



# Natural Gas: An Energy Game Changer

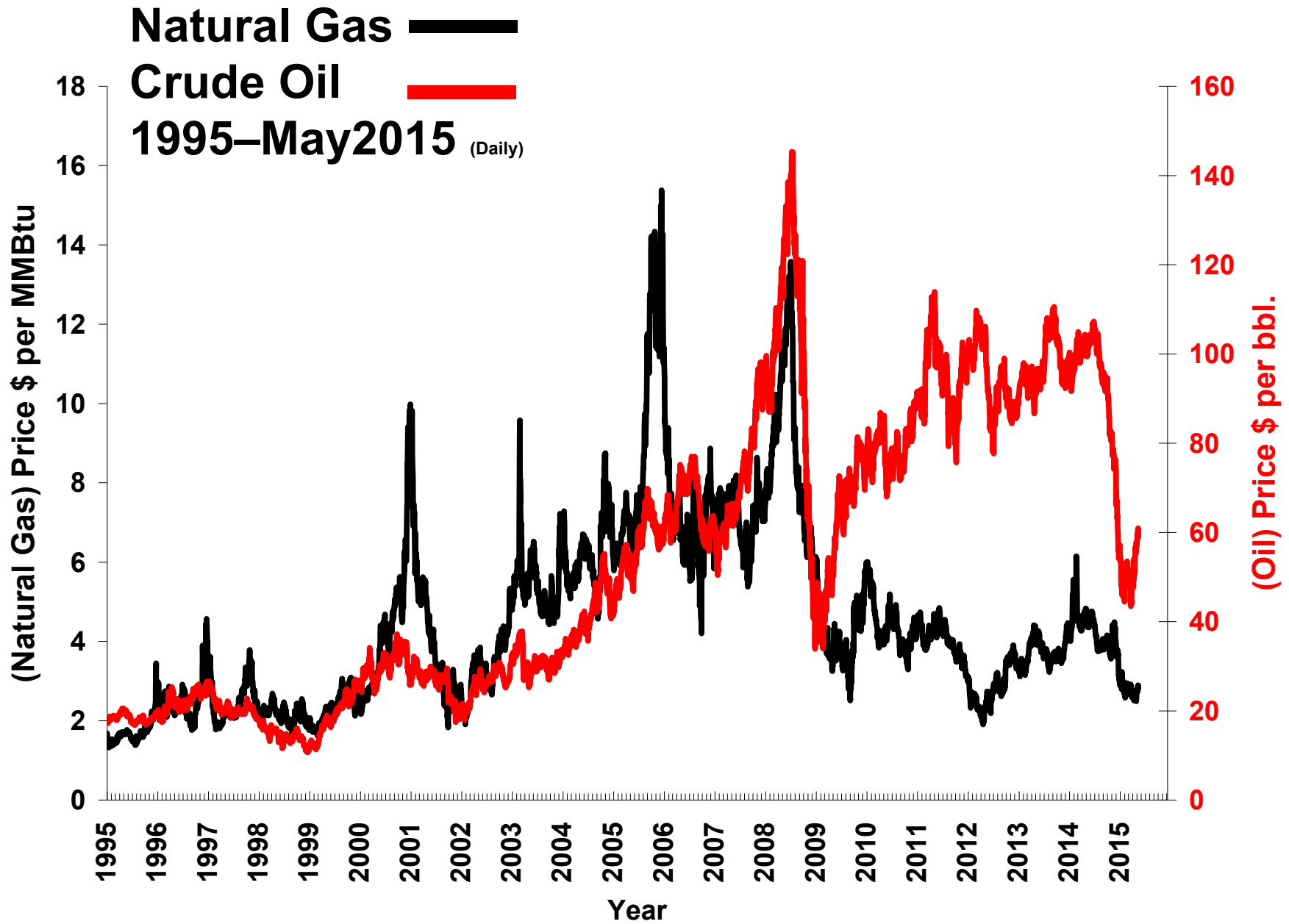
*Updated Slides – May 2015*

Ron Muhlenkamp



Muhlenkamp & Company, Inc.

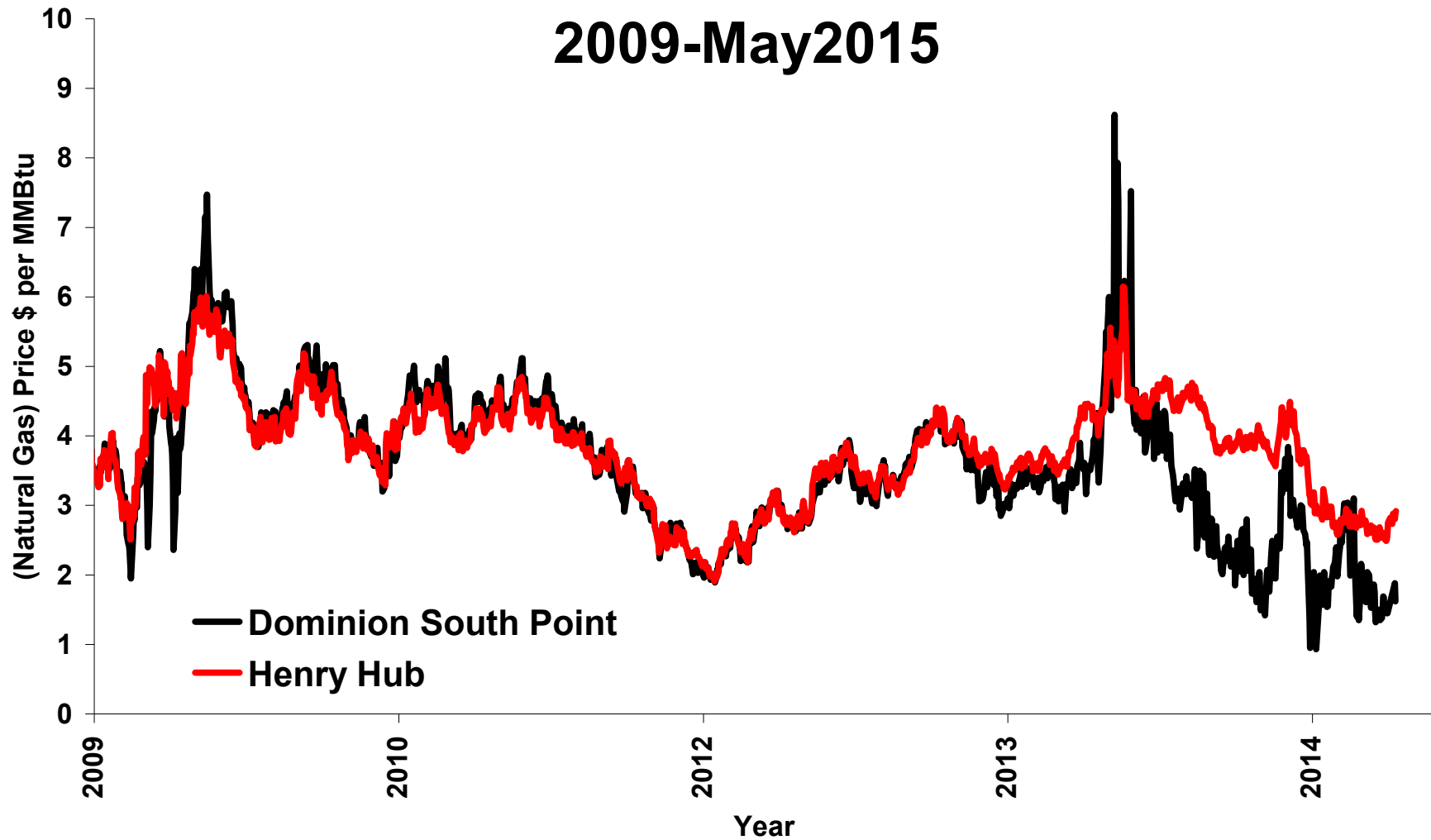
*Intelligent Investment Management*



Source: Bloomberg; Oil; Generic 1st 'CO' Future, Natural Gas; Generic 1st 'NG' Future delivery to Henry Hub



