

# Energy Outlook: Trends and Policies

*2010 Tri-State Member Service Conference  
Arkansas, Louisiana, and Mississippi Electric Cooperatives*

L'Auberge du Lac Casino Resort, Lake Charles, Louisiana

October 14, 2010



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## Take Away Points: What's Happened?

- **Worst economic recession in history. Record unemployment rates by any measure makes this the single most important benchmark and characteristic.**
- **Demand impacts (domestic, global) were considerable and have significant impacts on prices.**
- **Market has reacted with considerable supply, transportation, refining/processing and storage infrastructure development despite volatile prices and risks.**
  - **Classic industry infrastructure overshoot...**
- **Natural gas production and reserve increases have been impressive. Crude reserves holding steady with some anticipated growth in production in EOR and deepwater. Very impressive resource development over the past three years alone.**
  - **Classic industry innovation response....**

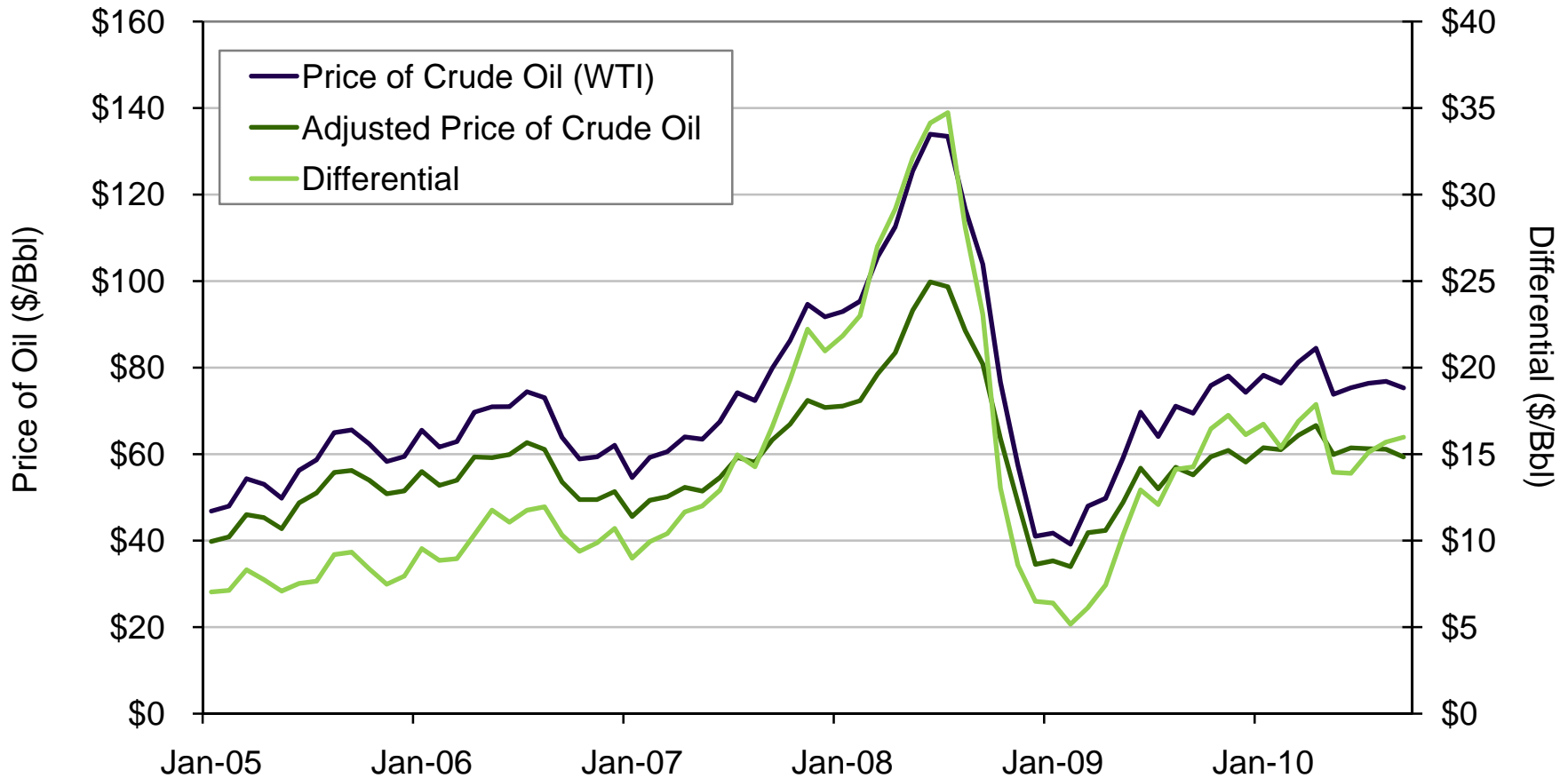
## Take Away Points: Outlooks and Issues

- **Resource development and innovation over the past 48 to 26 months has been phenomenal. Gains that clearly will have important long-run ramifications for energy supplies (domestically and globally).**
- **Demand (recovery) big unknown at this point.**
  - **Economic recovery is uncertain.**
  - **New technologies likely to have significant and unknown impacts on markets.**
- **Policy still has an impact, several initiatives, particularly in aftermath of the Deepwater Horizon accident, could unwind resource gains. Opportunities for big gains or big contractions.**

## Recent Trends

Dollar Value and Oil Prices

Prices say a lot about what has been going on in energy markets over the past five years.

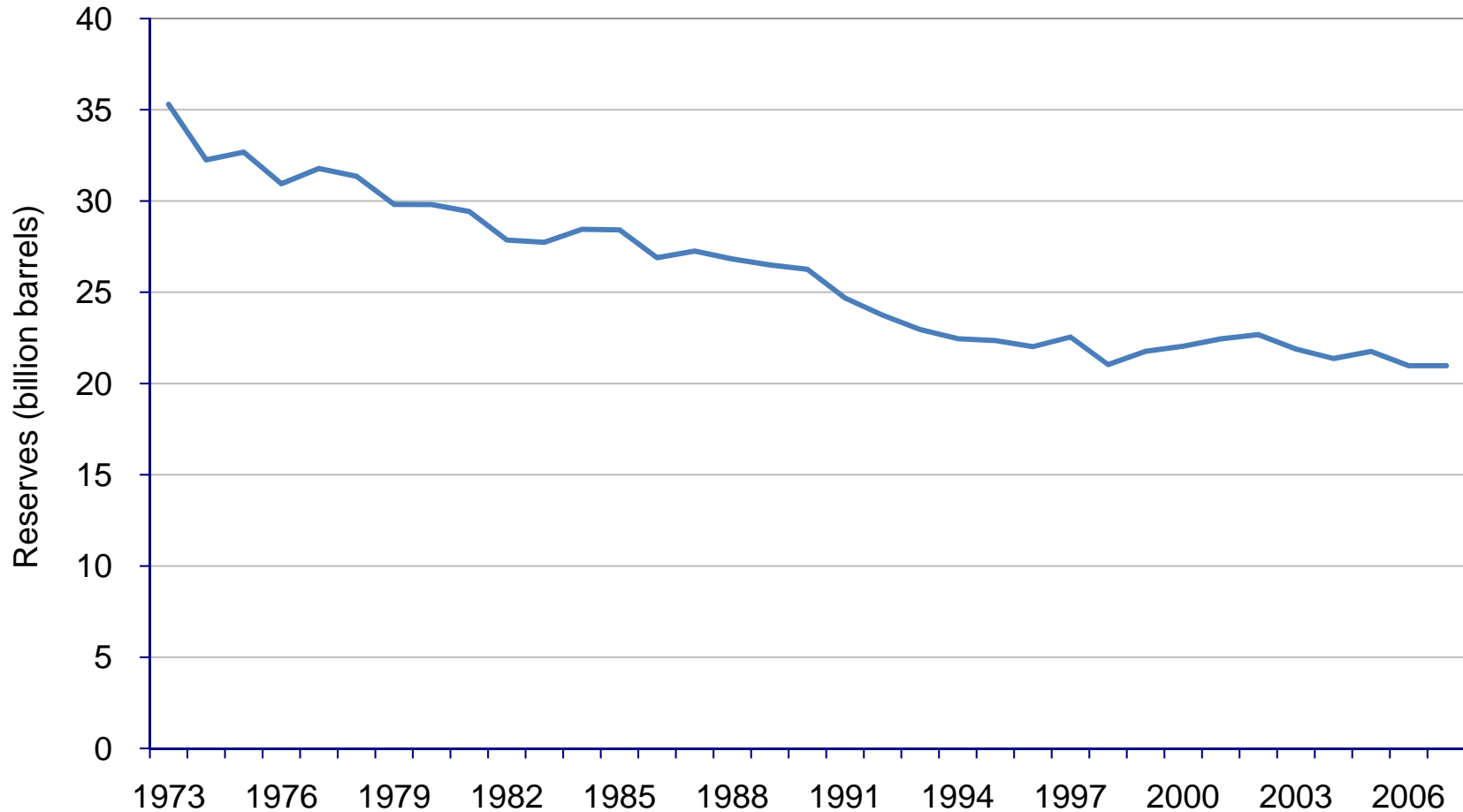


Note: The adjusted price of crude oil is the nominal WTI adjusted by the Federal Reserve Bank's Broad Index. The Broad Index is a weighted average of the foreign exchange values of the U.S. dollar against the currencies of a large group of major U.S. trading partners. Base year is 2002.

Source: Federal Reserve Bank

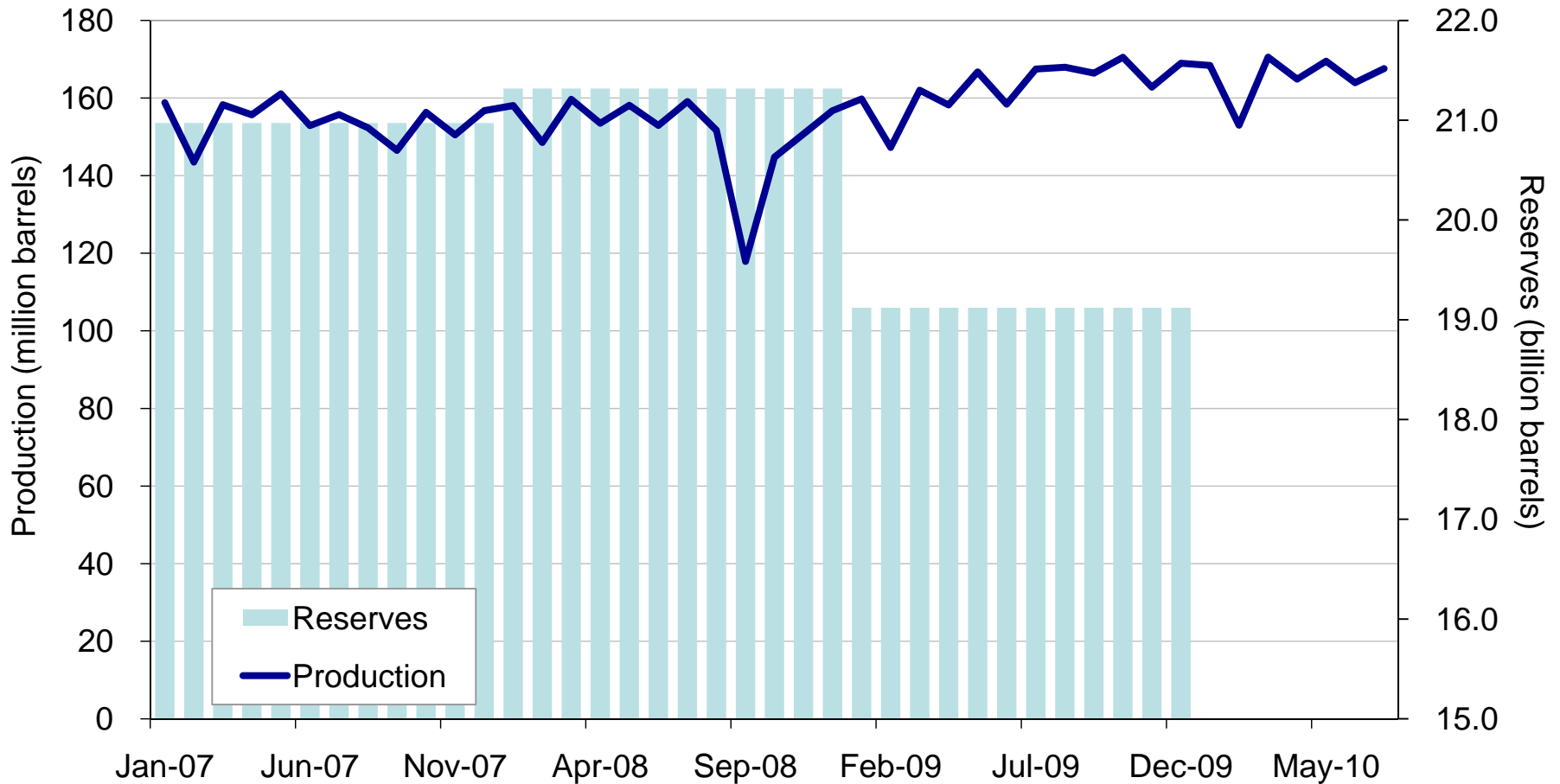
U.S. Crude Oil Production and Proved Reserves, January 2007 to Present

Reserves holding steady between 22 to 20 BBbls since 1992.



