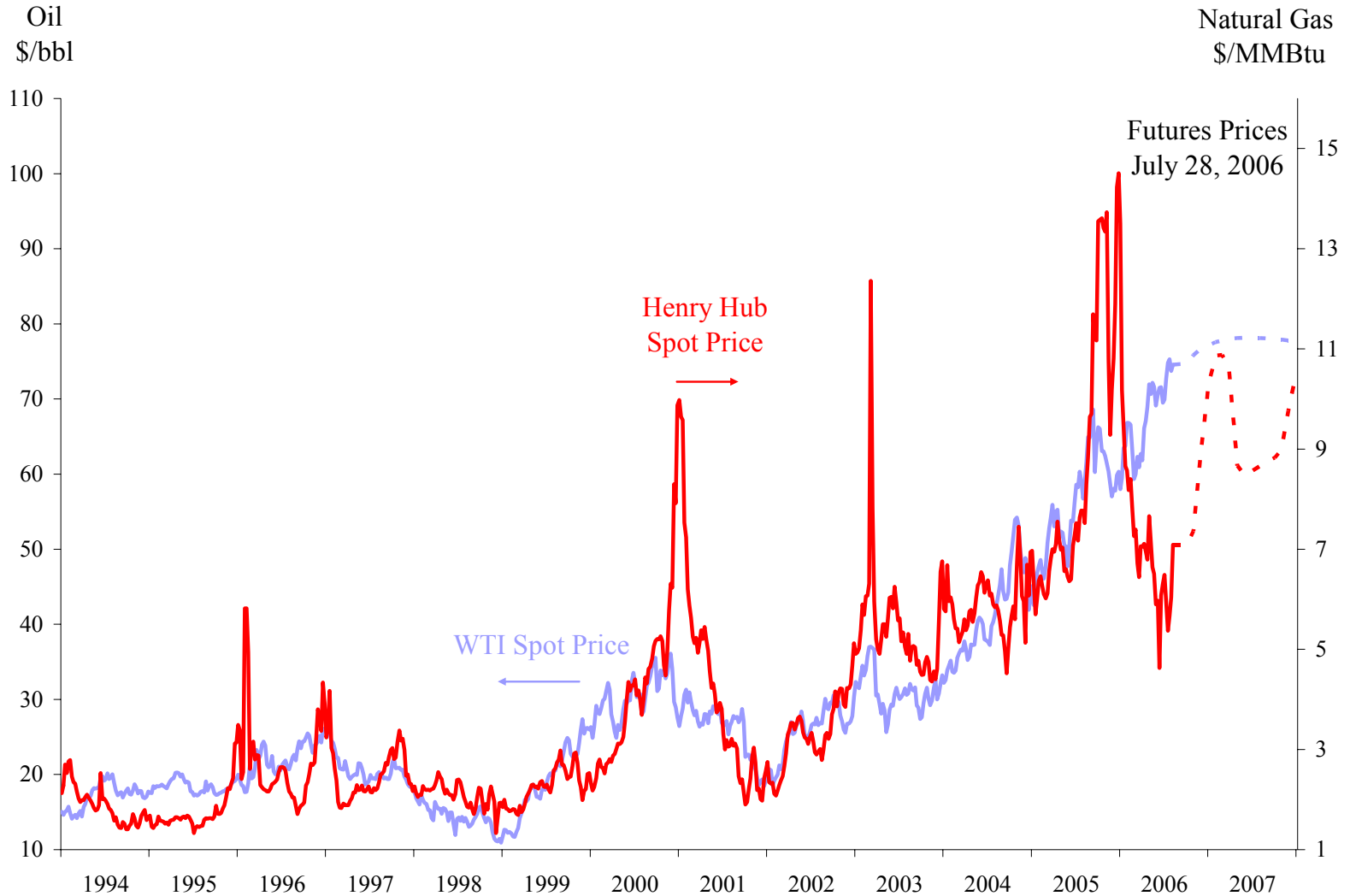
- Electric utilities and large industrial customers buy natural gas on spot markets
 - Natural gas is delivered by pipelines under contract carriage
- Residential and commercial customers buy gas from LDCs at regulated prices
 - LDCs initially buy natural gas under long-term contracts; now spot and contract

A New Environment

- Natural gas price deregulation successful
 - consumer prices for natural gas reduced
 - pipelines no longer earning rents
 - natural gas competitive with oil
- U.S. natural gas market deregulation has reached a zenith
 - no pressure to push deregulation to the LDCs

U.S. Natural Gas Prices: Do Oil Prices Matter?