# Natural Gas Pipeline Distribution Hubs 2009-May2015



Source: Bloomberg



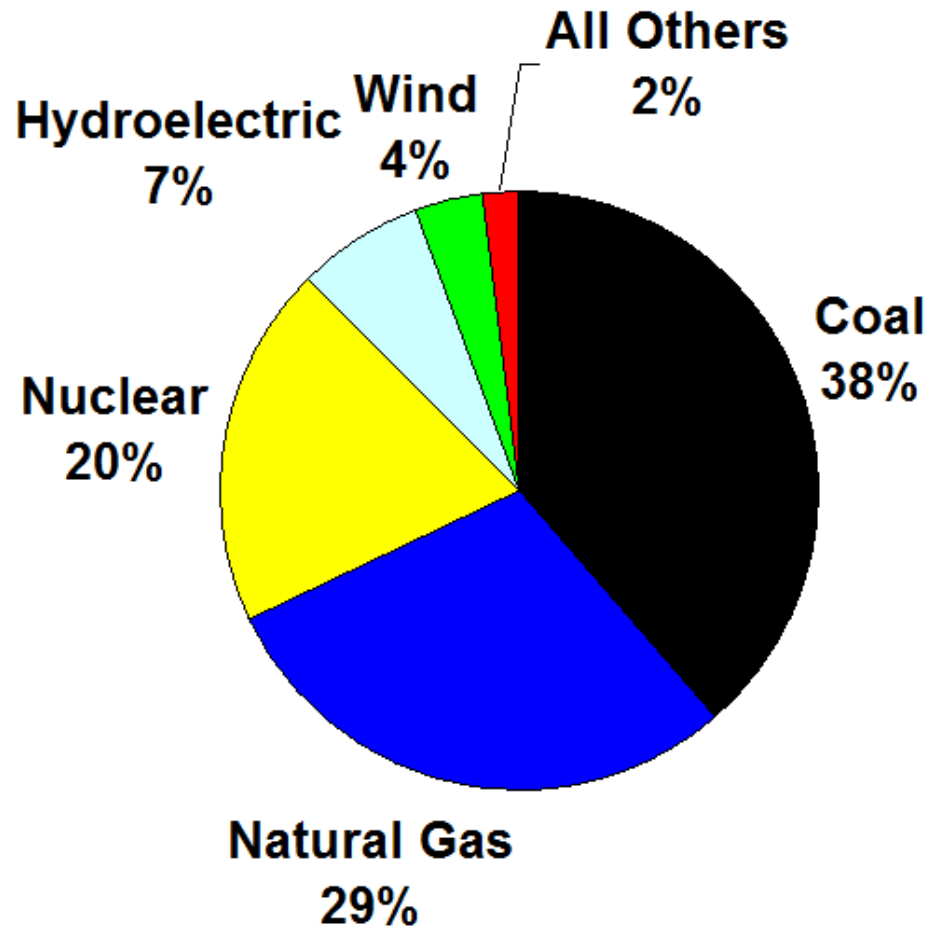
# How Shale Gas Benefits the Homeowner

	Cost per mcf at 11/2006 rates	Cost per mcf at 11/2008 rates	Cost per mcf at 11/2011 rates	Cost per mcf at 7/2013 rates	Cost per mcf at 5/2015 rates	Difference per mcf between 2015 and 2006
<b>Delivery Charge</b>	\$4.76890	\$4.88940	\$4.77030	\$4.72170	\$6.56960	\$1.80070
<b>Gas Cost Adjustment</b>	-\$0.59220	\$0.48500	-\$0.49780	\$1.08520	\$0.44130	\$1.03350
<b>Commodity Charge</b>	\$8.29520	\$11.19840	\$5.51330	\$4.17880	\$2.73590	-\$5.55930
<b>Total</b>	<b>\$12.47190</b>	<b>\$16.57280</b>	<b>\$9.78580</b>	<b>\$9.98570</b>	<b>\$9.74680</b>	<b>-\$2.72510</b>

Source: Muhlenkamp & Company, Inc.

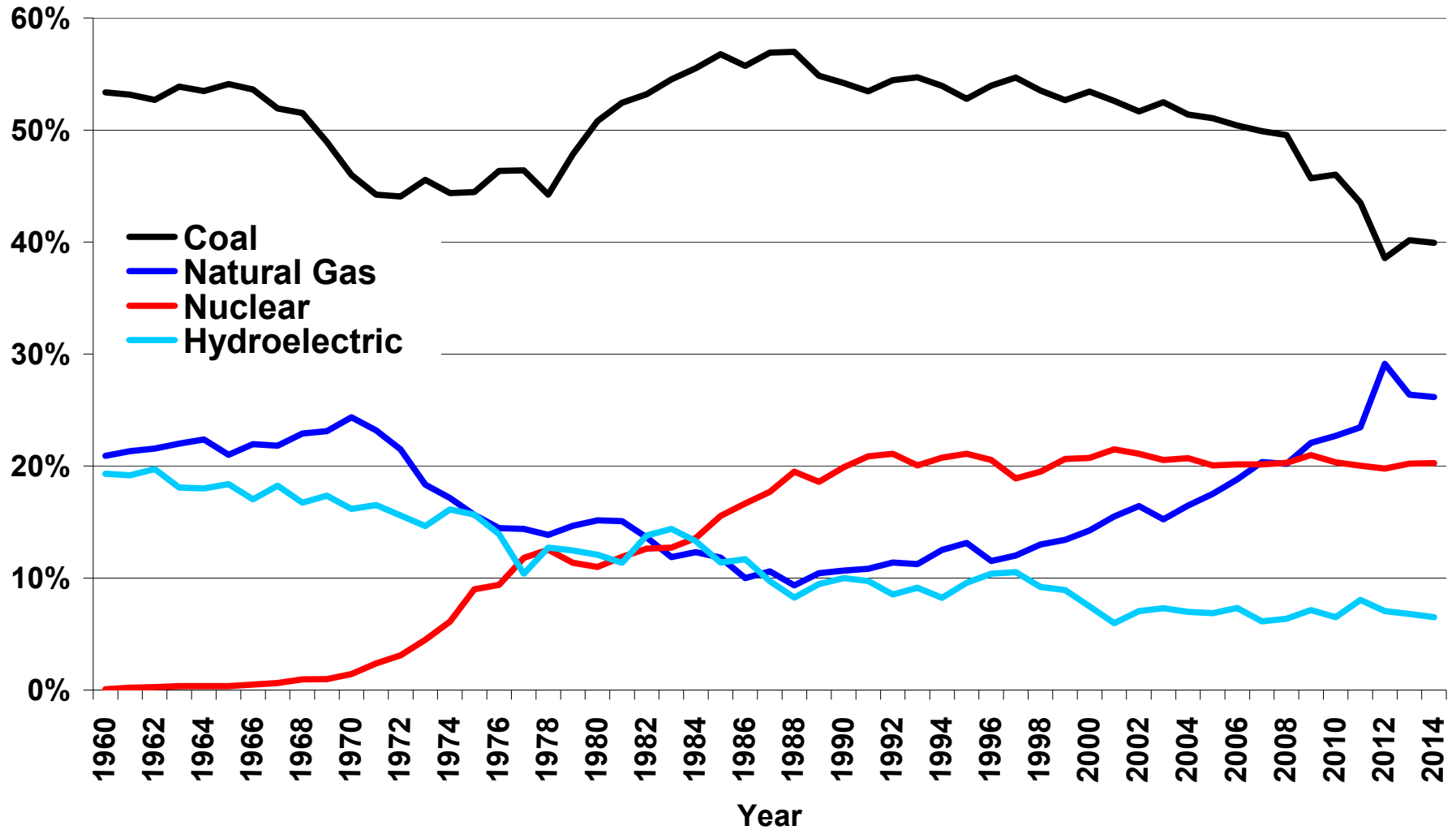


# Percent of Total U.S. Electricity Net Generation by Energy Source 2012



Source: U.S. Energy Information Administration; Electric Power Monthly, Tables 7.2b and 8.2b