U.S. Crude Oil Production and Proved Reserves, January 2007 to Present

U.S. crude production, while down from its heyday, is reaching a plateau given EOR and deepwater GOM production.



**Publicly Announced Lower Tertiary Trend Discoveries in the Gulf of Mexico**

Prospect	Block	Operator	Discovery Date
Trident	AC 903	Chevron	2001
Great White	AC 857	Shell	2002
Cascade	WR 206	BHP	2002
Chinook	WR 469	BHP	2003
St. Malo	WR 678	Chevron	2003
Tobago	AC 859	Chevron	2004
Silvertip	AC 815	Chevron	2004
Tiger	AC 818	Chevron	2004
Jack	WR 759	Chevron	2004
Stones	WR 508	BP	2005
Gotcha	AC 856	Total	2006
Kaskida	KC 292	BP	2006

During the last ten years, the average deepwater field has added over 67 MMBOE of proved and unproved reserves.

**About 60 billion barrels of oil found in deepwater fields to date.**

**Some 8- to 10 billion barrels have already been produced.**

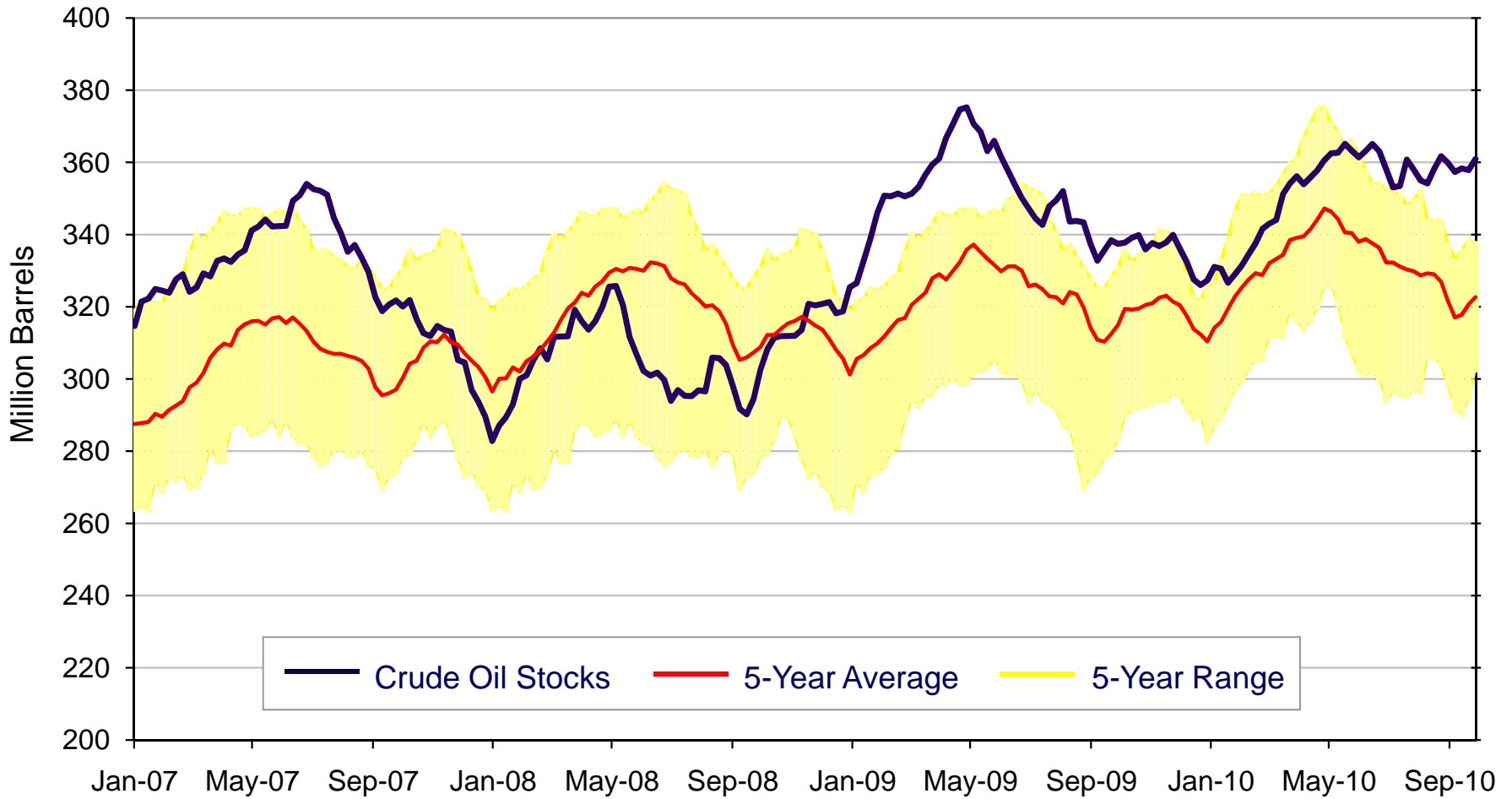
**Yet-to-find potential could be 114 billion barrels of oil, and 68 billion barrels of oil equivalent (BOE) of gas. [Oil and Gas Investor, May 2006]**





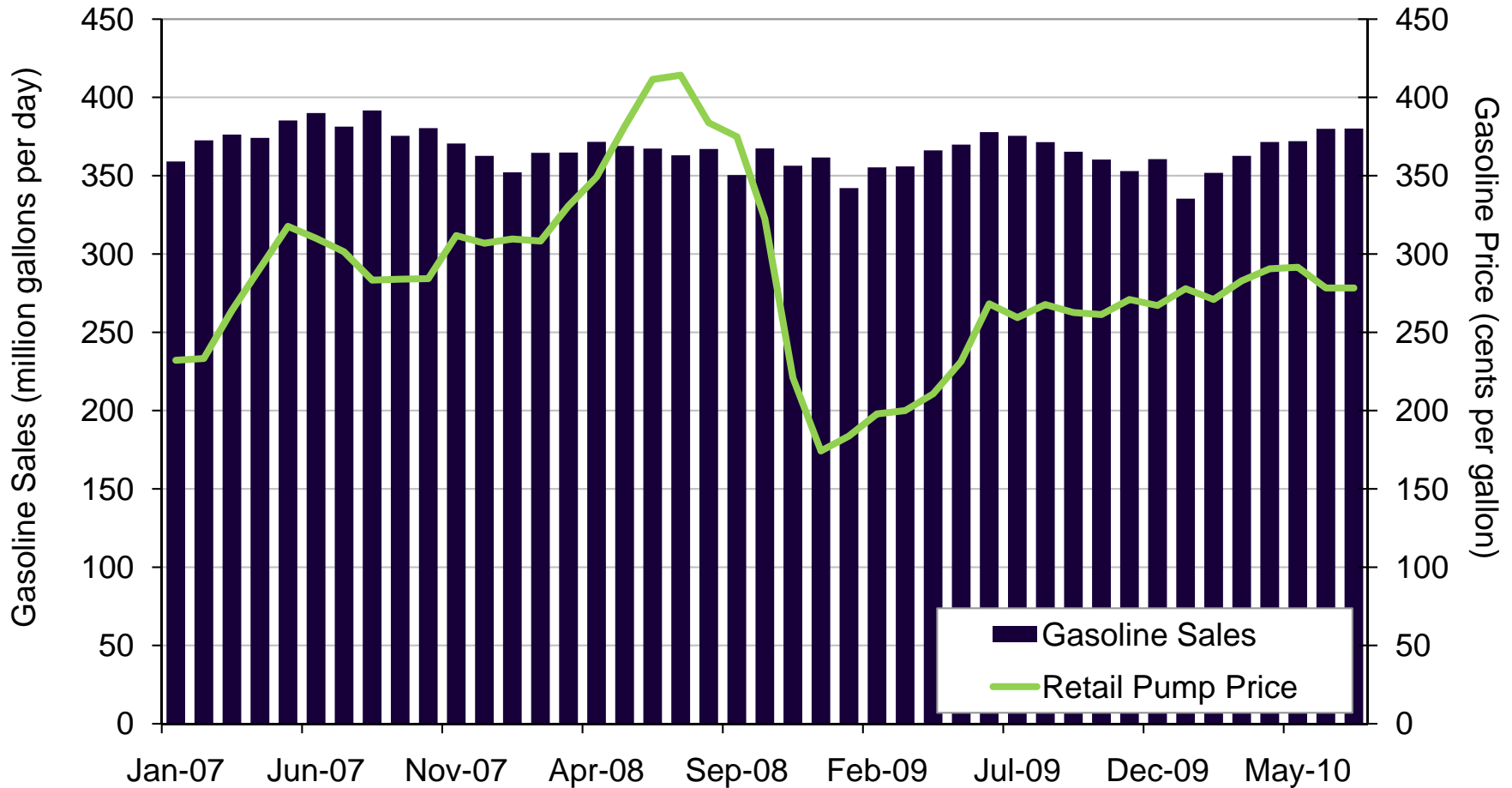
U.S. Crude Oil Stocks

Market continues to be long on crude stocks.



U.S. Gasoline Demand and Retail Pump Prices

The bottom has finally fallen out of gasoline demand. Many do not anticipate these levels to recover for at least a decade, if ever.