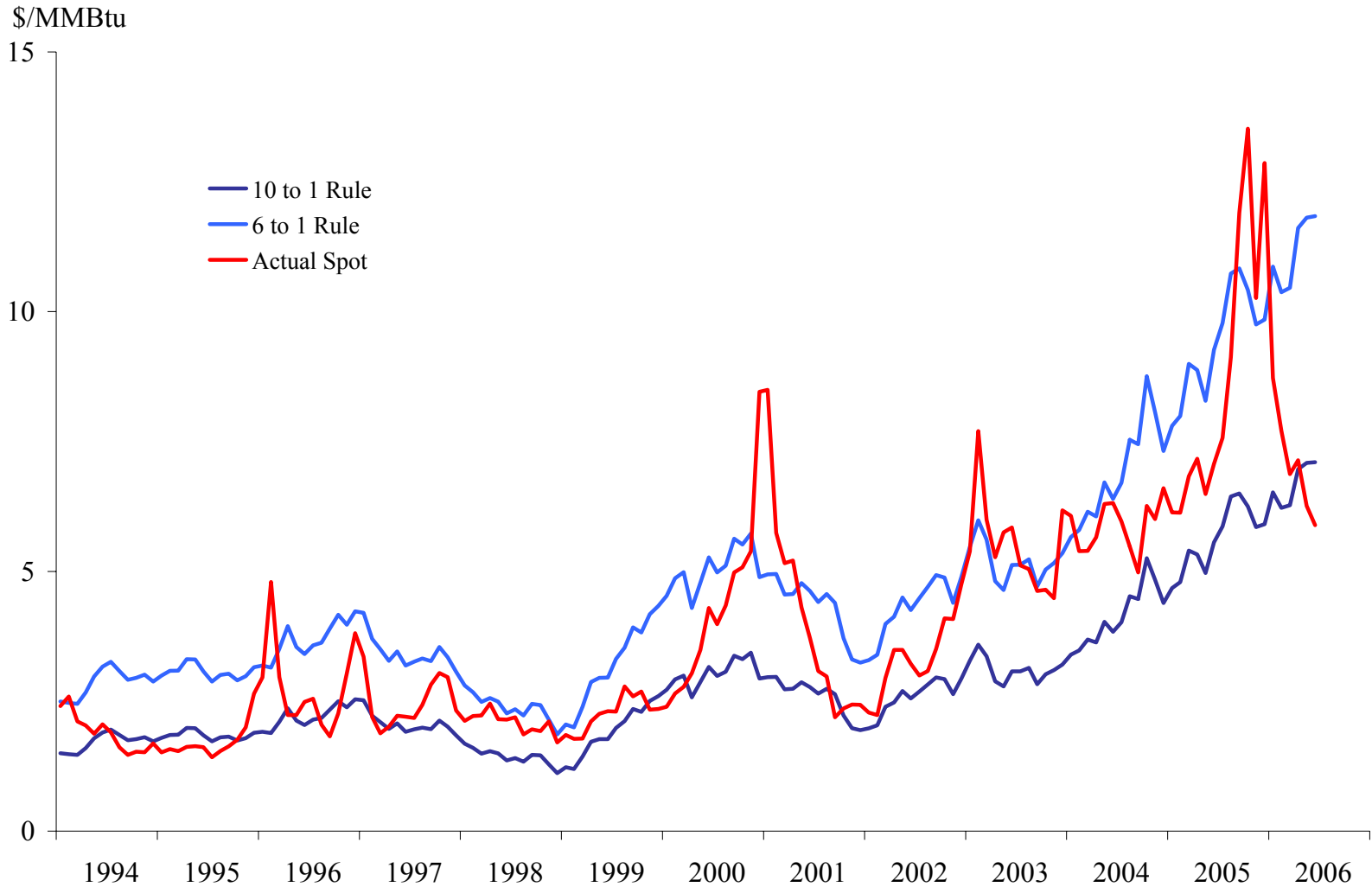
Natural Gas and Oil Prices



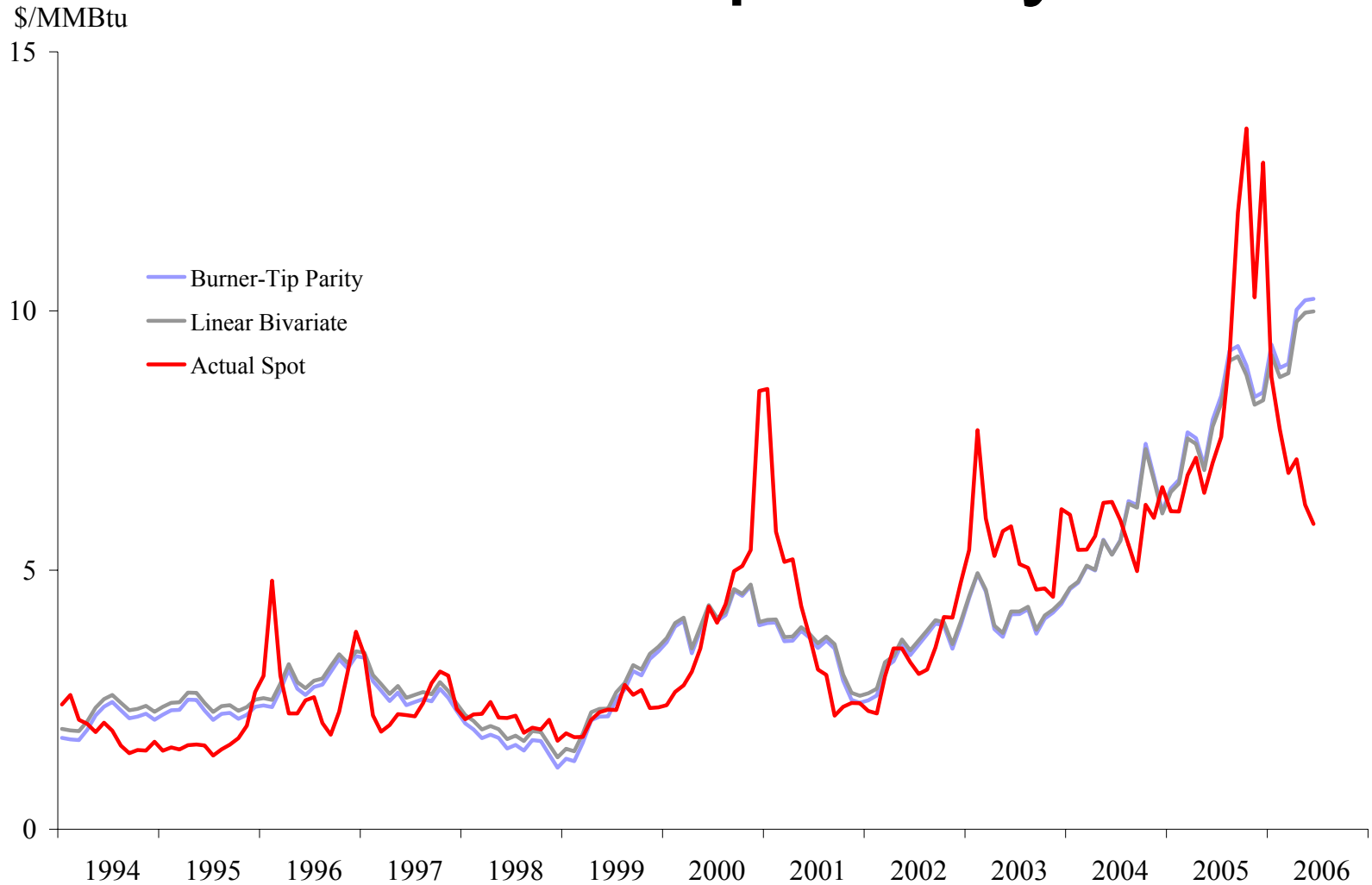
Natural Gas and Oil Prices



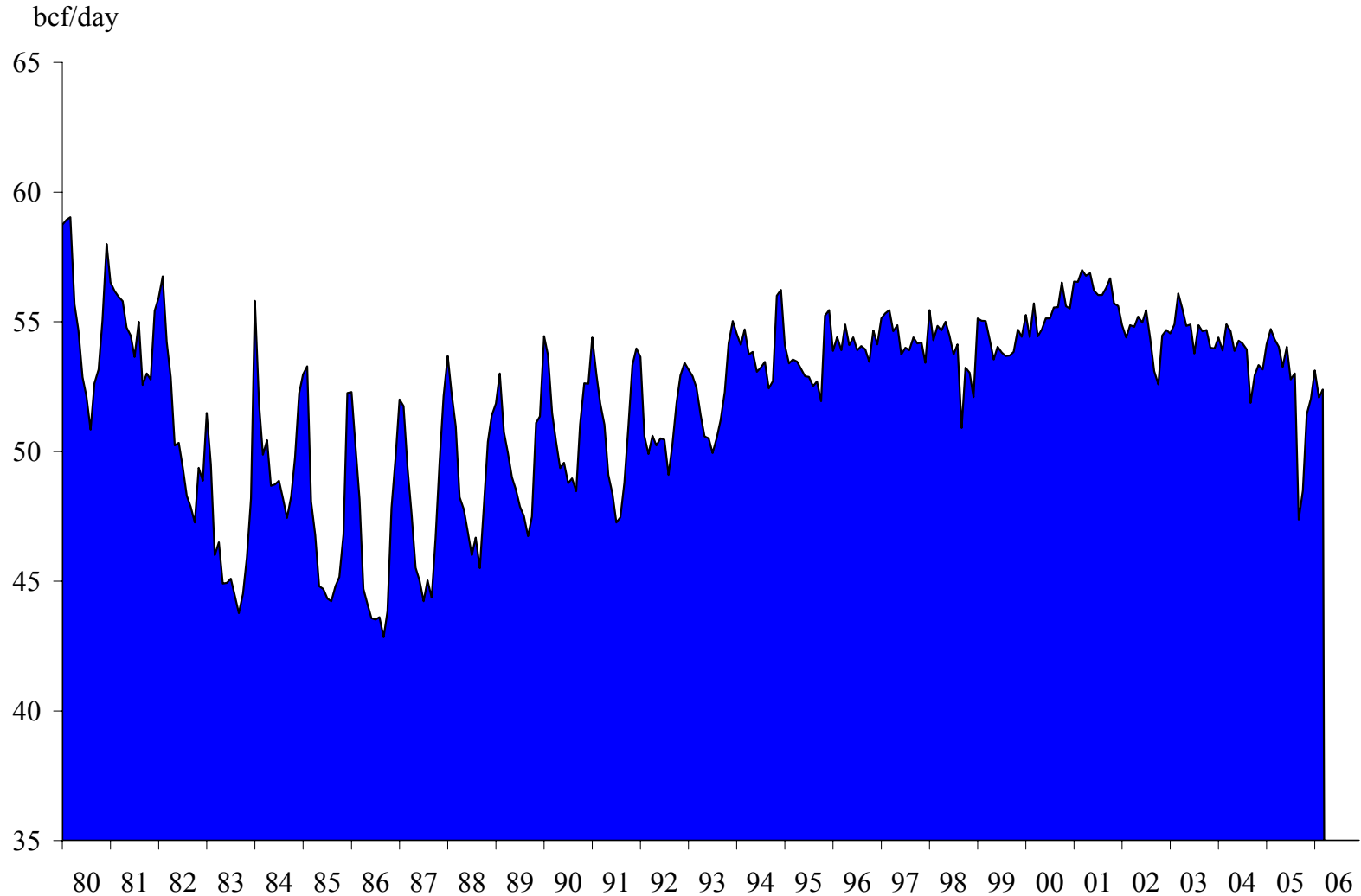
Old Rules of Thumb



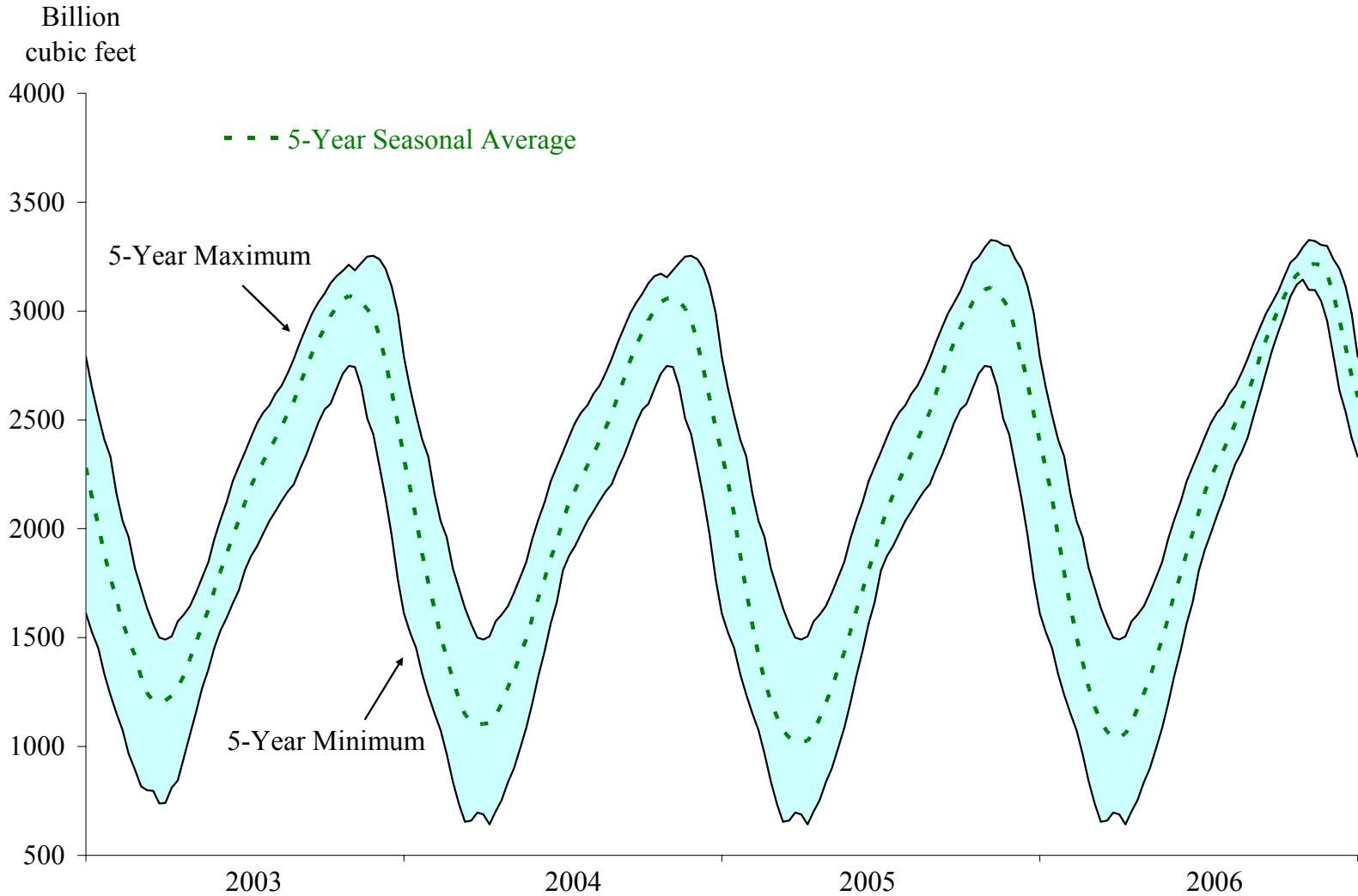