## Percent of Total U.S. Electricity Net Generation: Electric Power Sector by Energy Source 1960-2014 (Yearly)

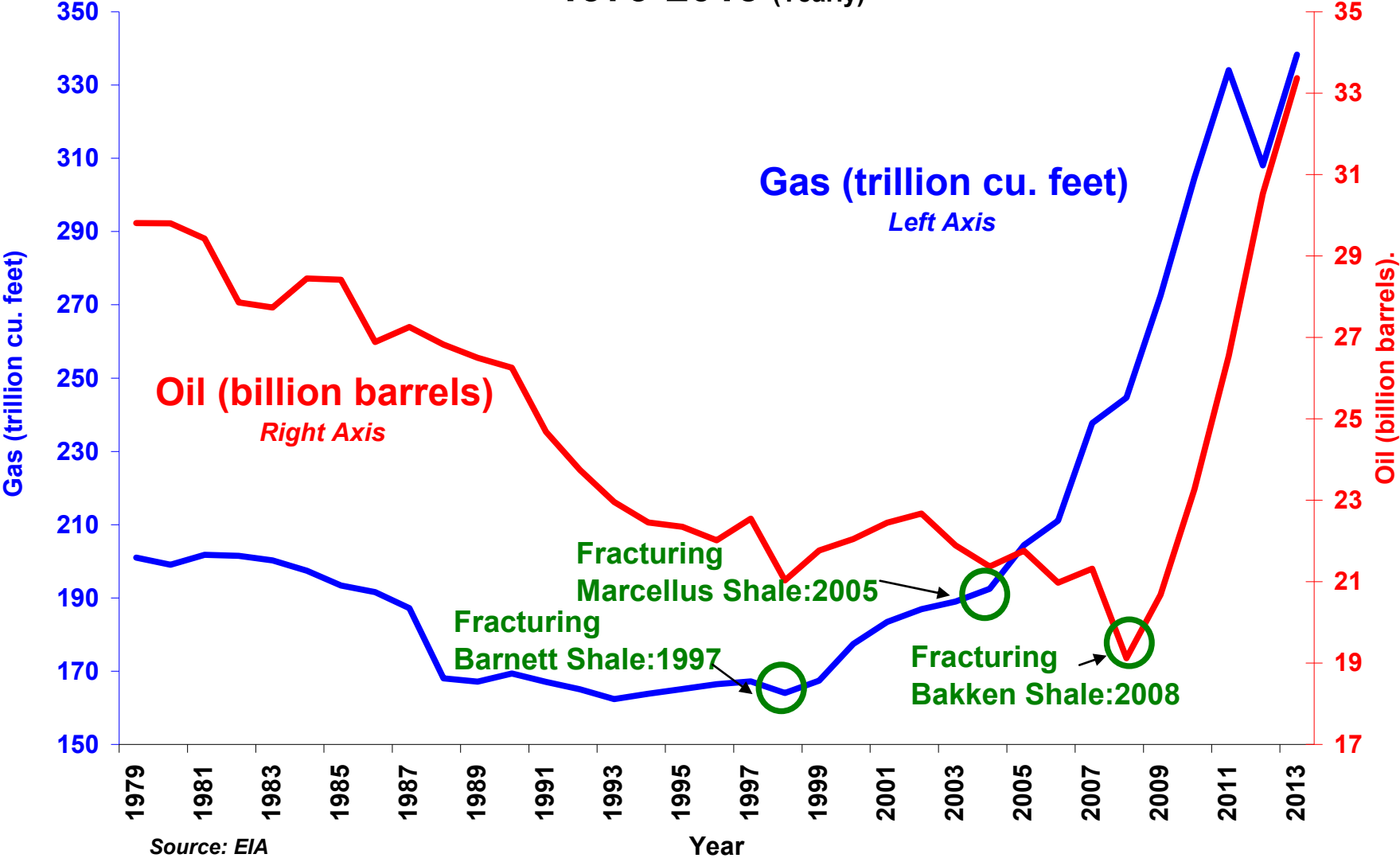


Source: U.S. Energy Information Administration; Electric Power Monthly, Tables 7.2b;



# U.S. Oil and Dry Natural Gas Proved Reserves

## 1979-2013 (Yearly)

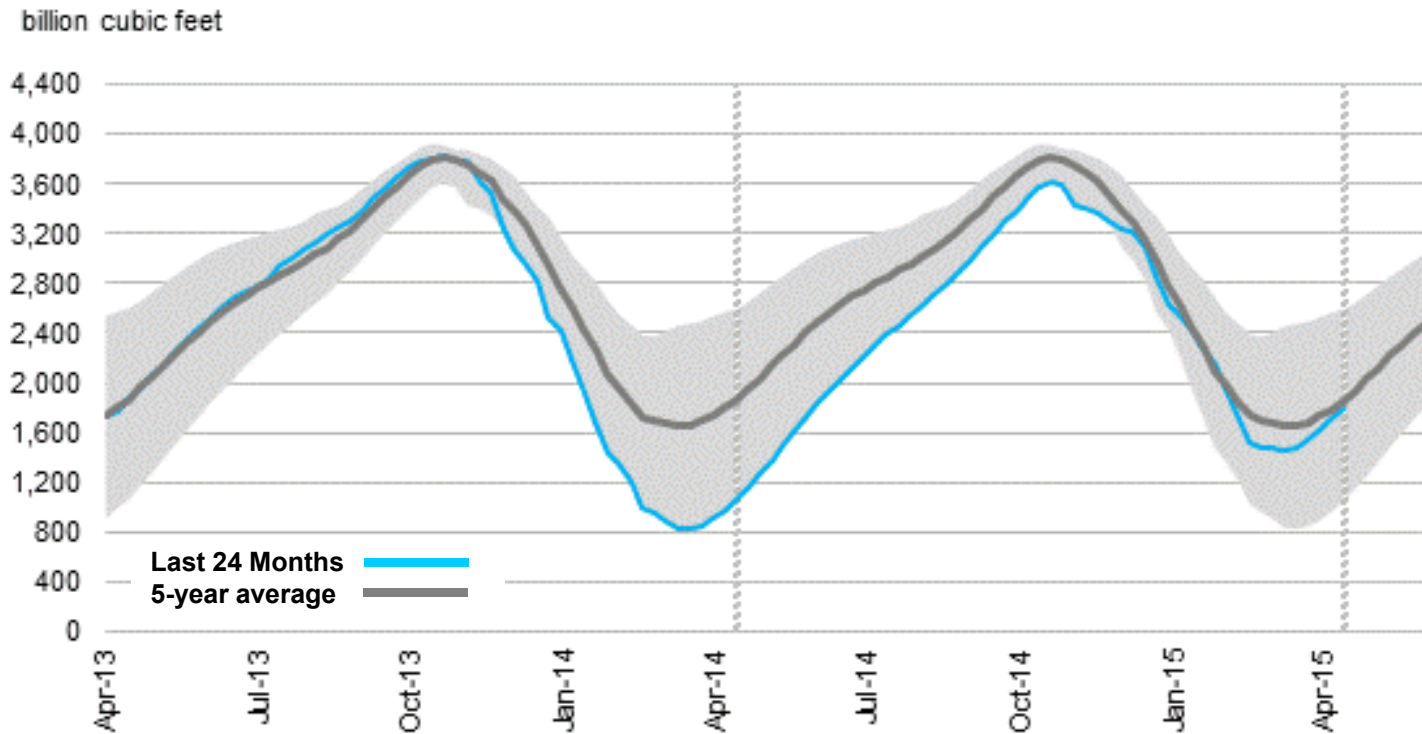


Source: EIA



# Working Gas in Underground Storage Compared with 5-year Range Week ending May 1, 2015

Working gas in underground storage compared with the 5-year maximum and minimum



**Note:** The shaded area indicates the 5-year range between the minimum and maximum values for the weekly series. Between 2009-2014.