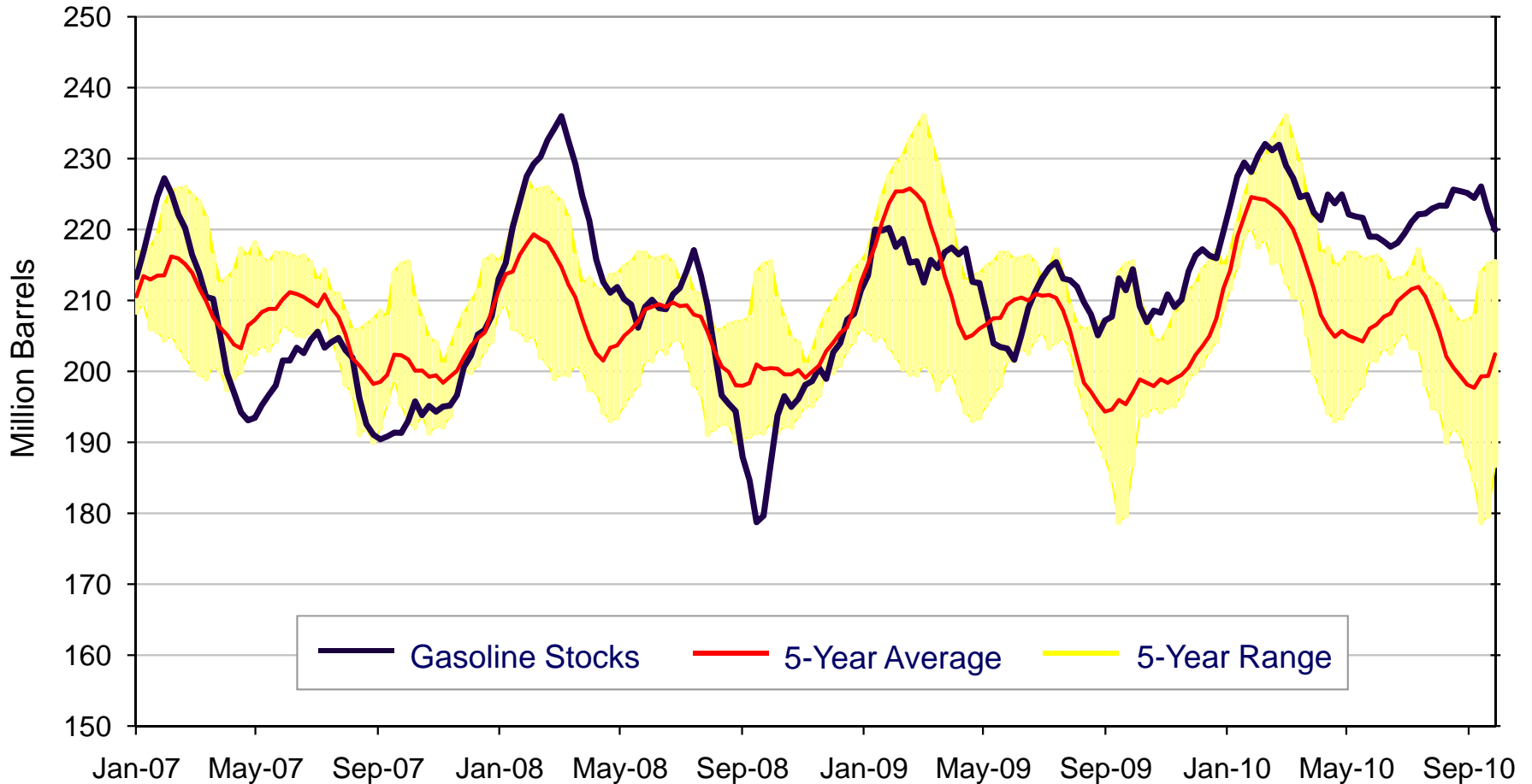


**Hybrids**



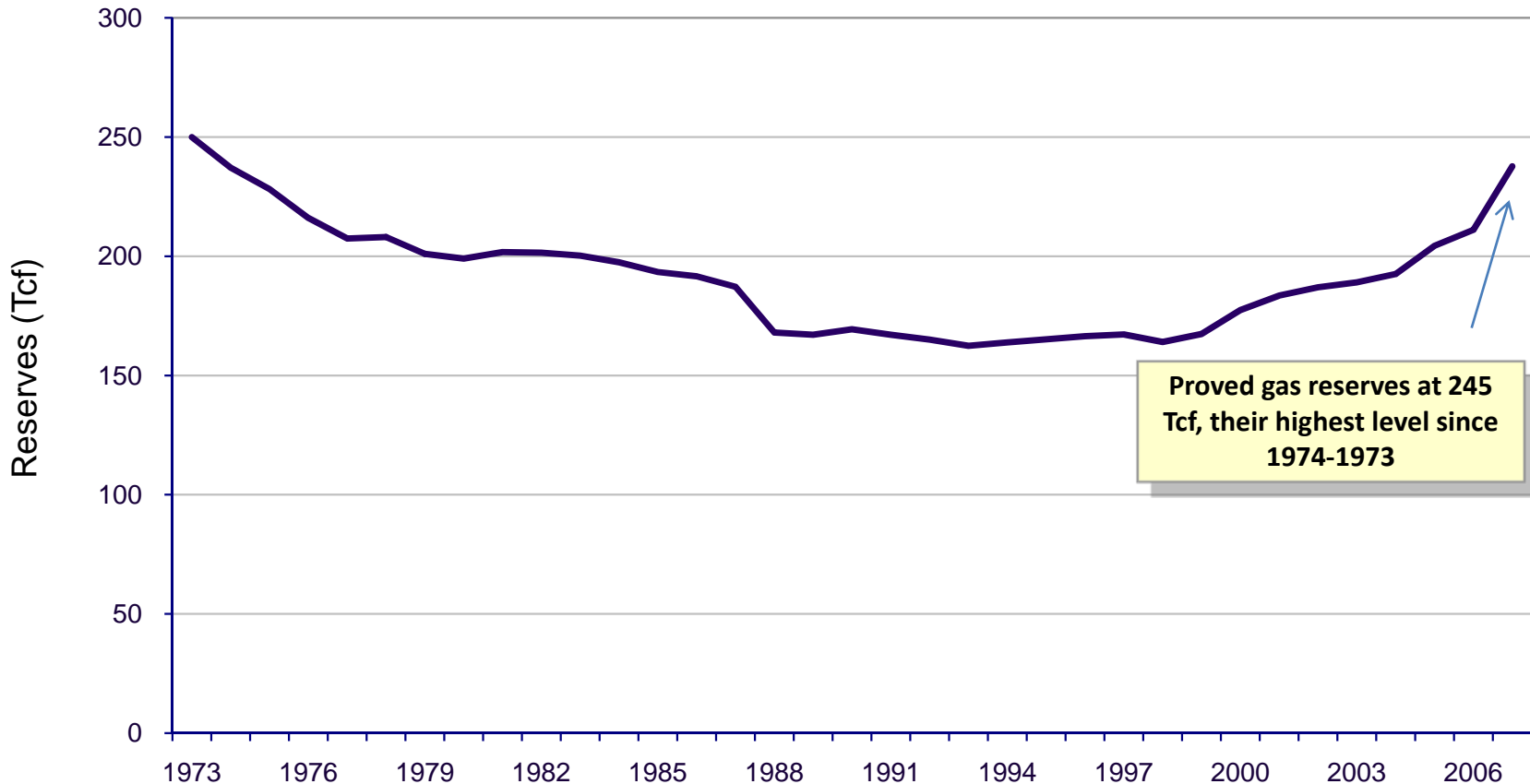
U.S. Gasoline Stocks and Days of Supply

Low stocks help drive up prices in 2007, but a moderate recovery started in 2008.



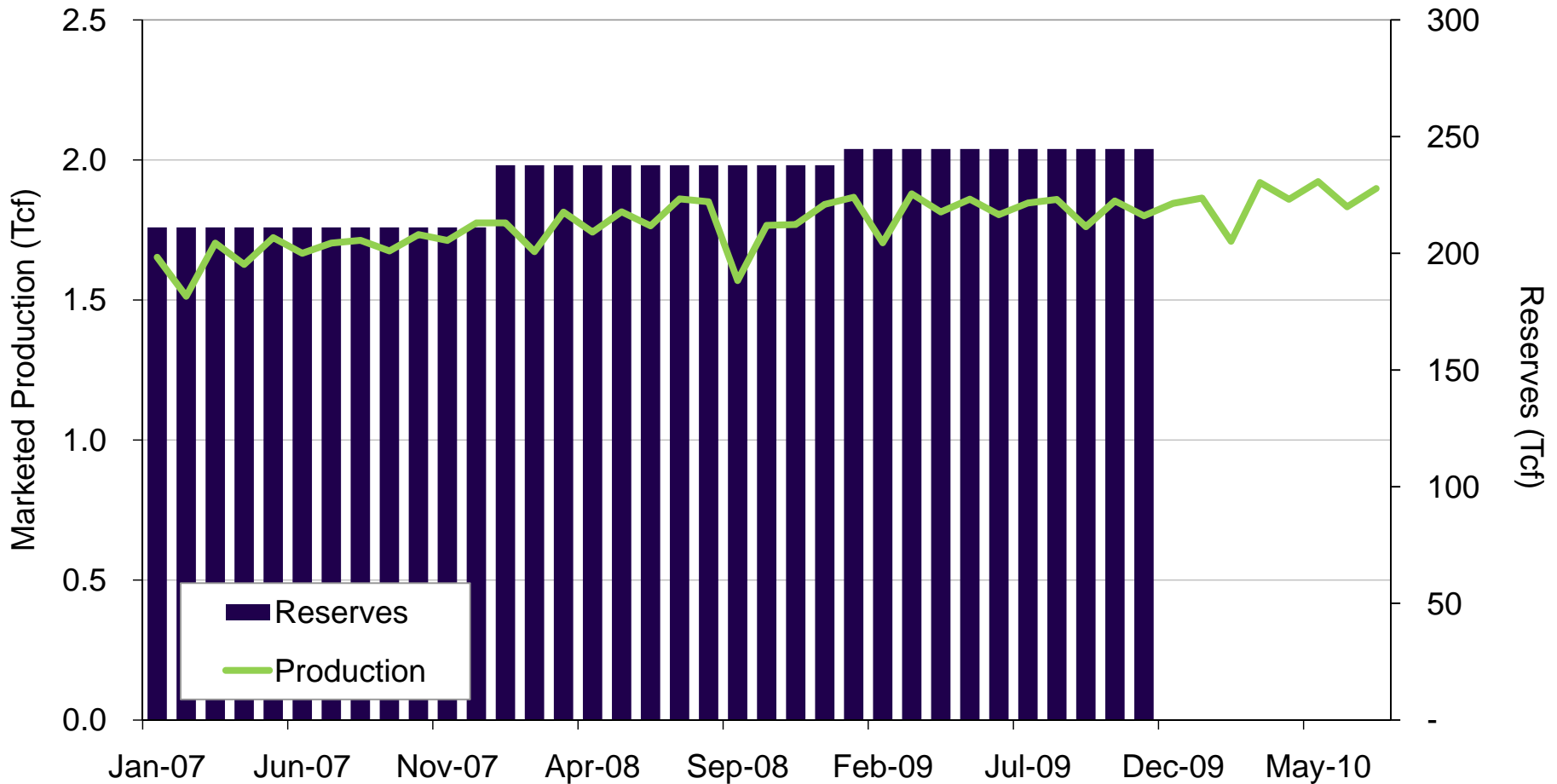
**U.S. Natural Gas Production and Proved Reserves, January 2007 to Present**

**2006-2007 reserves growth is the largest in over 30 years. Natural gas reserves have been increasing by almost 5 percent since 2000 (except 2004-2005 tropical season, 2.5 percent)**



U.S. Natural Gas Production and Proved Reserves, January 2007 to Present

Impressive natural gas production increases, driven by deepwater, and increasingly by unconventional resources.



## **Market Disruption**

Percent Change in Quarterly GDP

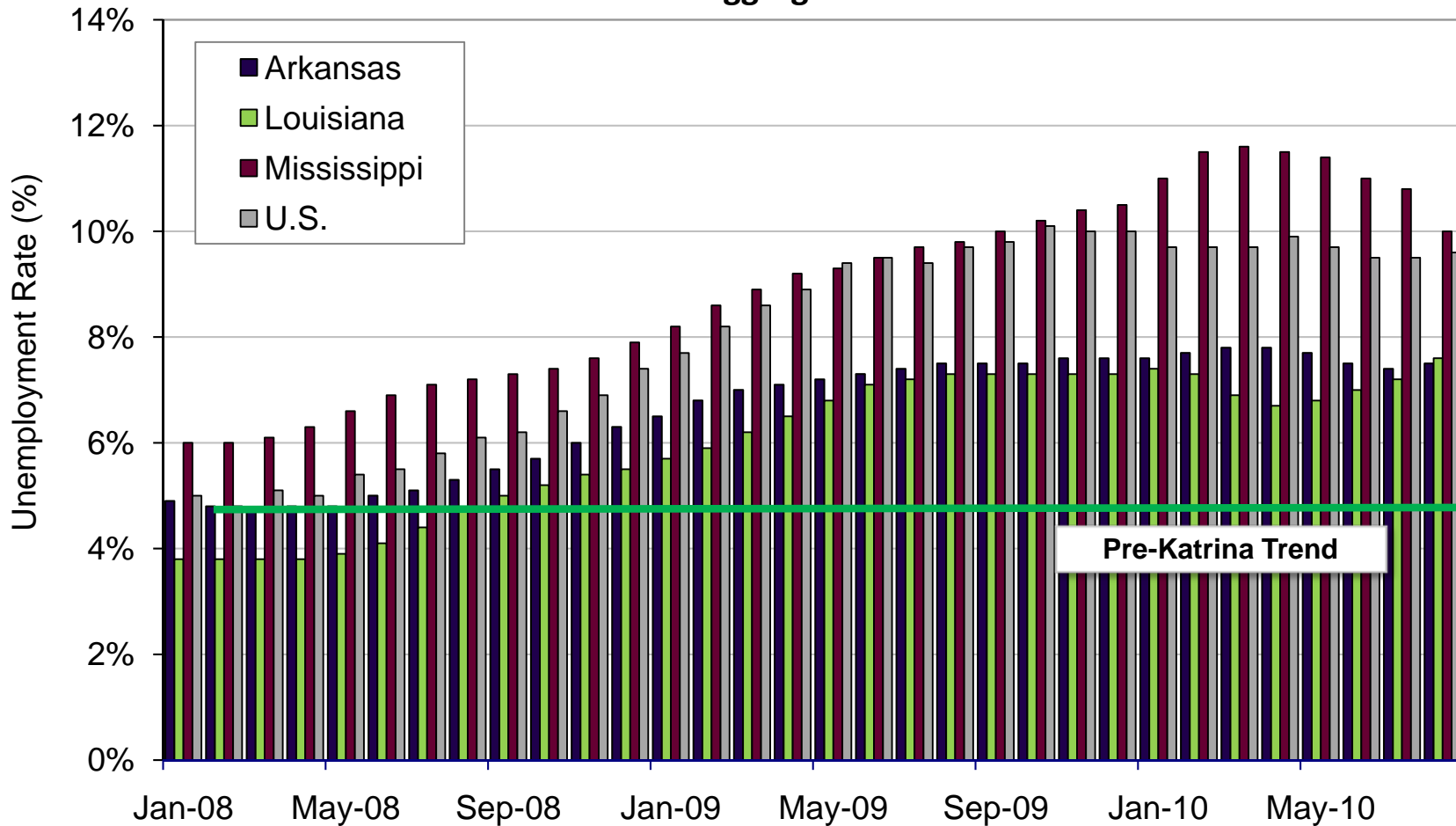
U.S. economy has technically been in recession since the beginning of 2008.