Burner-Tip Parity



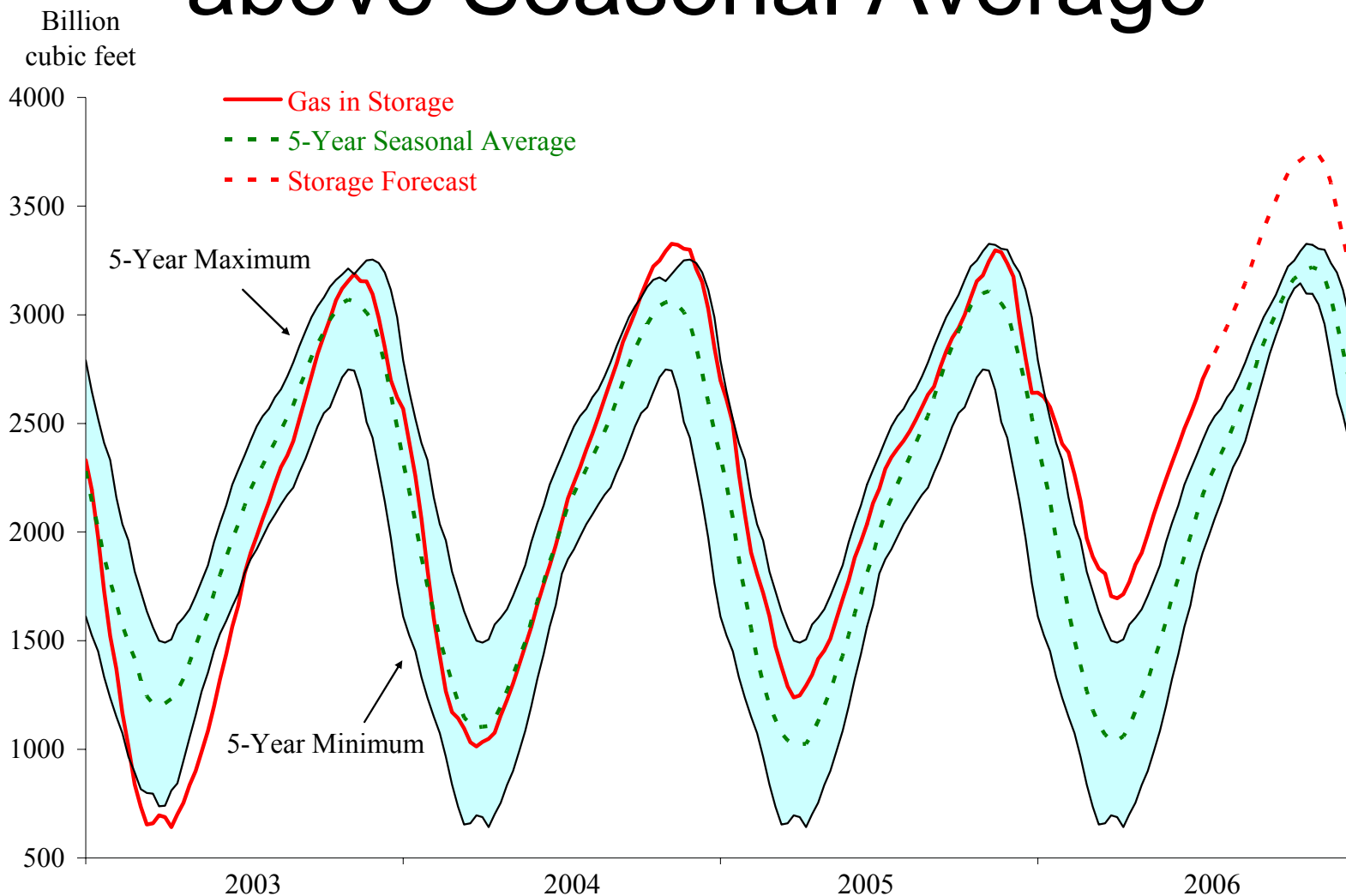
U.S. Natural Gas Production



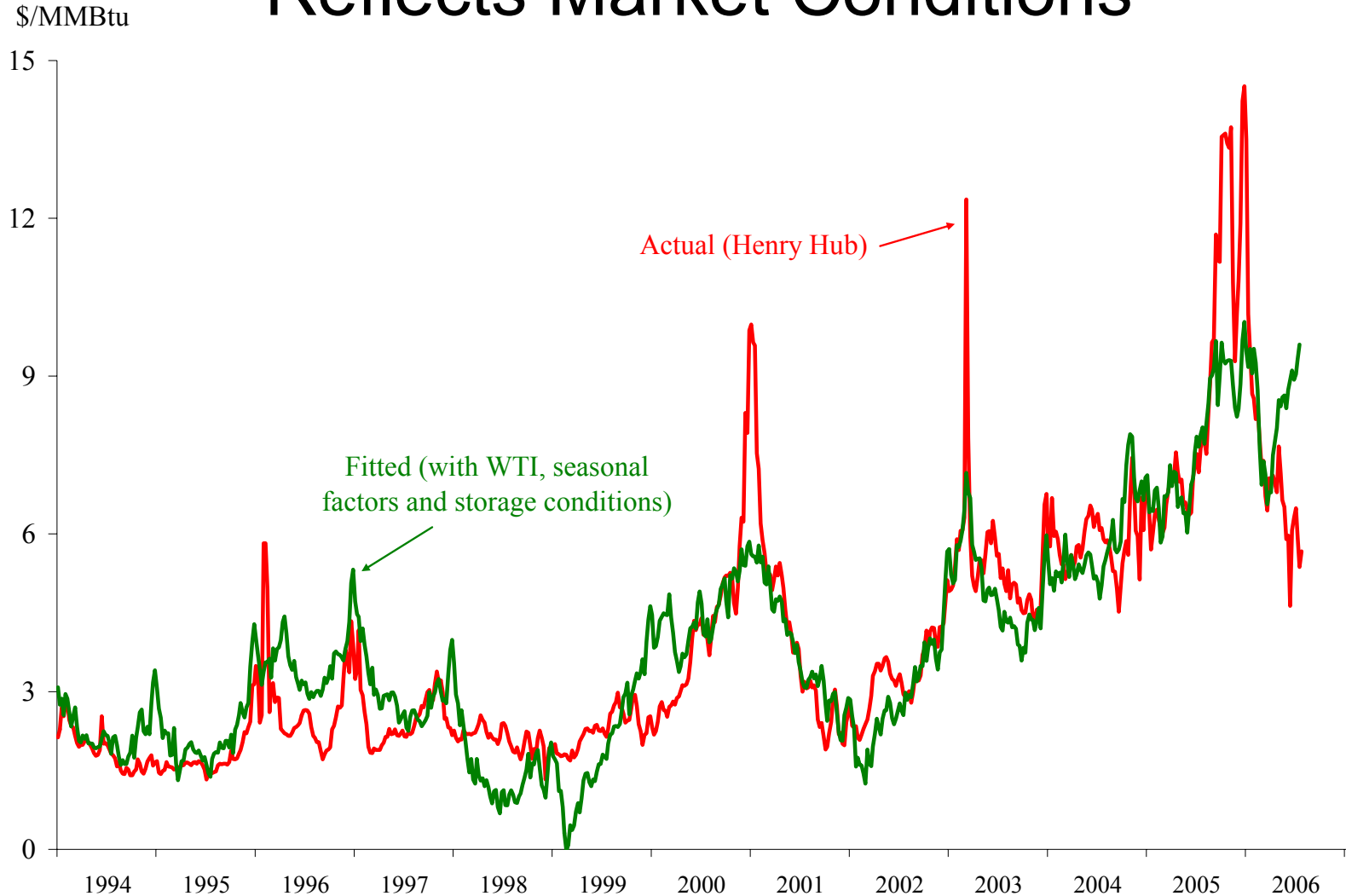
Natural Gas Storage



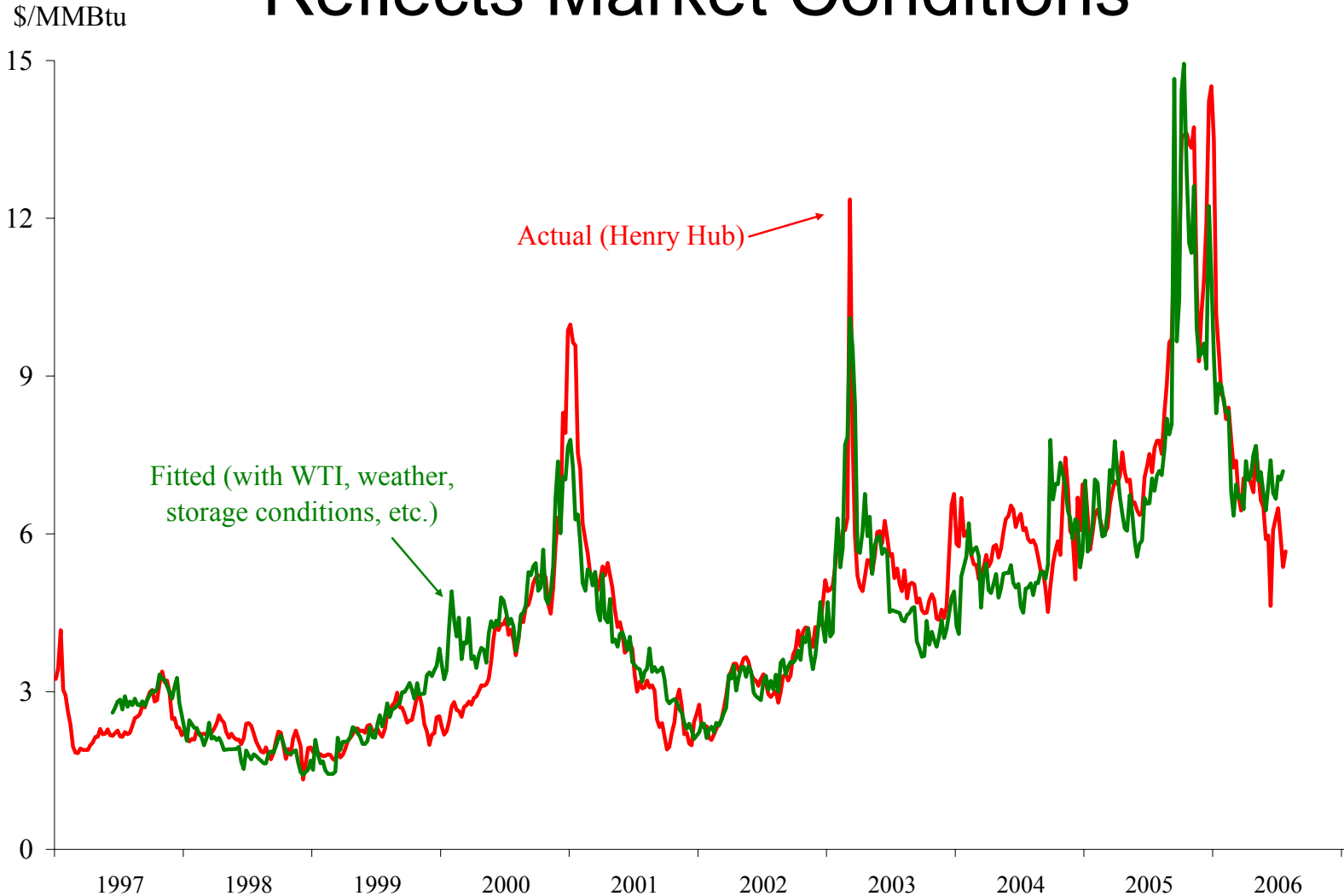
Natural Gas Storage above Seasonal Average



Natural Gas Price Reflects Market Conditions



Natural Gas Price Reflects Market Conditions



Natural Gas Price Error-Correction Process



U.S. Natural Gas Prices

- Driven by crude oil prices
- and
 - seasonality, weather, storage, hurricane disruptions, persistence
- Linkage to continue?
 - Hill Huntington's research suggests yes.

Deliverability and the Regional Volatility of Natural Gas Prices

Natural Gas Deliverability

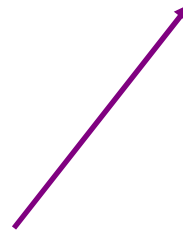
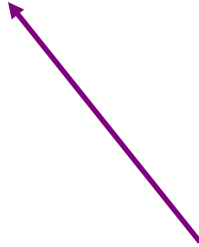
West