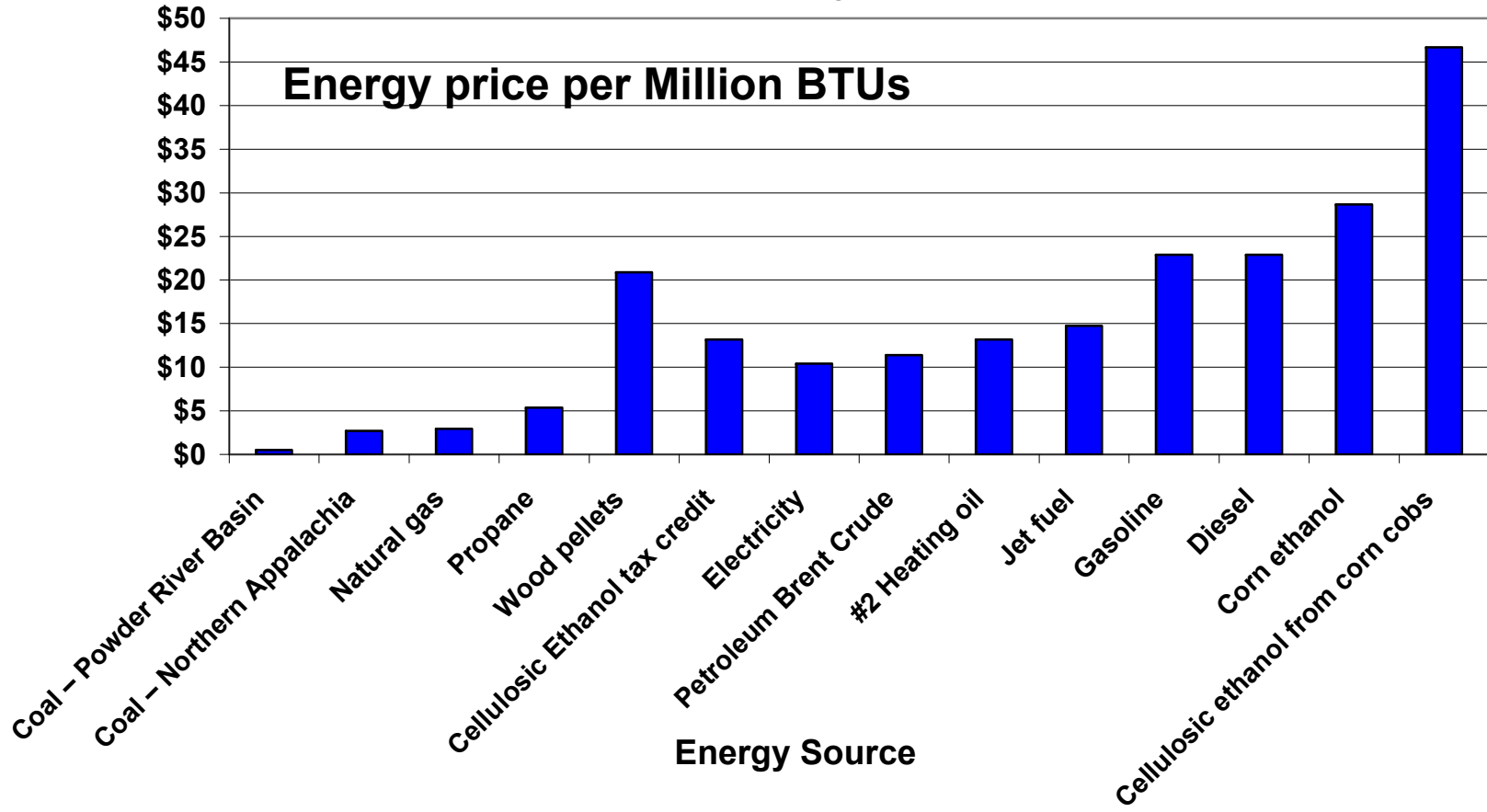
**Source:** U.S. Energy Information Administration; Form EIA-912, "Weekly Underground Natural Gas Storage Report."





# The Price of Energy

May 2015

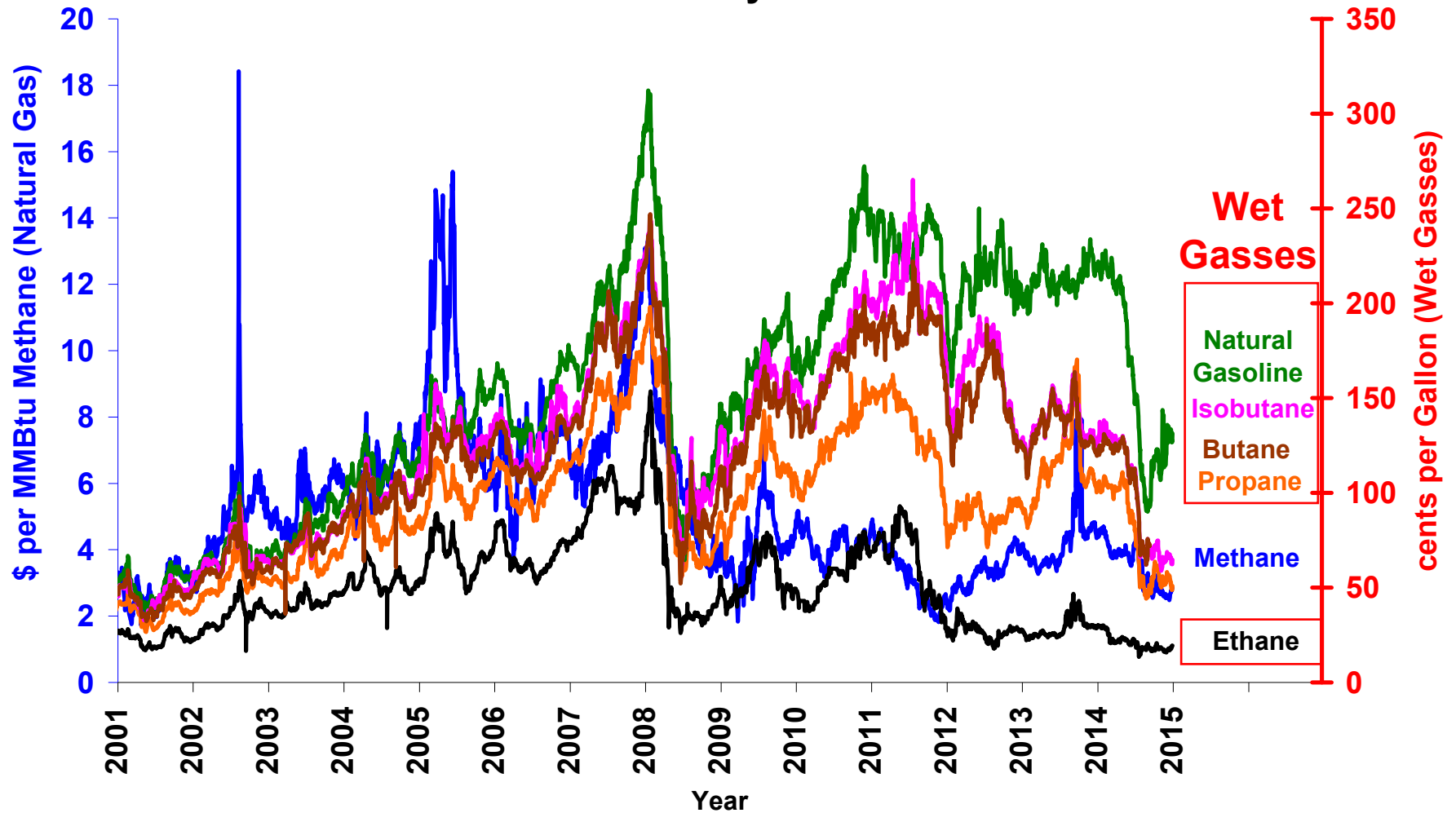


Spot prices used to calculate price/MMBTU

Sources for Data: U.S. Energy Information Administration (EIA) - Coal News and Markets Report 2. EIA, Natural Gas Futures Prices, Bloomberg, Propane Bloomberg generic Future 1 month, Volumetric Ethanol Excise Tax Credit (VEETC) - Ethanolifa.org; Wood Pellets - Bloomberg; Electricity - Bloomberg; Petroleum - Bloomberg; EIA, #2 Heating Oil - Indexmundi.com; Jet Fuel - Indexmundi.com; Gasoline - Bloomberg; Diesel - EIA Weekly Retail On-Highway Diesel Price US Total/USD gallon; Corn Ethanol - Chicago Board of Trade Ethanol Futures for September 2014 Contract; Cellulosic ethanol - ethanolproducer.com