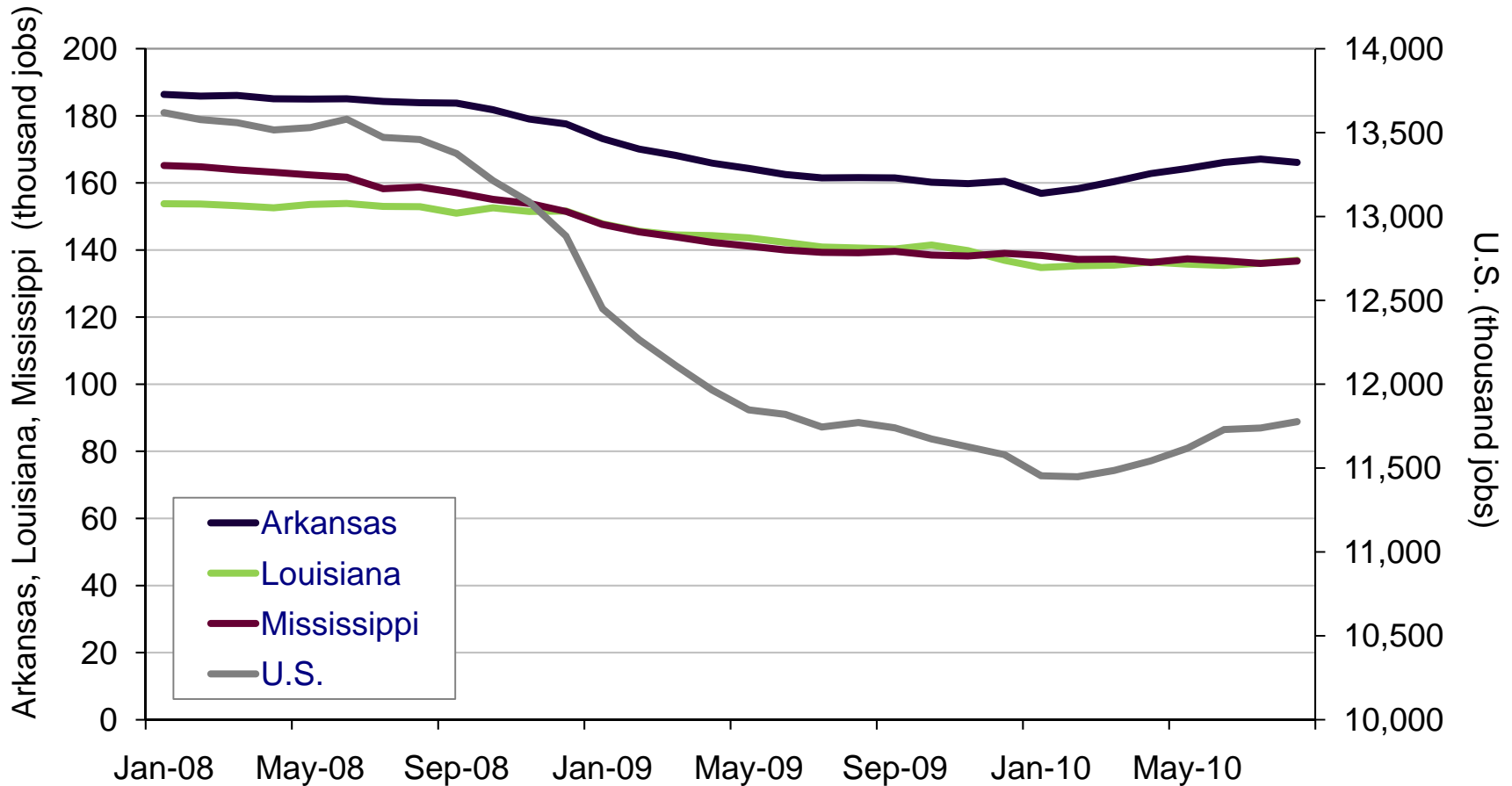
Unemployment Rate – Arkansas, Louisiana, Mississippi and U.S.

Arkansas and Louisiana employment compares well with national average on aggregate basis



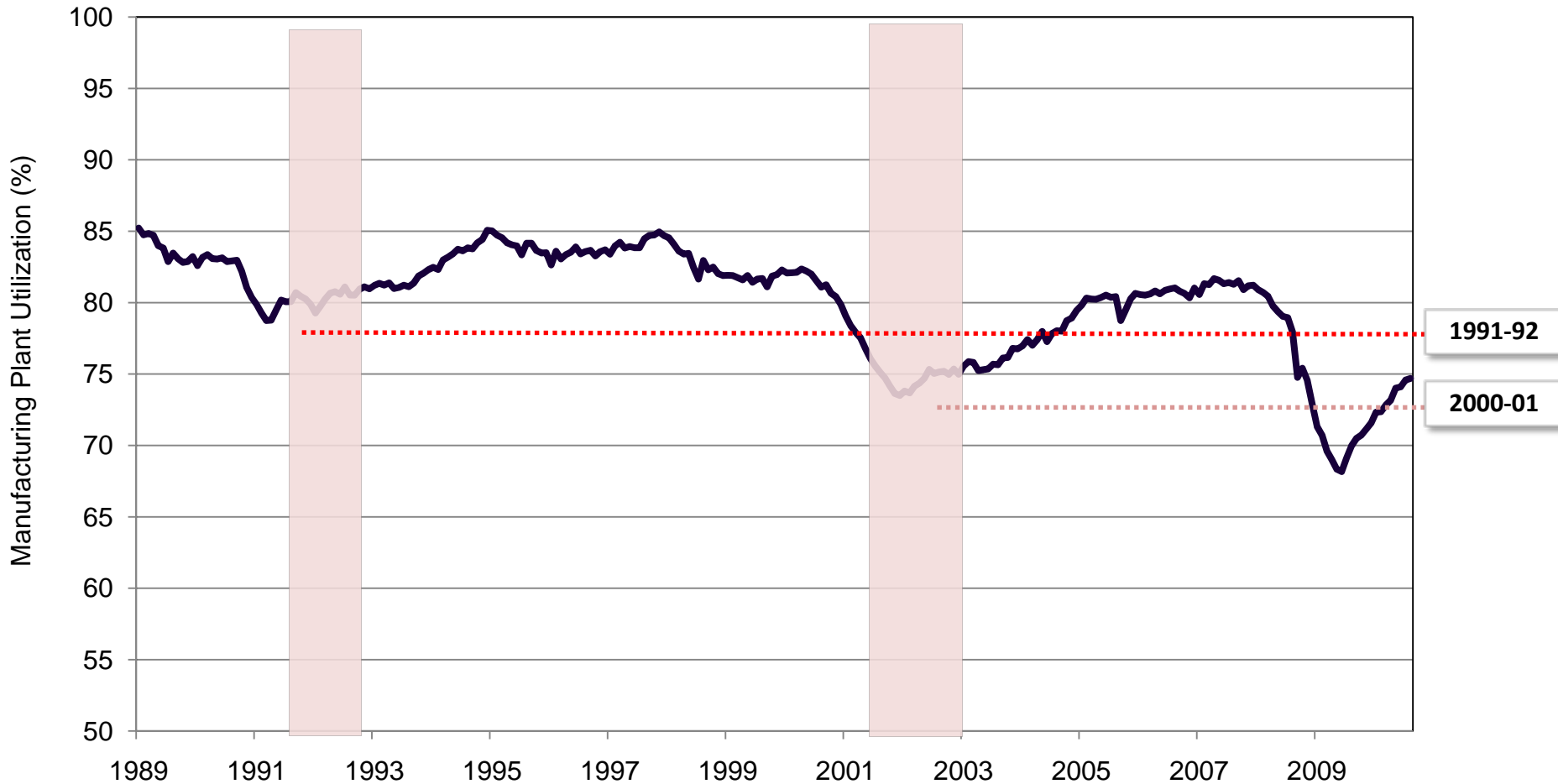
**Manufacturing Employment – Arkansas, Louisiana, Mississippi and U.S.**

**However, manufacturing trends have been disturbing and following similar trends to the national averages.**



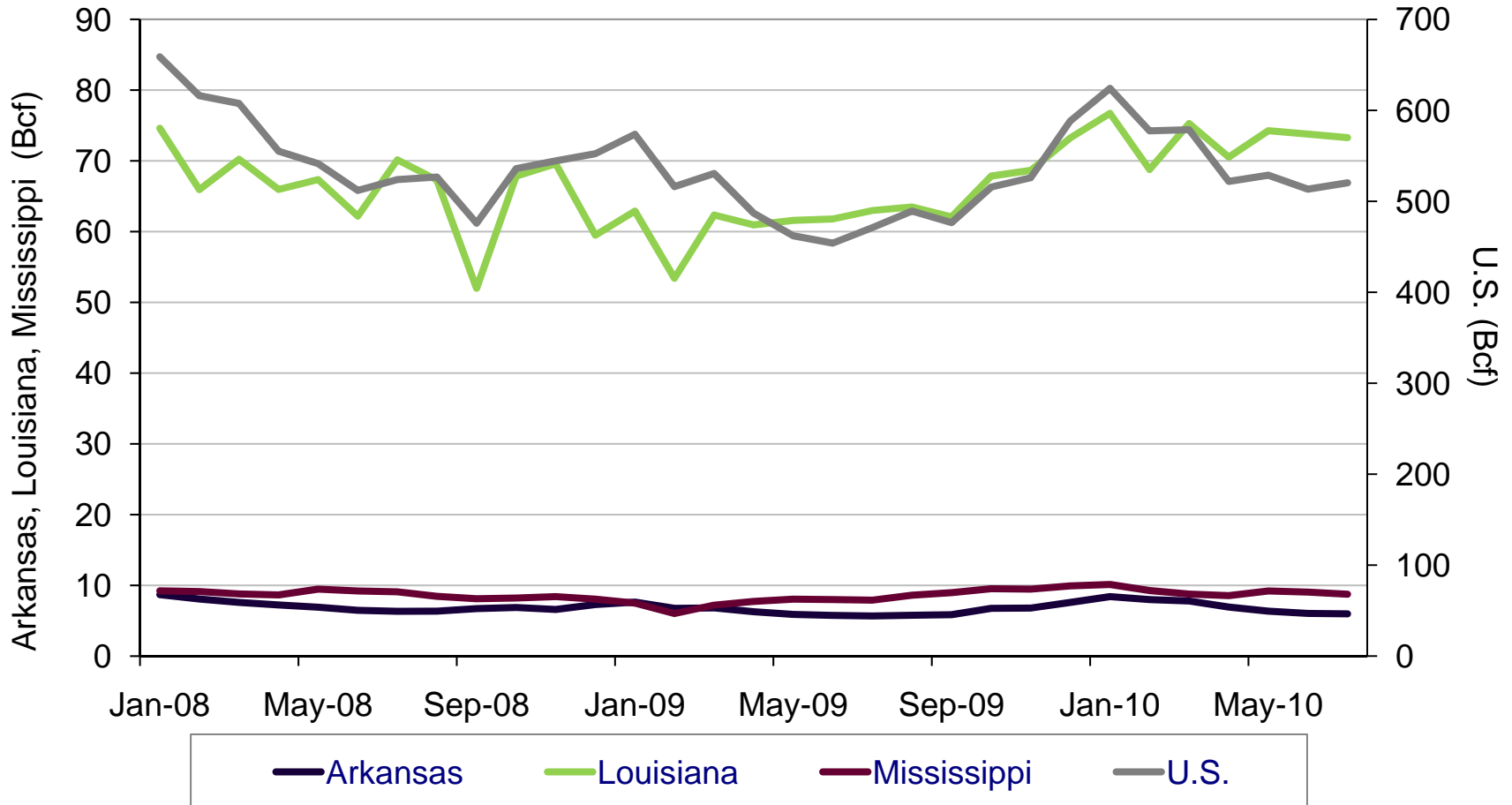
Manufacturing Capacity Utilization

Manufacturing industry utilization considerably lower than last two recessions, despite recent upturn.



Industrial Natural Gas Consumption

Industrial gas demand starting to rebound – could be signs of recovery.



## **Public Policy Challenges**

**New Changes in Natural Gas and Oil Taxes**

**The IPAA estimates that taken together, these tax changes would strip over \$30 billion from US natural gas and oil production investment.**

**Intangible Drilling and Development Costs (IDC)** – Tax treatment designed to attract capital to natural gas and oil production. Eliminating this option would remove \$3 billion that would have otherwise been invested in new U.S. production.

**Percentage Depletion** – Provides capital for independents and is important for marginal well operators. Removal is estimated to cost \$8 billion in investment.

**Geological and Geophysical (G&G) Amortization** – Early recovery of G&G costs allows for more investment in finding new resources. Extending the amortization period would remove over \$1 billion from efforts to find and develop new U.S. production.