East

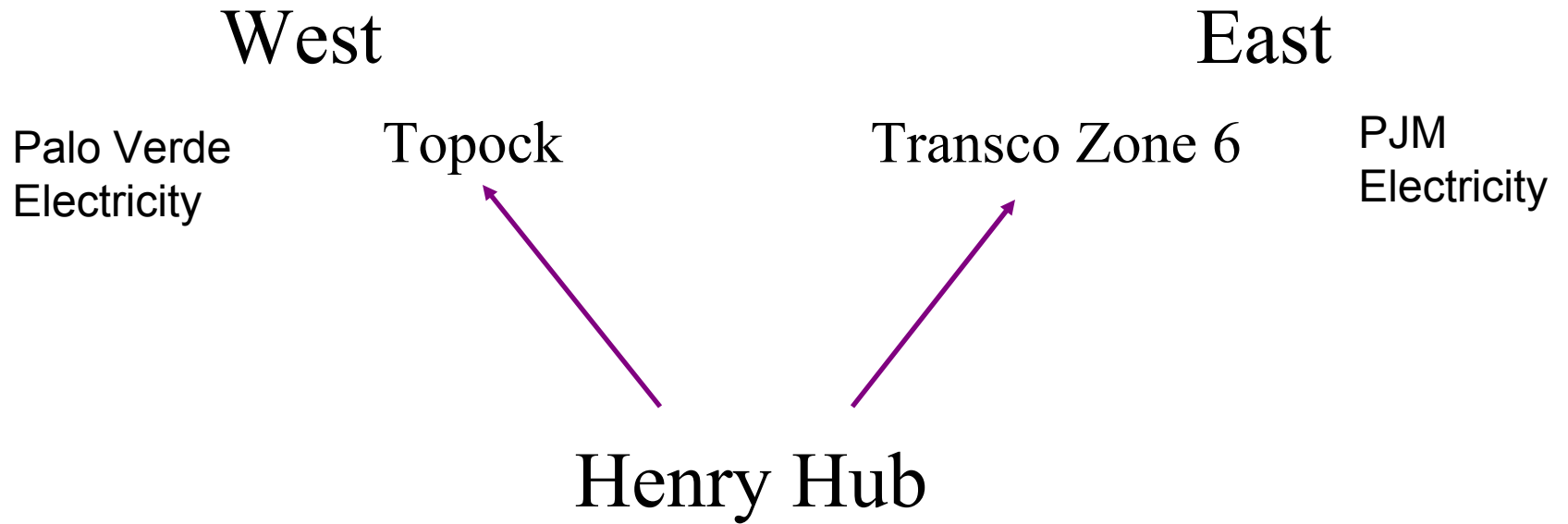
Topock

Transco Zone 6

Henry Hub

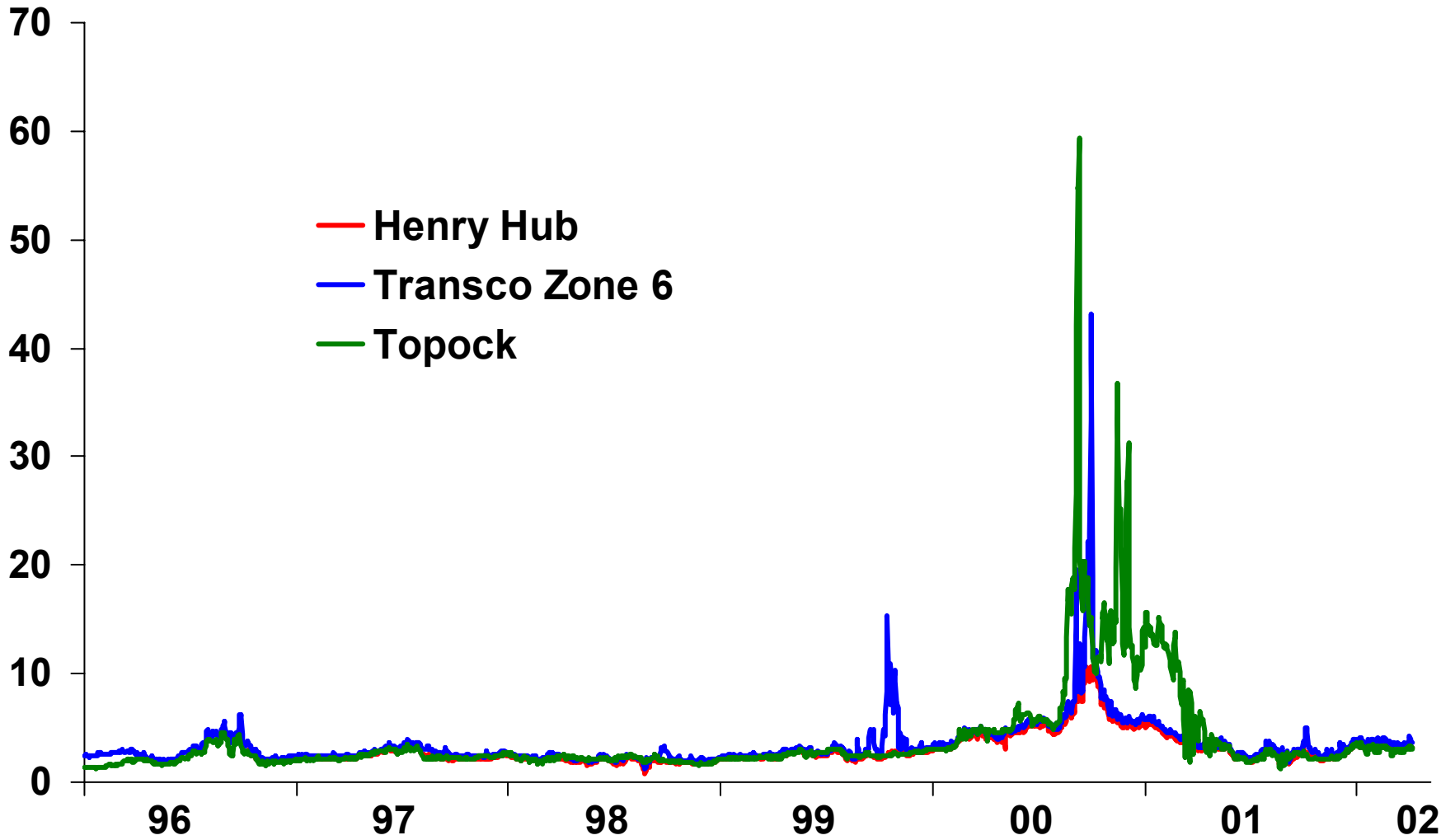