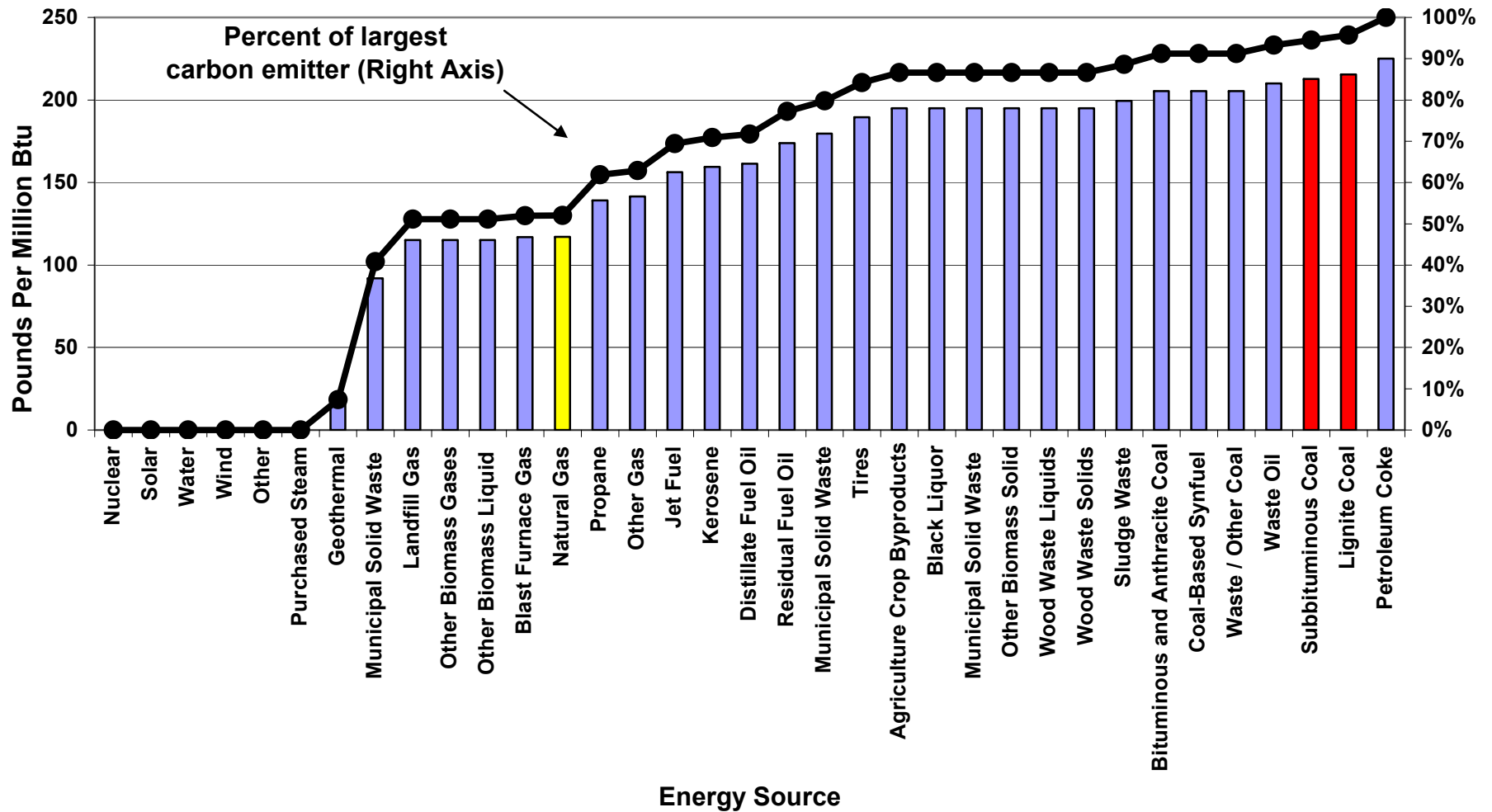


# Natural Gas Price (Left Scale) vs. Wet Gas Prices (Right Scale) 2001-May2015



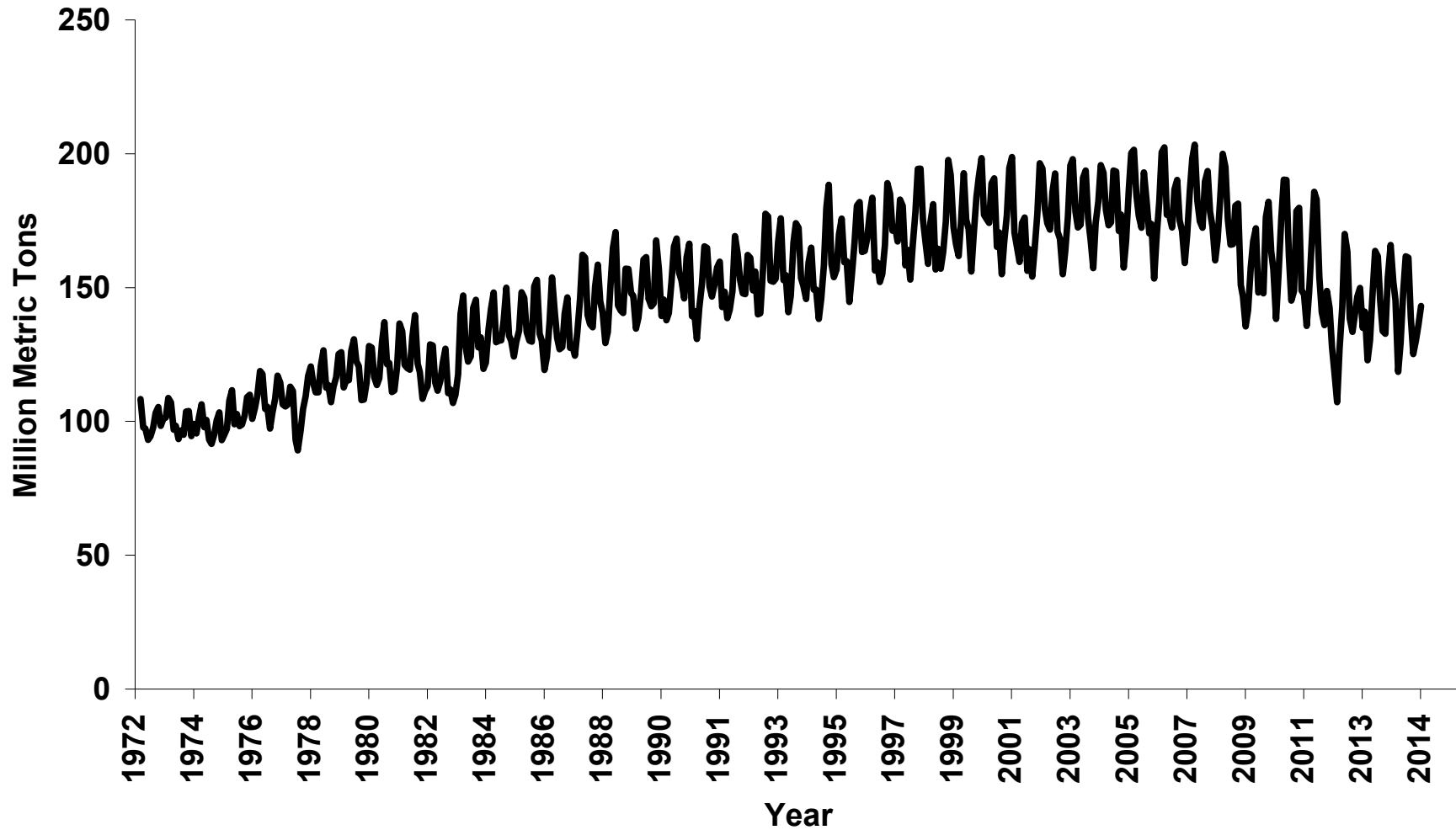
Source: Bloomberg

## Carbon dioxide emission factors for electric power generation by fuel type in the United States



Source: U.S. Energy Information Administration, Carbon Dioxide Emissions Coefficients Report

## U.S. Carbon Dioxide Emissions from Coal 1972-Jan2015 (Monthly)



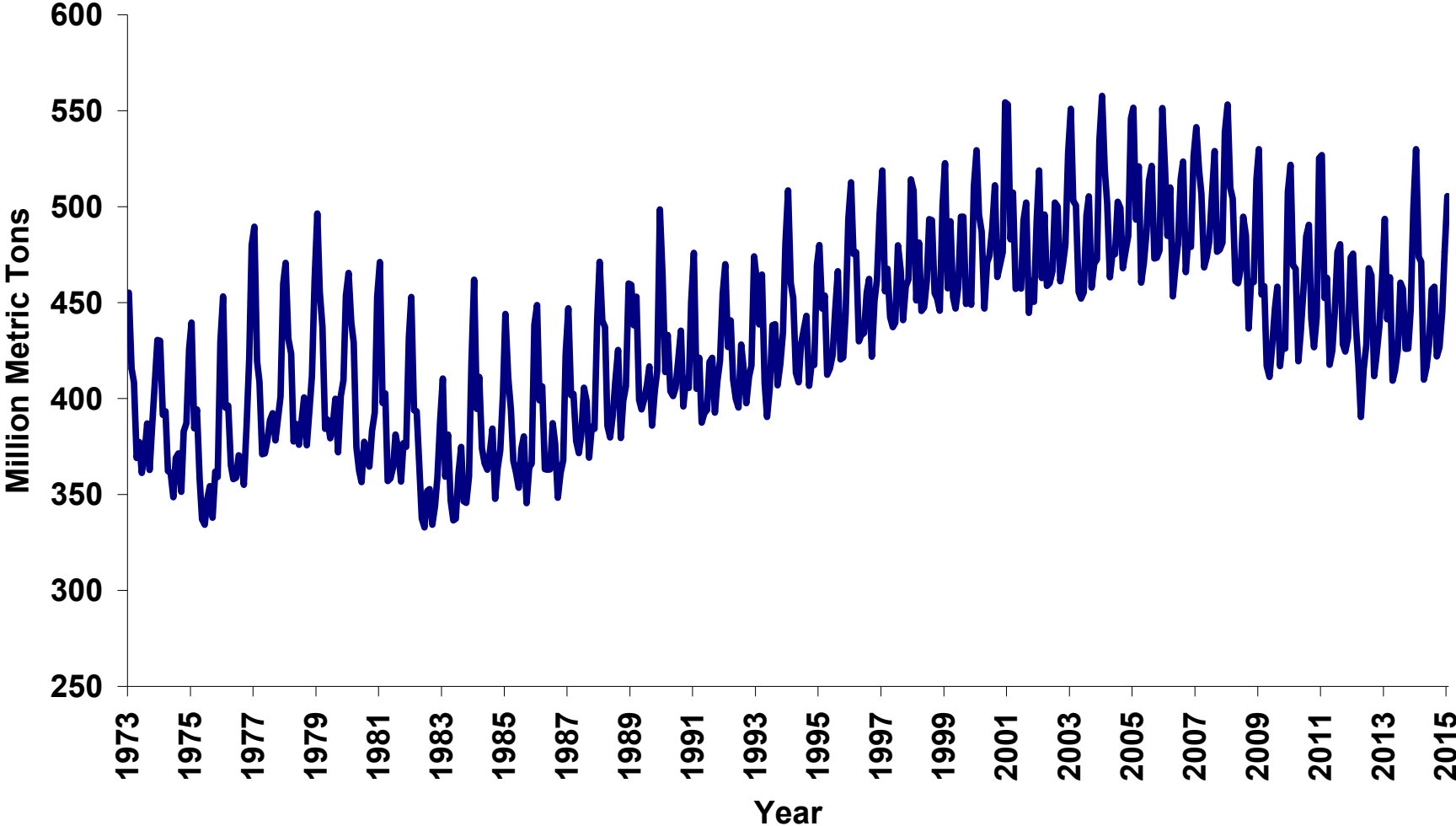
Source: U.S. Energy Information Administration, [Monthly Energy Review](#).