**Marginal Well Tax Credit** – Countercyclical tax credit that creates a safety net for marginal wells during periods of low prices. Enacted in 2004, the marginal well tax credit has not been needed, but it remains a key element of support for U.S. production.

**Enhanced Oil Recovery (EOR) Tax Credit** – Designed to encourage oil production using technologies that are required after a well passes through its initial phase of production. Currently, the oil price threshold for the EOR tax credit has been exceeded and the oil value is considered adequate to justify EOR efforts. But, at lower prices EOR becomes uneconomic and these costly wells would be shutdown.

**Manufacturing Tax Deduction** – Another tax provision that provides capital to U.S. independent producers to invest in new production.

**Excise Tax on GOM Production** – Creating a new tax designed to add a \$5 billion burden on U.S. offshore development will drive producers from the GOM, reducing new U.S. production of natural gas and oil.

**Passive Loss Exception for Working Interests in Oil and Gas Properties** – If, in the future, income/loss arising from the ownership of oil and natural gas working interests, is treated as passive income/loss, the primary reason for individuals to invest in oil and gas working interests would be significantly diminished.

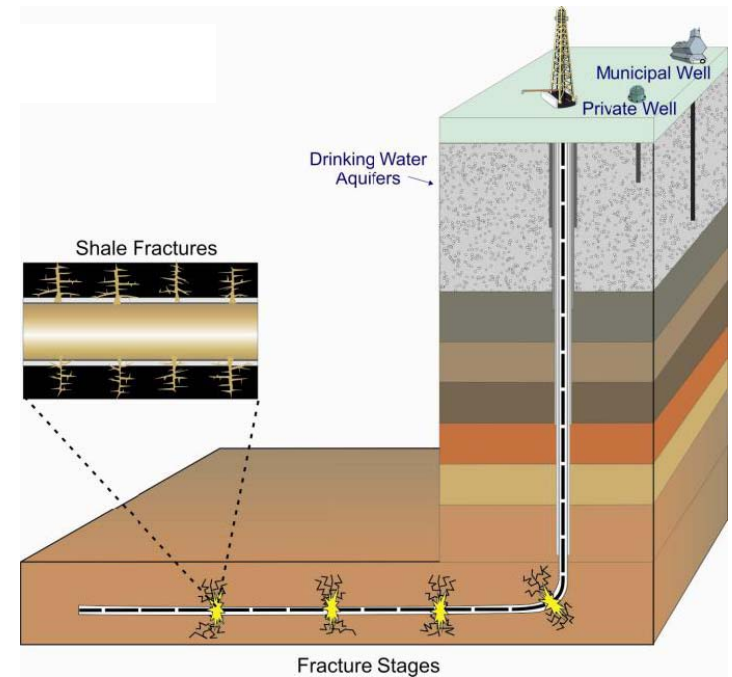
**EPA Research Study of Hydraulic Fracturing**

In its Fiscal Year 2010 budget report, the U.S. House of Representatives Appropriation Conference Committee identified the need for a focused study of hydraulic fracturing.

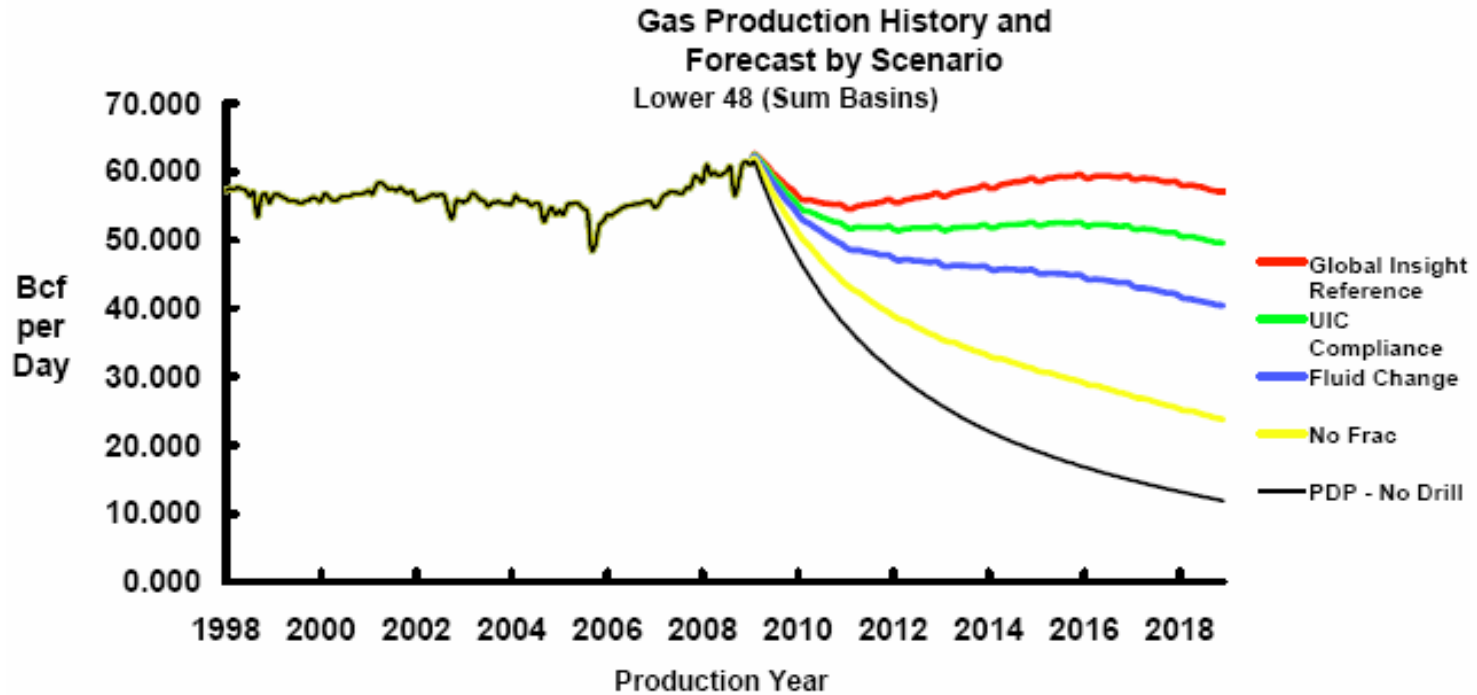
EPA's Office of Research and Development will be conducting a scientific study to investigate the possible relationships between hydraulic fracturing and drinking water.

EPA is currently working on a design to articulate the study's goals and outcomes.

With input from public meetings in July, August, and September, EPA plans to complete the draft study design by October 2010. EPA expects to initiate the study in early 2011 and to have the initial study results available by late 2012.



Estimated Effects of Regulating Hydraulic Fracturing



Change in Natural Gas Production  
(Trillion Cubic Feet)

	2008	2014	Change From Reference	
			Change	Percent Change
Global Insight Reference	20.9	20.4		
UIC Compliance		18.3	-2.1	-10%
Fluid Change		16	-4.4	-22%
No Fracturing		11.3	-9.1	-45%
No Drilling		7.2	-13.2	-65%

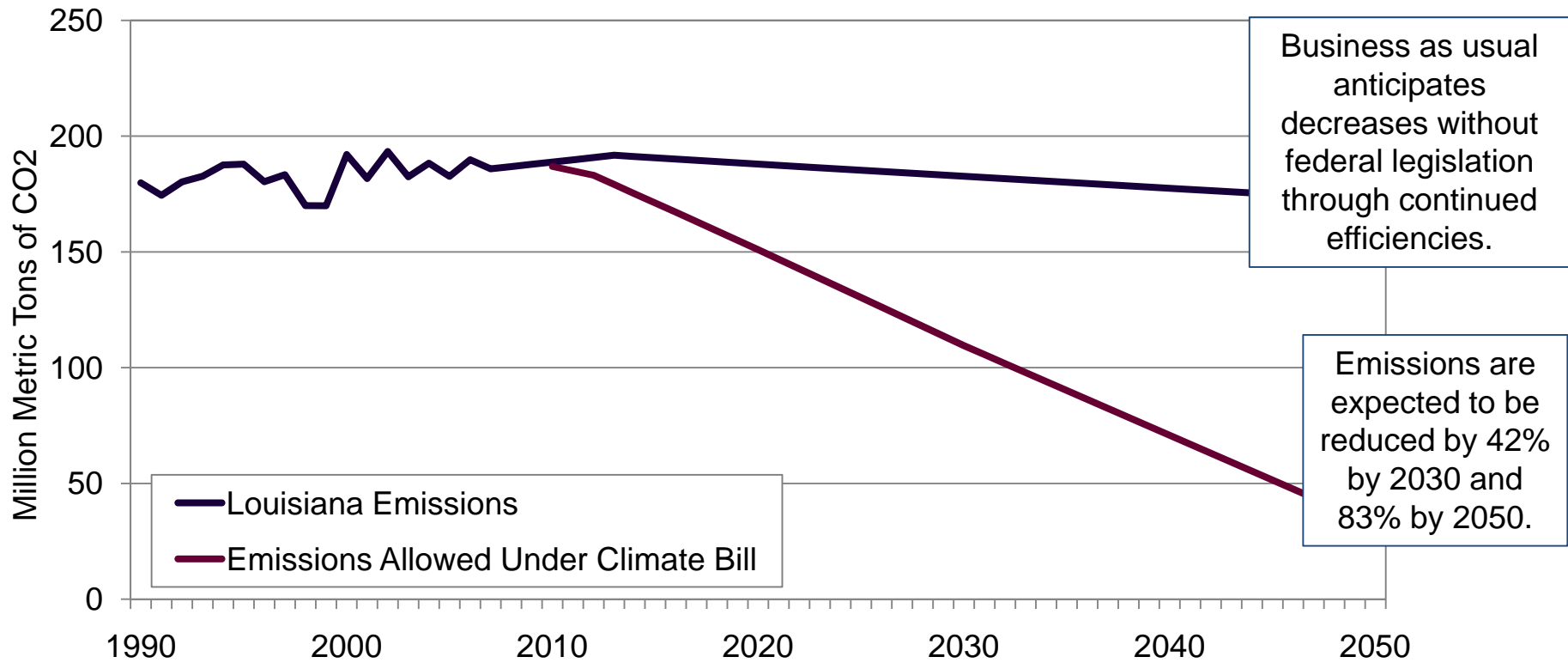


**Climate Change and Clean Energy**

<b>Method</b>	<b>Description</b>	<b>Challenges</b>
Credits & Offsets	Initially allocated/auctioned credits and new offsets developed from mitigation projects	Efficiency of system (credits). Monitoring and verification of offsets.
Capital Investment	Carbon capture and storage	Expensive, uncertain, large supporting infrastructure and institutional support.
Fuel Switching	Nuclear, IGCC, natural gas	Expensive, longer-term investments, questionable development realization (cost, scope, reliability).
Renewables	Biomass, wind, solar, geothermal, hydro	Expensive, varying reliability, uncertainty (cost recovery)
Efficiency Improvements	Automotive Appliances Building measures Demand-Side Mgt. Demand Response	Good short run opportunities, significant, but limited in scope. Also require investment to reach pay-back.