Natural Gas Deliverability

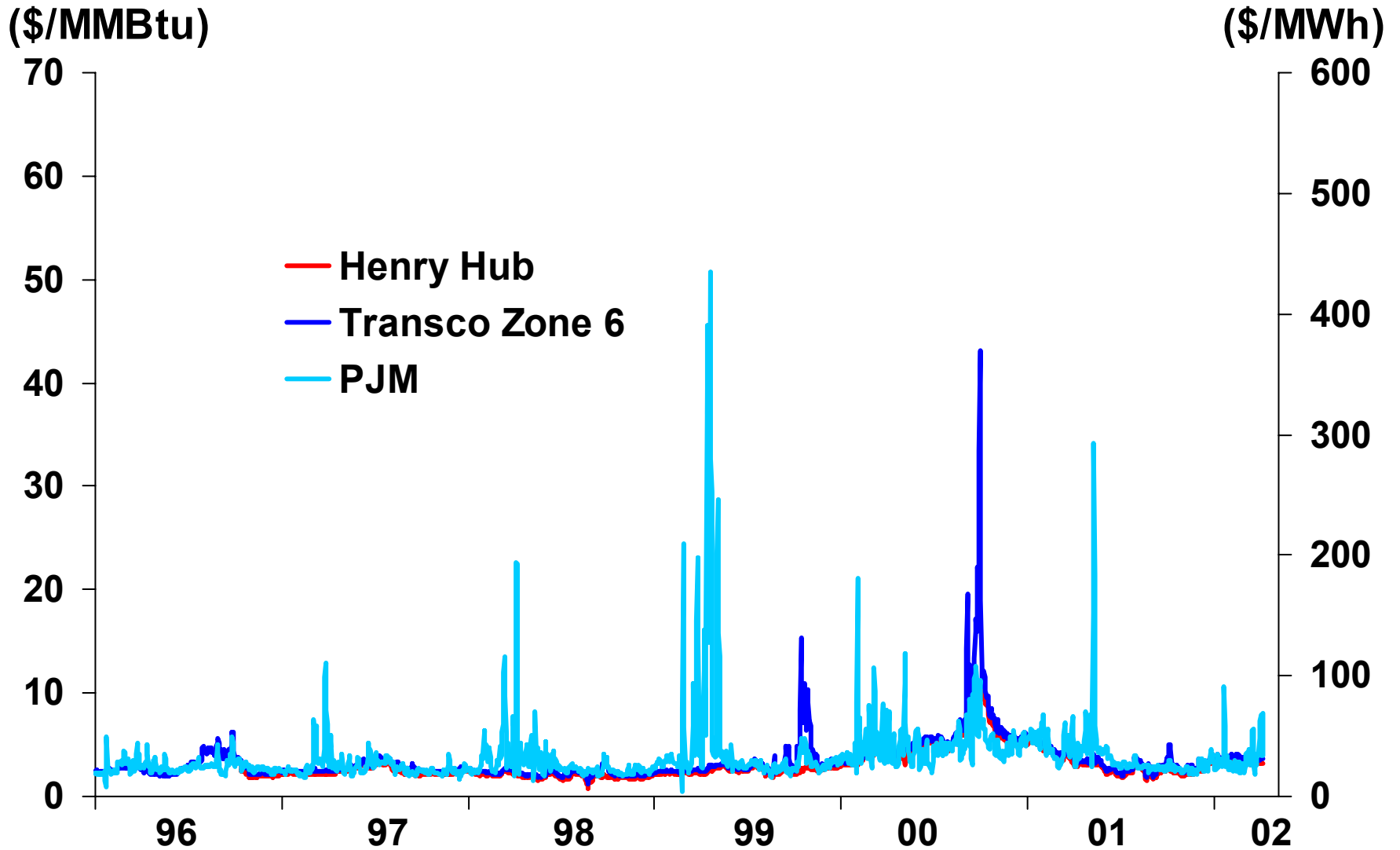


Natural Gas Prices

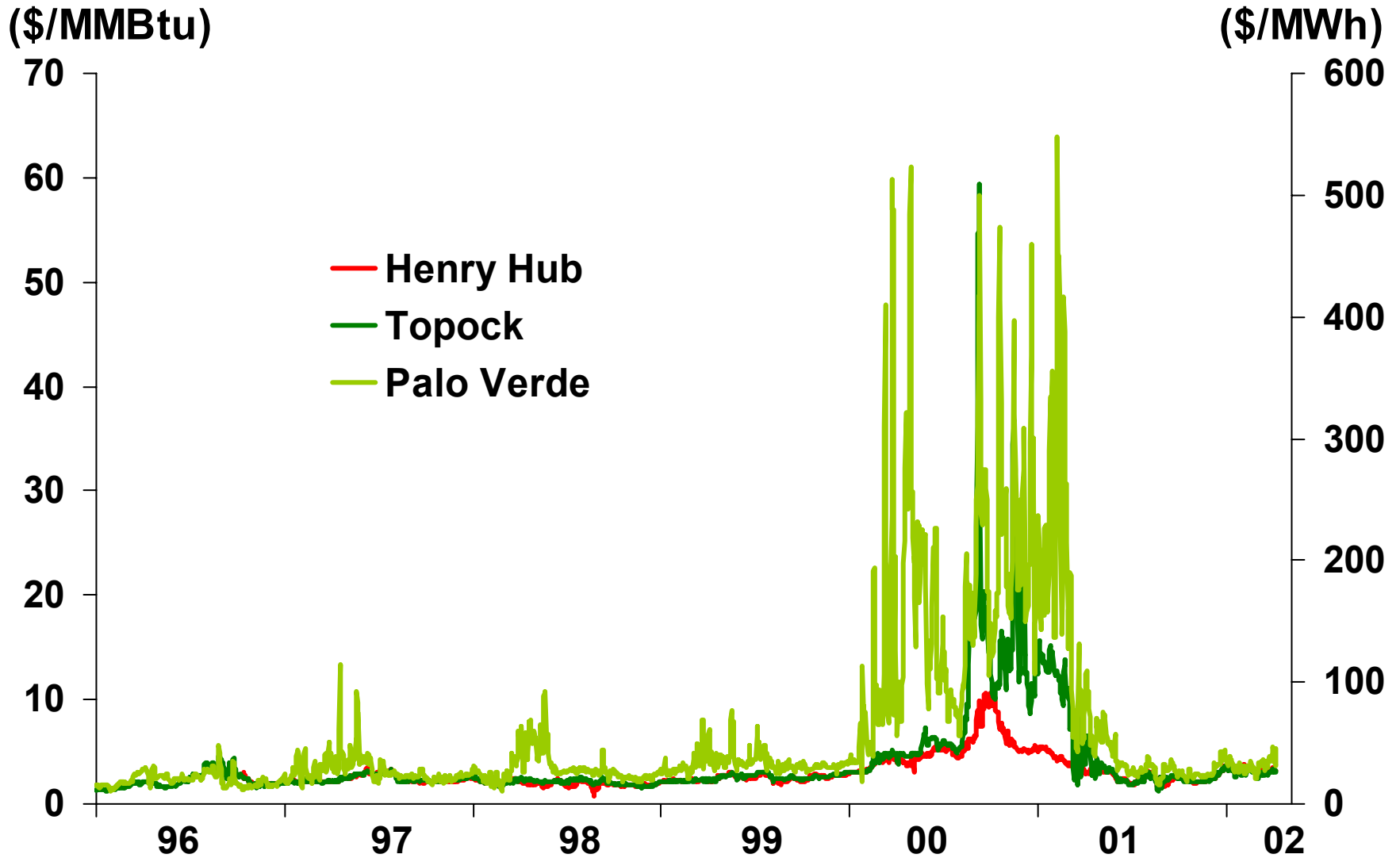
(\$/MMBtu)