Note: Reflects total carbon dioxide emissions in [metric tons](#) by month.



# U.S. energy-related CO2 emissions in early 2012 lowest since 1992

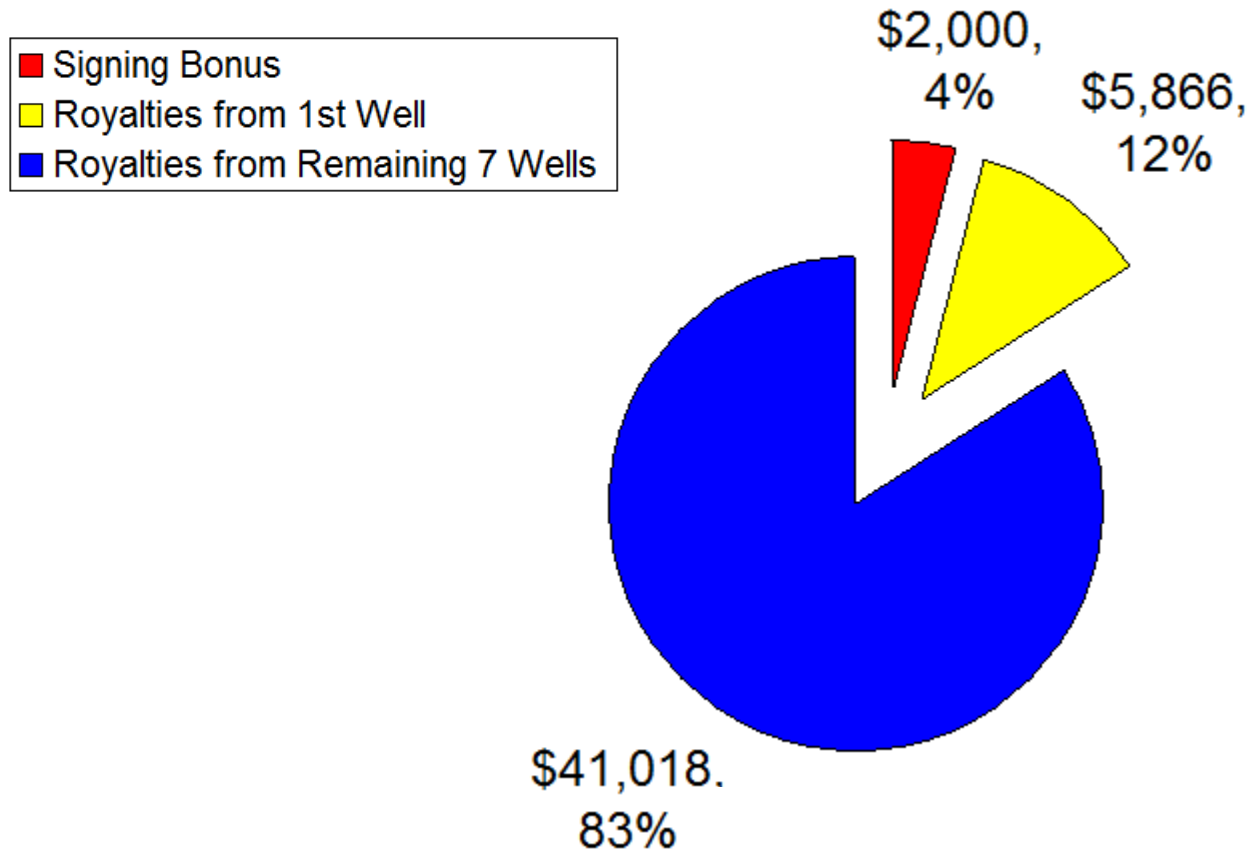
## U.S. Total Carbon Dioxide Emissions from Energy Demand 1973-Jan2015 (Monthly)



Source: U.S. Energy Information Administration, [Monthly Energy Review](#).  
Note: Reflects total carbon dioxide emissions in [metric tons](#) by quarter.

**Per Acre Estimate of Pre-Tax Cumulative Dollars Received by the Landowner Over the Life of a Typical Marcellus Shale Dry Gas Well in Southwestern Pennsylvania\***