**Historic and Projected Louisiana Emissions**

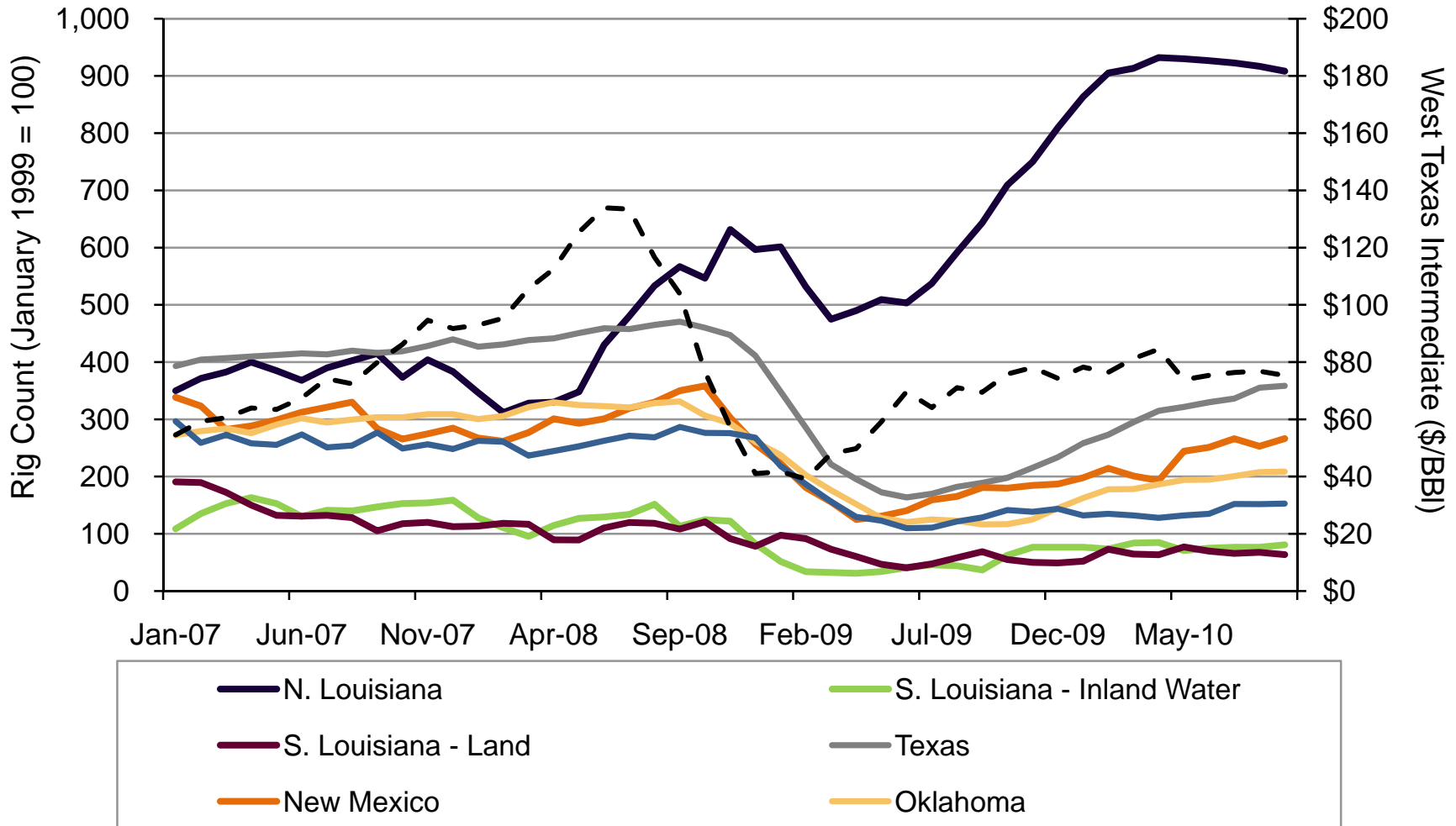
**Climate change regulation/legislation would require a considerable reduction in emissions over the next 30 years.**



## **Energy Opportunities**

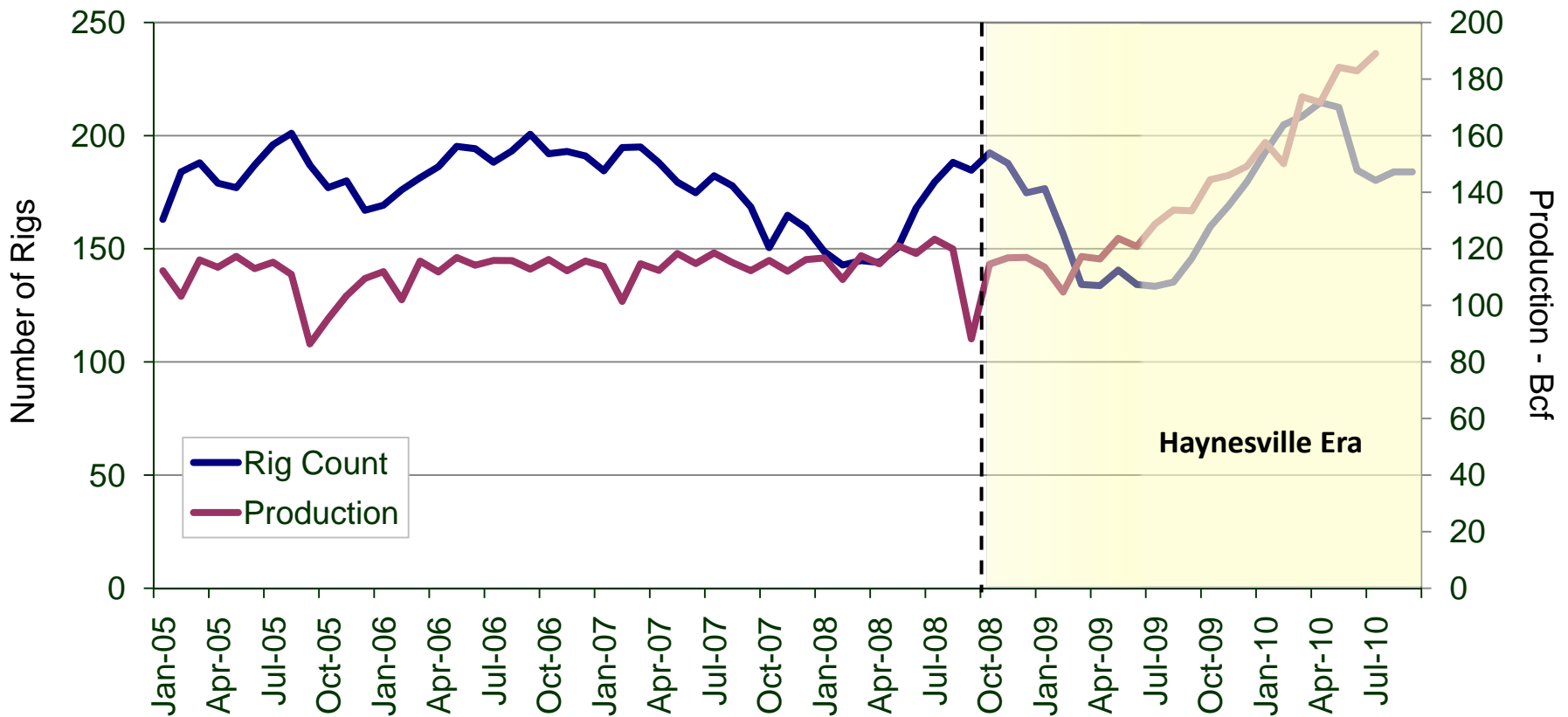
**Rig Count and Crude Oil Price, (Each State Measured Relative to 1999 Activity)**

**North Louisiana has been the shining opportunity in the industry during the course of the recent price downturn/correction.**

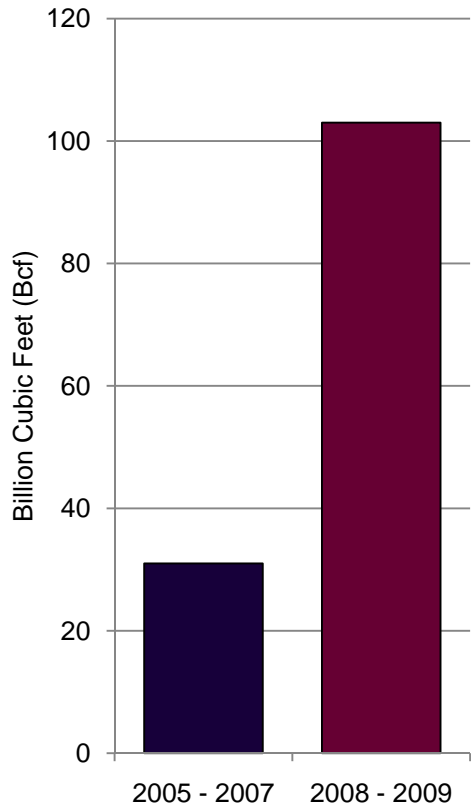


Louisiana Rig Count and Natural Gas Production

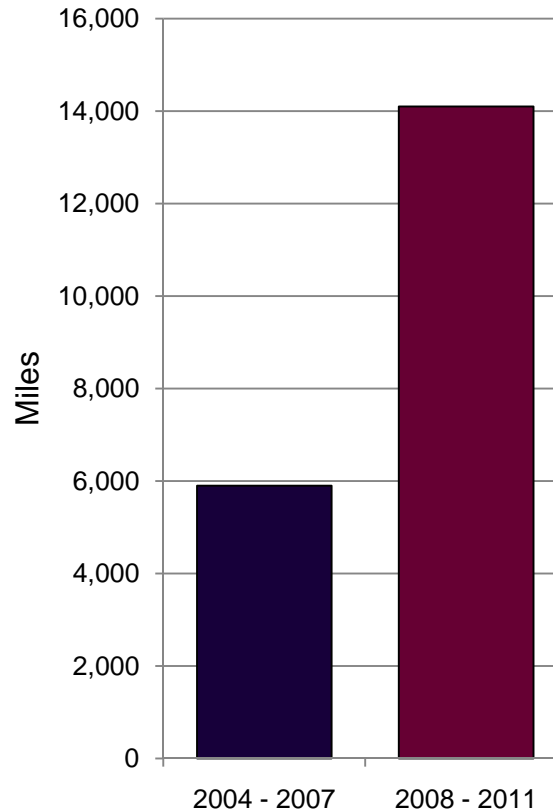
Louisiana natural gas production was relatively constant until late 2008. Production became explosive given new production from Haynesville shale parishes.



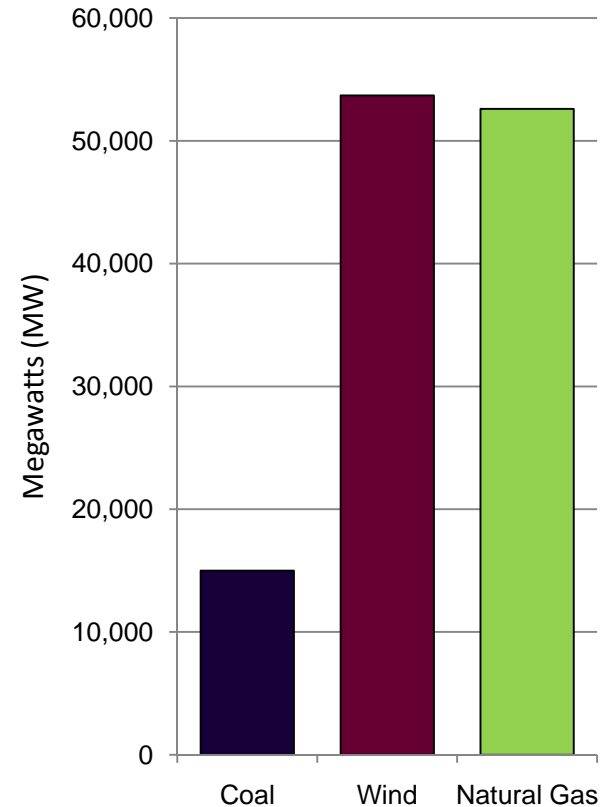
**Market Recognizes Future Role of Natural Gas**