Henry Hub and East



Henry Hub and West



U.S. Natural Gas Prices

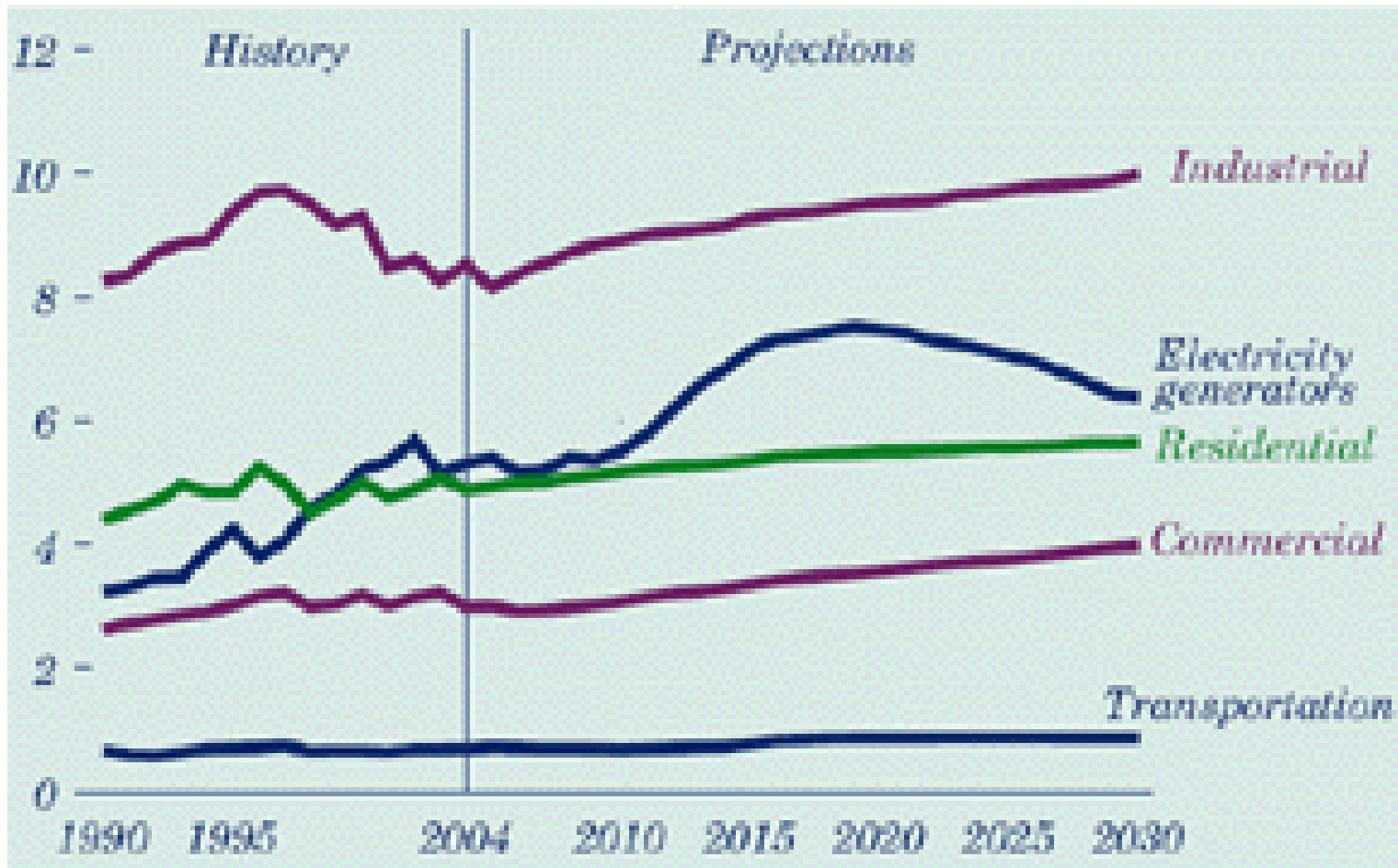
- Regional natural gas prices reflect market conditions at Henry Hub
- Regional natural gas prices also reflect local market dynamics that are not evident at Henry Hub
- Delivery constraints: lack of arbitrage
 - Pipeline capacity or monopolization

Outlook for North American Natural Gas Markets

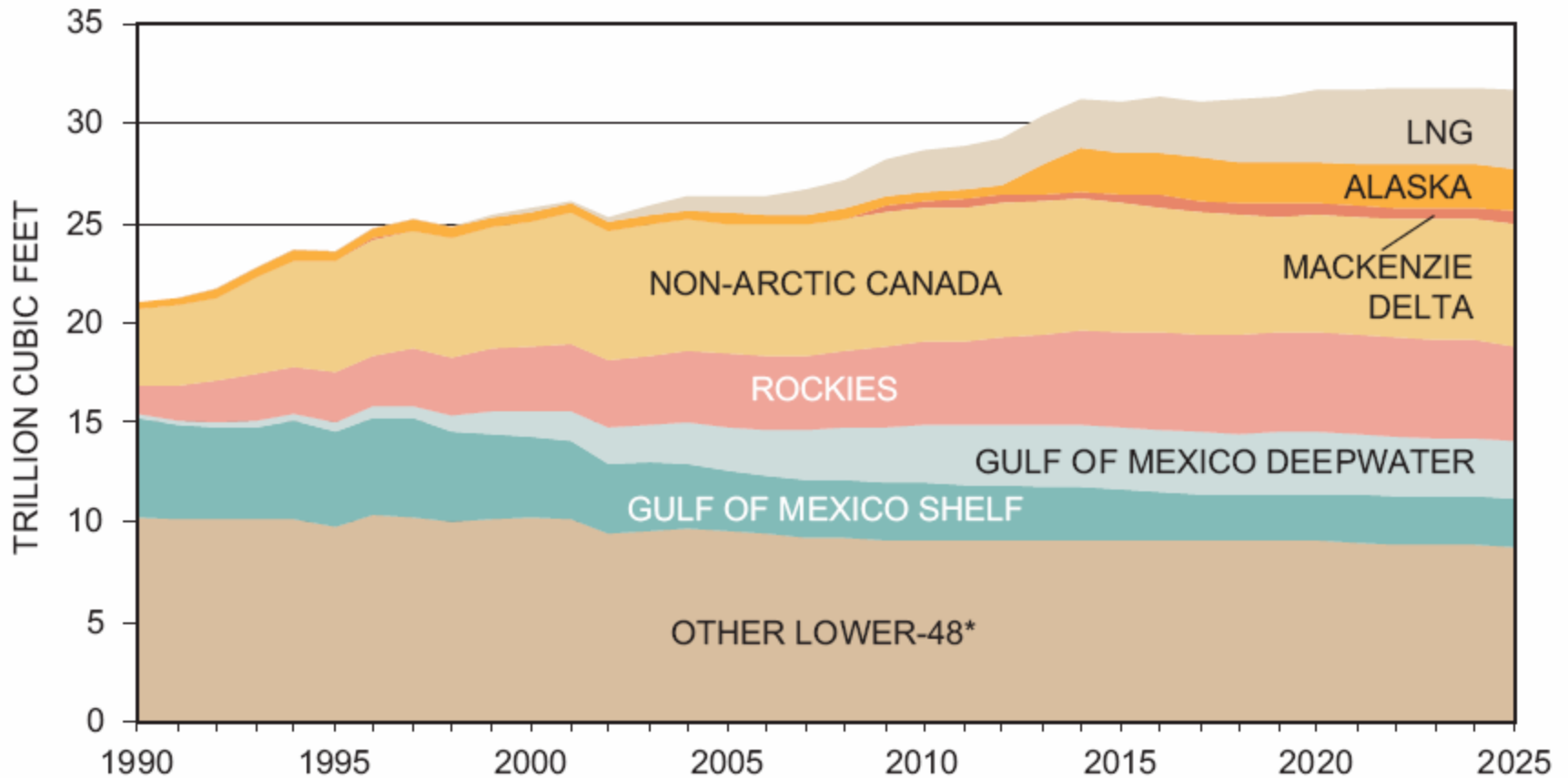
Natural Gas Price Outlook

- Technical feasibility suggests natural gas prices at \$4.00-5.00 per million Btu
- More likely is \$6.50+ per million Btu
 - Natural gas prices generally track oil prices
 - Can vary with market conditions
- Pipeline capacity to limit arbitrage and cause regional price volatility

EIA's Consumption Outlook



U.S. and Canadian natural gas sources



EIA's Oil Price Outlook



EIA's Natural Gas Price Outlook



U.S. Natural Gas Outlook

- Prices of \$6.50+ per million Btu
 - lower prices imply rapid consumption growth
- Moderate growth of natural gas use
- Development of Alaska natural gas
- Increased reliance on imports (LNG)
 - with most new terminals in Gulf of Mexico
- Pipeline capacity constraints limit arbitrage and create regional price volatility