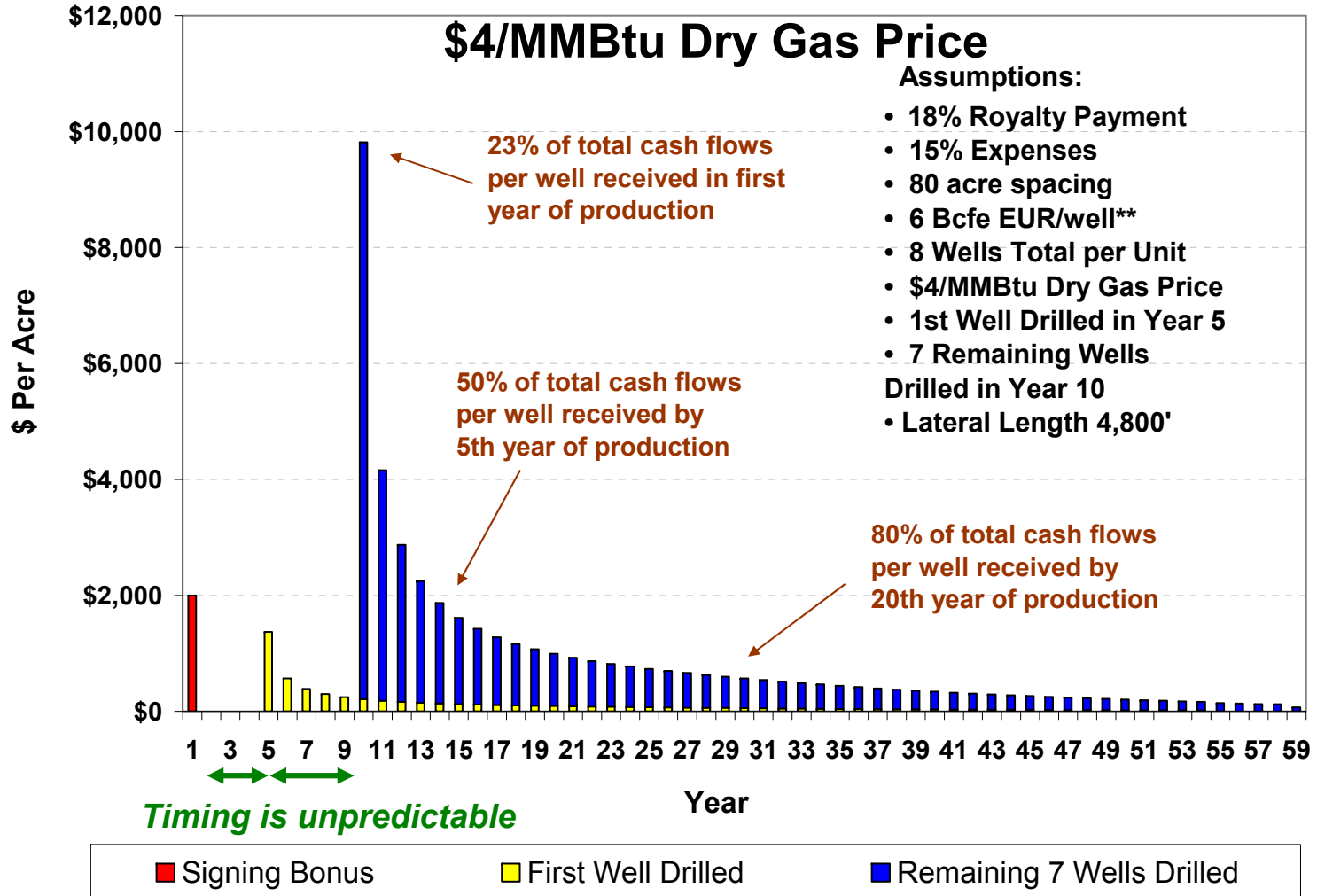
**\$4/MMBtu Dry Gas Price**



\* Typical Marcellus Shale dry gas well pad as of 8/1/13: assumes 58 year well life, 80 acre spacing, 6 Bcfe EUR (Estimated Ultimate Recovery) per well, 8 wells total, \$4/MMBtu Dry Gas Price.



## Estimate of Pre-Tax Cash Flows to the Landowner from a Typical Marcellus Shale Dry Gas Well in Southwestern Pennsylvania\*



\*\* EUR=Estimated Ultimate Recovery

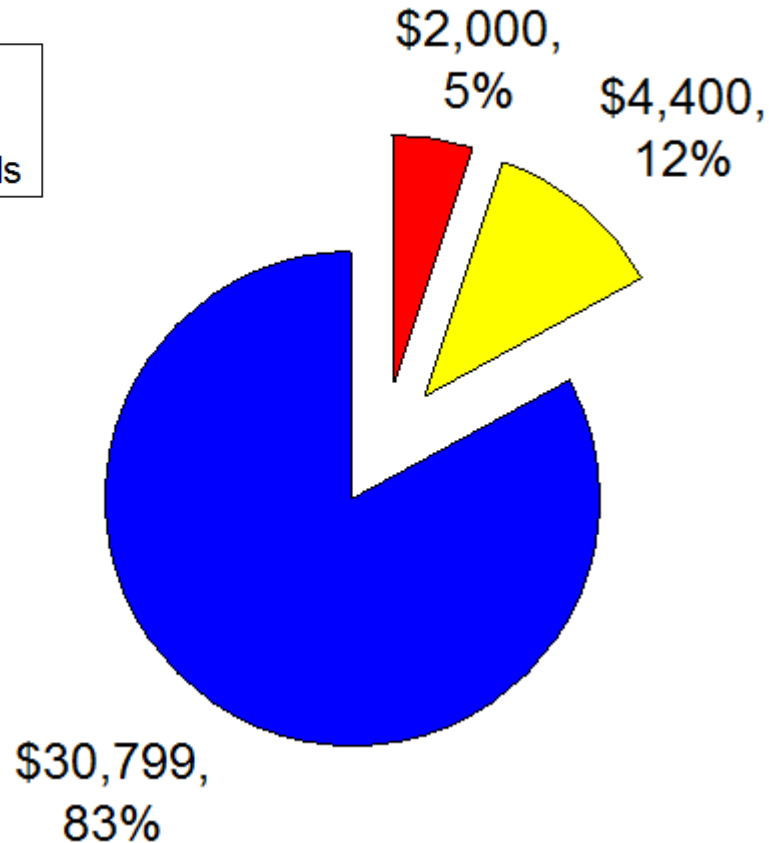
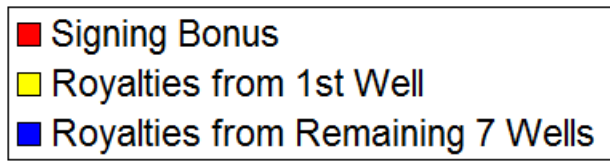
\* Typical Marcellus Shale dry gas well pad in SW Pennsylvania as of 8/1/13

\*\* EUR = Estimated Ultimate Recovery



**Per Acre Estimate of Pre-Tax Cumulative Dollars Received by the Landowner Over the Life of a Typical Marcellus Shale Dry Gas Well in Southwestern Pennsylvania\***

**\$3/MMBtu Dry Gas Price**

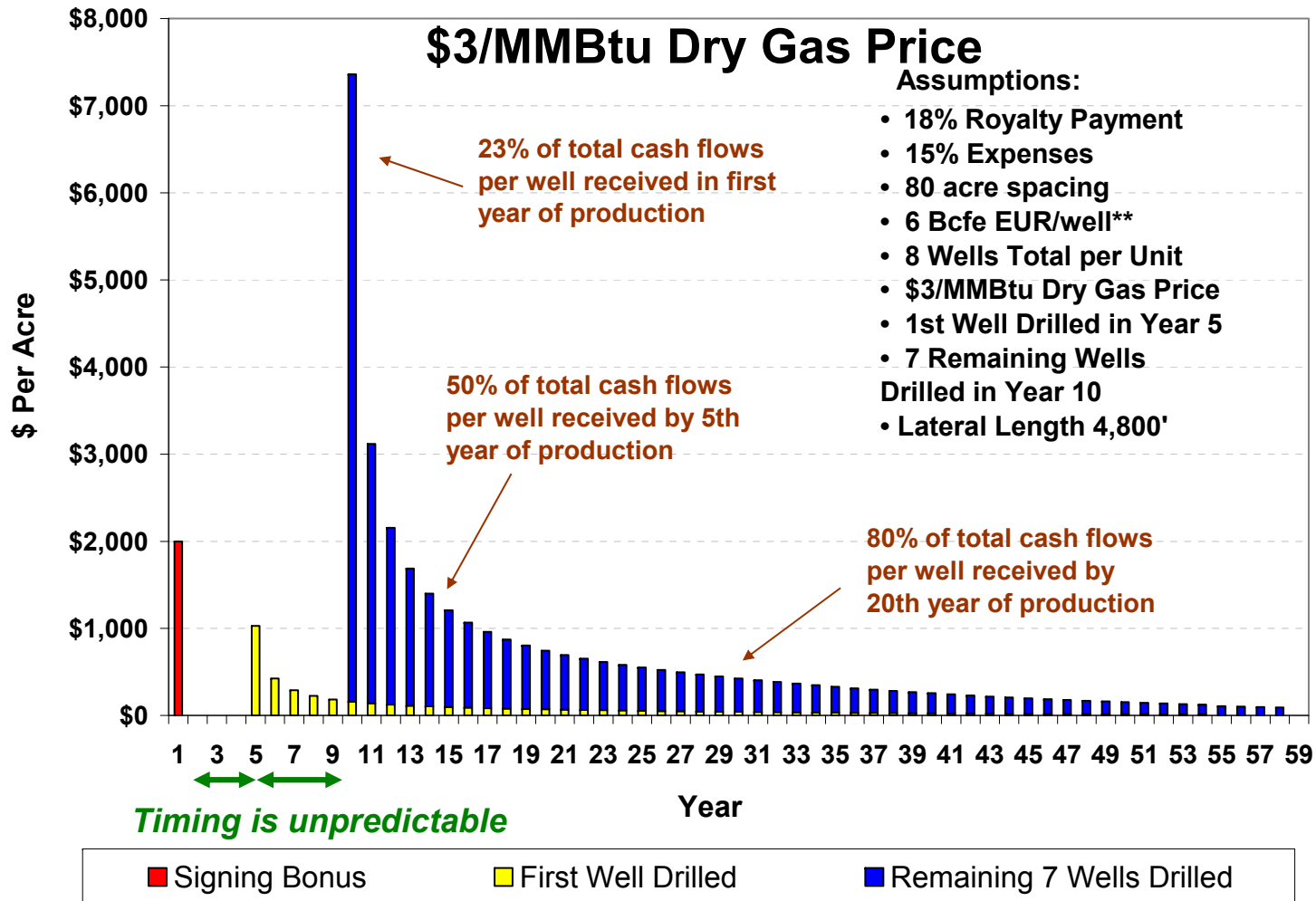


- Typical Marcellus Shale dry gas well pad as of 7/1/15: Assumes • 18% Royalty Payment • 15% Expenses
- 80 acre spacing • 6 Bcfe EUR/well\*\* • 8 Wells Total per Unit • \$3/MMBtu Dry Gas Price • Lateral Length 4,800'
- 1,252 Mcfe EUR/Ft