**New Natural Gas Storage Capacity**

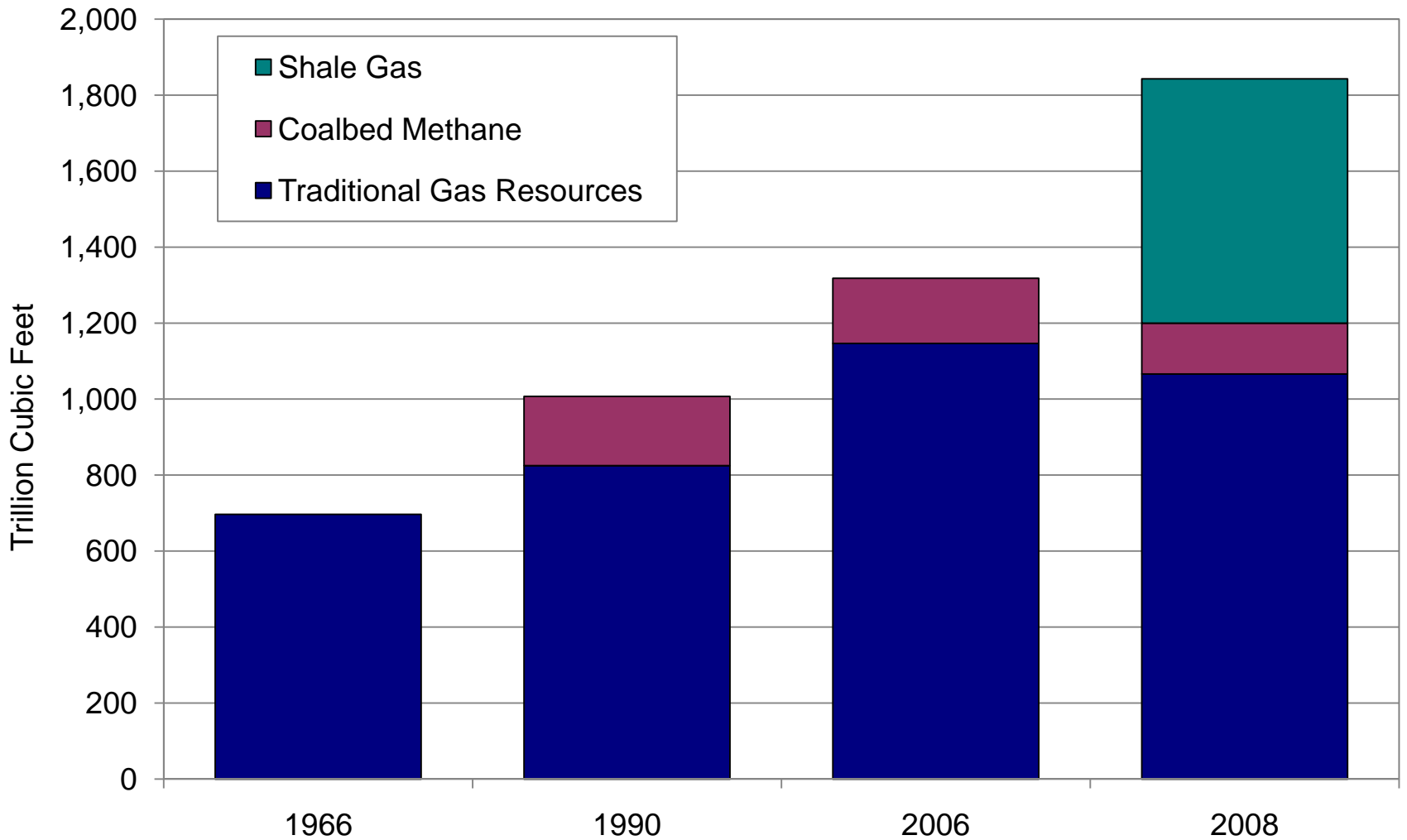


**New Natural Gas Pipelines**



**New Capacity for Electricity Generation**

Estimated Size of U.S. Natural Gas Resources



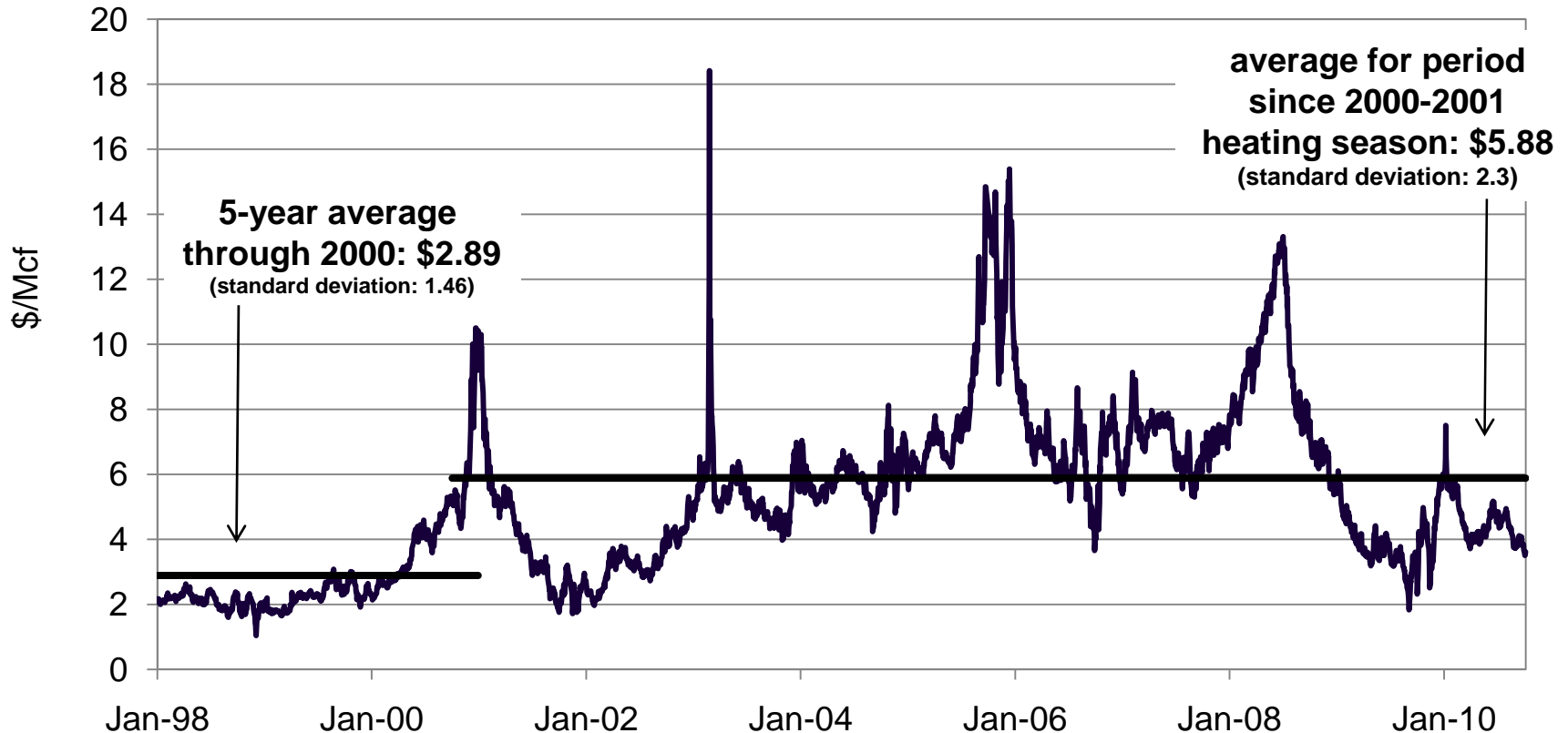
## **Challenges and Diversity**



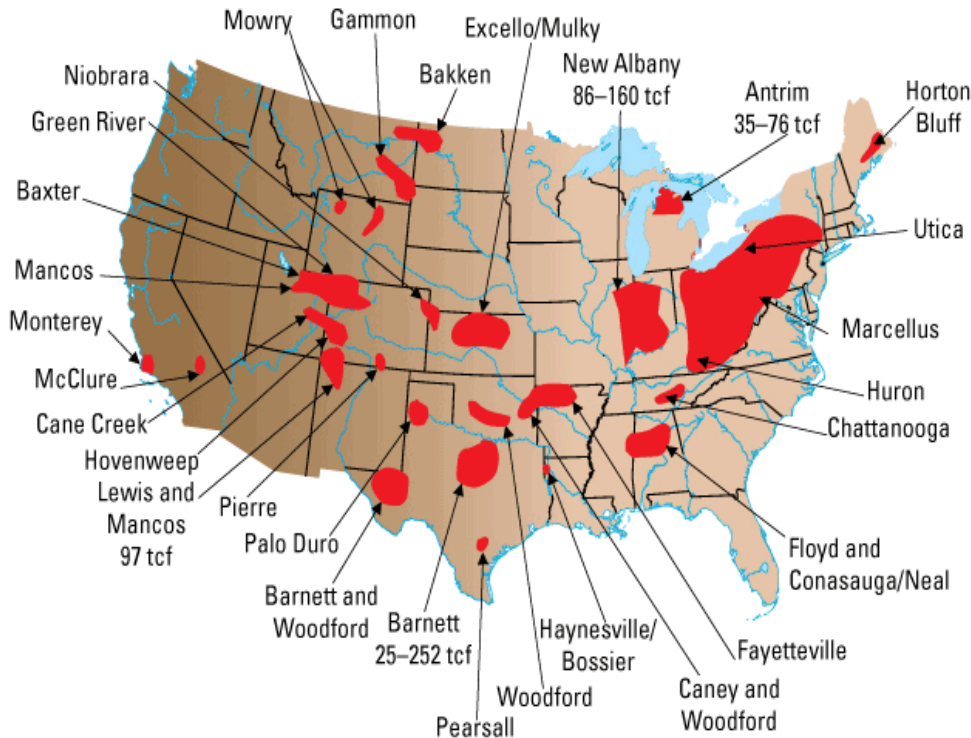
**Henry Hub Prices (1998 to Current)**

**While price volatility is always an issue for energy investments, the sheer free-fall of gas prices from their July, 2008 high has been staggering.**

**Survival in a low-gas price environment is one of the single biggest challenges for shale producers throughout the U.S.**



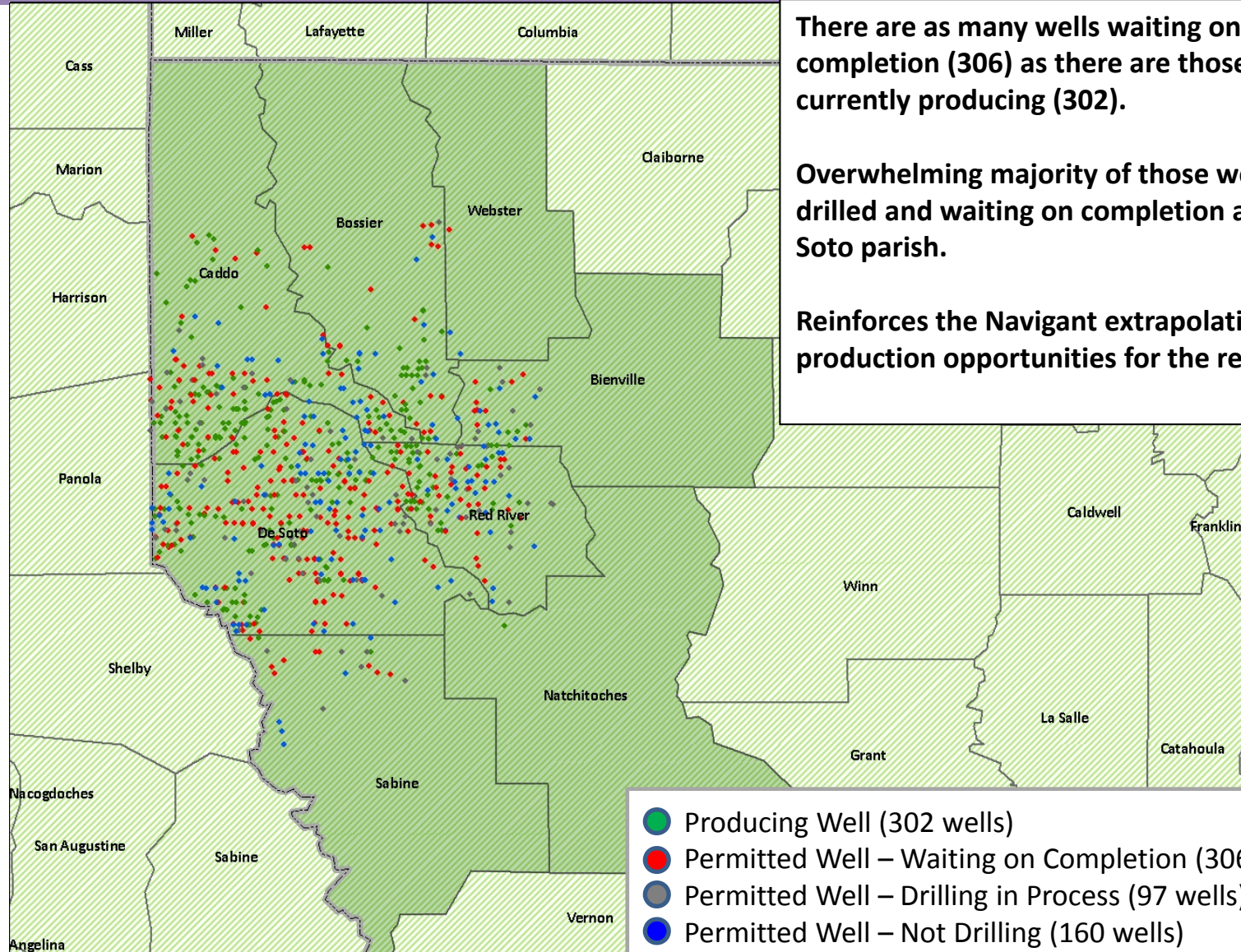
**Forward-Looking Challenges**



- **Analysis of shale resources over the past three years has focused very heavily on identifying and characterizing the resource.**
- **Significant emphasis on understanding its magnitude.**
- **This has been an important contribution since many producers now have a good appreciation for the opportunities in shale development.**

- **Other stakeholder groups, such as investors, policy makers, regulators, interest groups and the general public are also starting to understand and appreciate the importance of these resources.**
- **Challenge over the next three to five years will be in understanding the winners and losers within the various plays.**
- **Can be as much variation in production within some of these plays and between them.**