## Estimate of Pre-Tax Cash Flows to the Landowner from a Typical Marcellus Shale Dry Gas Well in Southwestern Pennsylvania\*

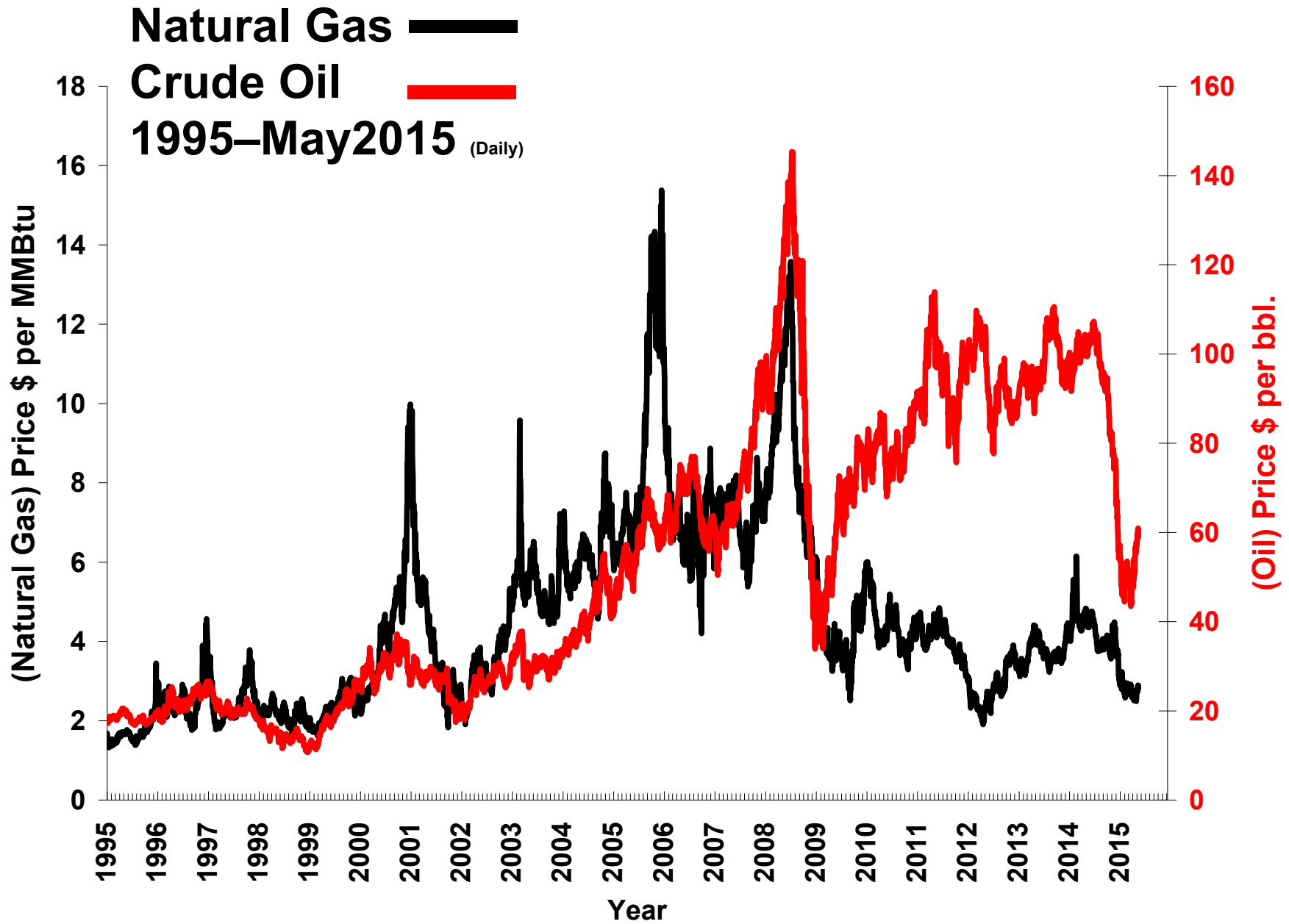


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\* Typical Marcellus Shale dry gas well pad in SW Pennsylvania as of 07/01/14

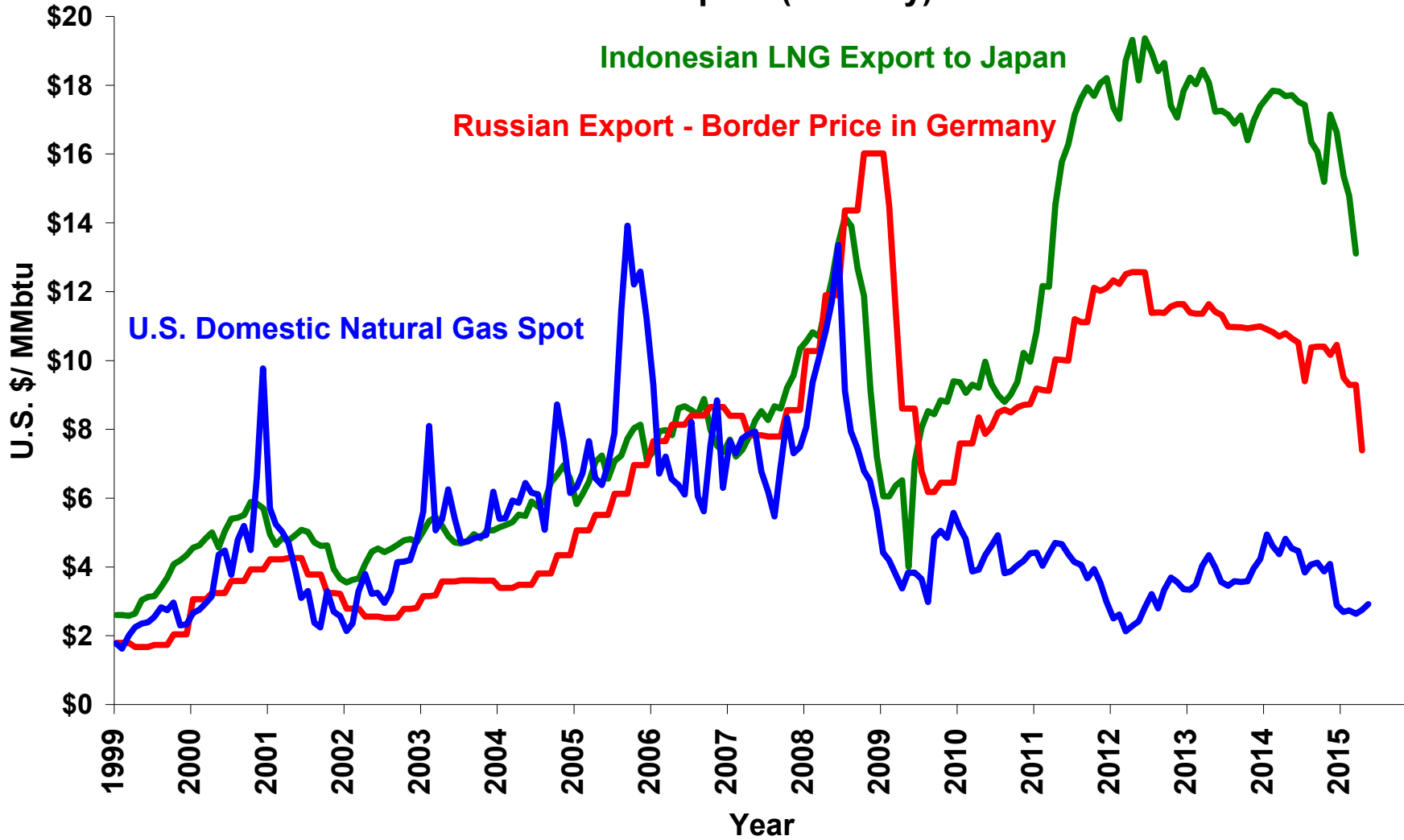
\*\* EUR = Estimated Ultimate Recovery





Source: Bloomberg; Oil; Generic 1st 'CO' Future, Natural Gas; Generic 1st 'NG' Future delivery to Henry Hub

# Natural Gas Price by Region (Delivered Basis) 1999-Apr15 (Monthly)



Source: Bloomberg