**Distribution and Status of Haynesville Wells**



**There are as many wells waiting on completion (306) as there are those currently producing (302).**

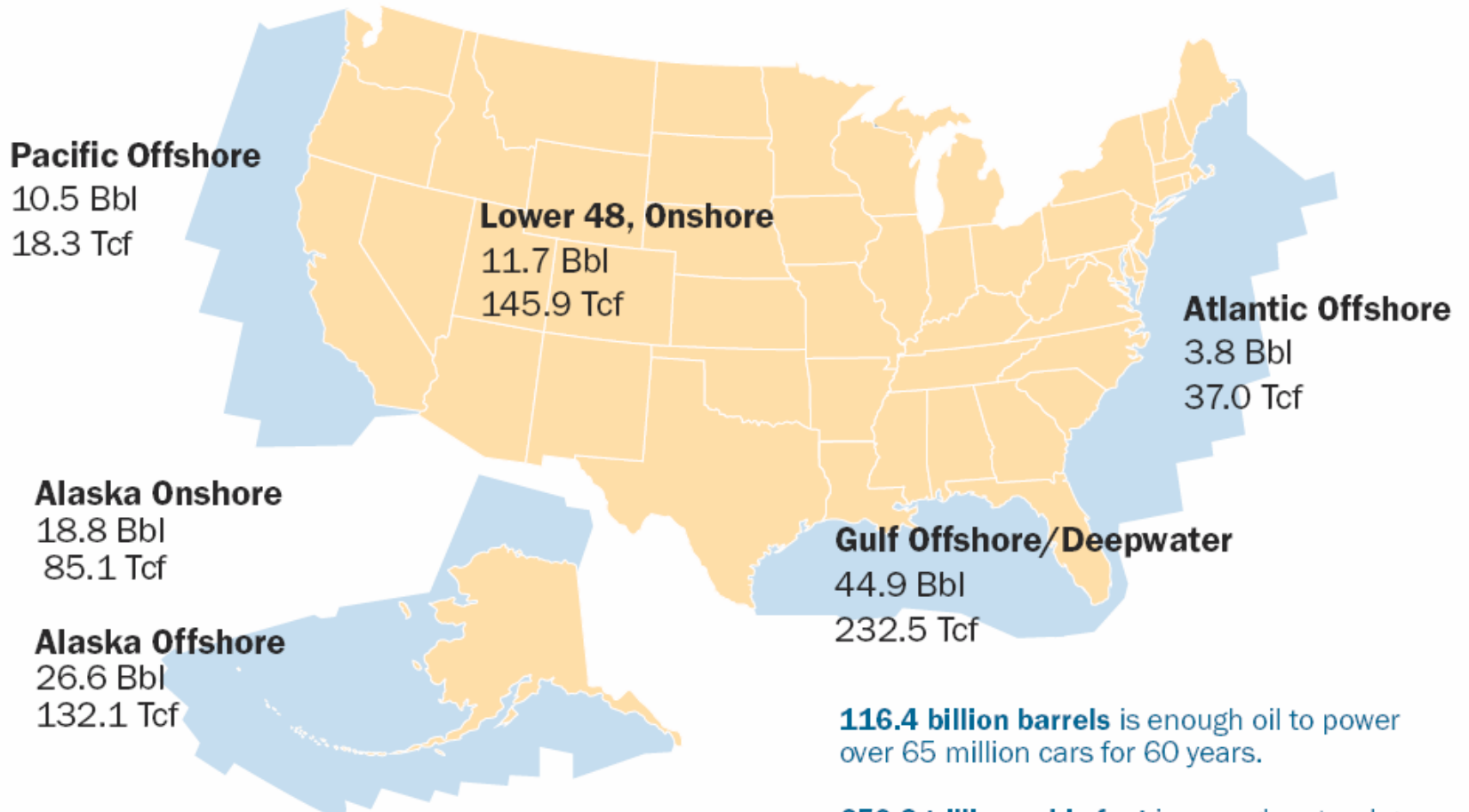
**Overwhelming majority of those wells drilled and waiting on completion are in De Soto parish.**

**Reinforces the Navigant extrapolation of production opportunities for the region.**

- Producing Well (302 wells)
- Permitted Well – Waiting on Completion (306 wells)
- Permitted Well – Drilling in Process (97 wells)
- Permitted Well – Not Drilling (160 wells)

**U.S. Crude Oil and Natural Gas Resources**  
 (Undiscovered, Technically Recoverable Federal Resources)

**Continued debate on where and how resources should be developed.  
 Clearly, the resource base is there.**



**116.4 billion barrels** is enough oil to power over 65 million cars for 60 years.

**650.9 trillion cubic feet** is enough natural gas to heat 60 million homes for 160 years.

\*Figures may not add exactly to total due to rounding.  
 Source: MMS, BLM, and API calculations.



**GOM Offshore Oil and Gas – Economic Overview**



- In 2008, over **420 MMBbls** of oil and **2.4 Tcf** of natural gas were produced in the Gulf of Mexico OCS.
- Employs over **200,000 workers** in the Gulf Coast region. Over **100,000 workers** associated with offshore activities.
- Contributes almost **\$100 billion** to Gulf Coast states' GDP.
- GOM accounts for **30** percent of total U.S. crude oil production.
- Deepwater areas produced **76** percent of all GOM crude oil production in 2007.

Note: Gulf Coast states include Louisiana, Texas, Mississippi and Alabama

Source: Bureau of Economic Analysis, US Department of Commerce; Energy Information Administration, U.S. Department of Energy; and Baker Hughes.

**GOM Offshore Oil and Gas – Deepwater Exploration Trends**

**Over the past 20 years, the water depth barrier has moved from 5,300 feet to over 9,500 feet.**

Project/Prospect	Area/Block	Water Depth (feet)	Discovery Year	Project/Prospect	Area/Block	Water Depth (feet)	Discovery Year
Mensa	MC 731	5,313	1986	Chinook <sup>3</sup>	WR 469	8,831	2003
Kepler	MC 383	5,741	1987	Atlas <sup>2</sup>	LL 50	8,944	2003
Coulomb	MC 657	7,558	1987	GC767	GC 767	5,116	2004
Fourier	MC 522	6,895	1989	Ticonderoga	GC 768	5,259	2004
King	MC 84	5,303	1993	Goldfinger	MC 771	5,413	2004
King's Peak	DC 133	6,541	1993	Thunder Hawk	MC 734	5,714	2004
Ariel	MC 429	6,134	1995	La Femme	MC 427	5,782	2004
Neptune (AT)	AT 575	6,203	1995	Jack <sup>3</sup>	WR 759	6,962	2004
BAHA <sup>3</sup>	AC 600	7,620	1996	San Jacinto	DC 618	7,805	2004
Anstey	MC 607	6,601	1997	Mondo Northwest	LL 2	8,362	2004
Atlantis	GC 743	6,612	1998	Atlas NW <sup>2</sup>	LL 5	8,807	2004
Rigel	MC 252	5,227	1999	Cheyenne <sup>2</sup>	LL 399	8,983	2004
Hom Mountain	MC 127	5,422	1999	Tiger <sup>3</sup>	AC 818	9,004	2004
Devil's Tower	MC 773	5,532	1999	Silvertip <sup>3</sup>	AC 815	9,226	2004
Thunder Horse	MC 778	6,082	1999	Tobago <sup>3</sup>	AC 859	9,627	2004
Aconcagua	MC 305	7,051	1999	Big Foot	WR 29	5,268	2005
Camden Hills	MC 348	7,206	1999	Q2	MC 961	7,926	2005
Thunder Horse North	MC 776	5,662	2000	Mondo NW Extension	LL 1	8,351	2005
Constitution	GC 680	5,001	2001	Jubilee Extension	LL 309	8,774	2005
Red Hawk	GB 877	5,329	2001	Stones <sup>3</sup>	WR 508	9,571	2005
Seventeen	MC 299	5,881	2001	Thunder Bird	MC 819	5,672	2006
Bass Lite	AT 426	6,623	2001	Kaskida <sup>3</sup>	KC 292	5,721	2006
Blind Faith	MC 696	6,952	2001	Thunder Ridge	MC 737	6,108	2006
Callisto	MC 876	7,790	2001	Mission Deep	GC 955	7,068	2006
Merganser <sup>2</sup>	AT 37	7,939	2001	Gotcha <sup>3</sup>	AC 856	7,714	2006
Trident <sup>3</sup>	AC 903	9,721	2001	Isabela	MC 562	6,535	2007
Great White <sup>3</sup>	AC 857	8,119	2002	Julia <sup>3</sup>	WR 627	7,087	2007
Cascade <sup>3</sup>	WR 206	8,152	2002	Dalmatian	DC 48	5,876	2008
Vortex <sup>2</sup>	AT 261	8,344	2002	Freedom	MC 948	6,095	2008
St. Malo <sup>3</sup>	WR 678	6,991	2003	Tortuga	MC 561	6,302	2008
Shiloh	DC 269	7,509	2003	Hal <sup>3</sup>	WR 848	7,657	2008
Spiderman <sup>2</sup>	DC 621	8,082	2003	Diamond	LL 370	9,975	2008
Jubilee <sup>2</sup>	AT 349	8,778	2003				

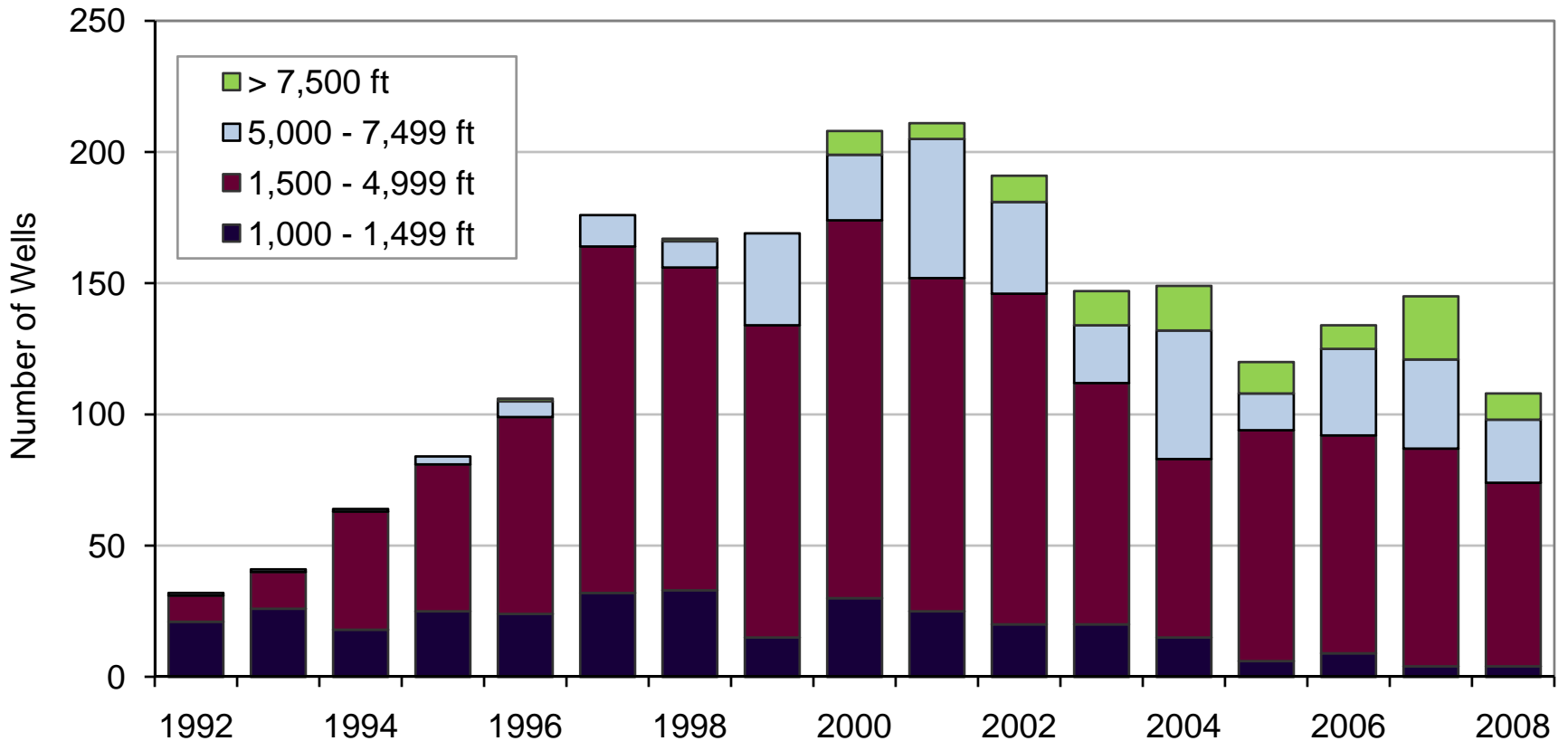
**GOM Offshore Oil and Gas – Deepwater Statistics and Considerations**



- **Over \$1.5 billion in surface structure and equipment needed to service deepwater wells.**
- **Drilling costs \$80 million to \$120 million per well.**
- **Drilling crews between 200 to 300 for large drilling project.**
- **Structures and wells are typically 100 miles to 200 miles from the coast.**
- **Water depths between 5,000 feet to 8,500 feet.**
- **Drilling depths of 15,000 feet to 28,000 feet (lower tertiary).**

GOM OCS Deepwater Wells

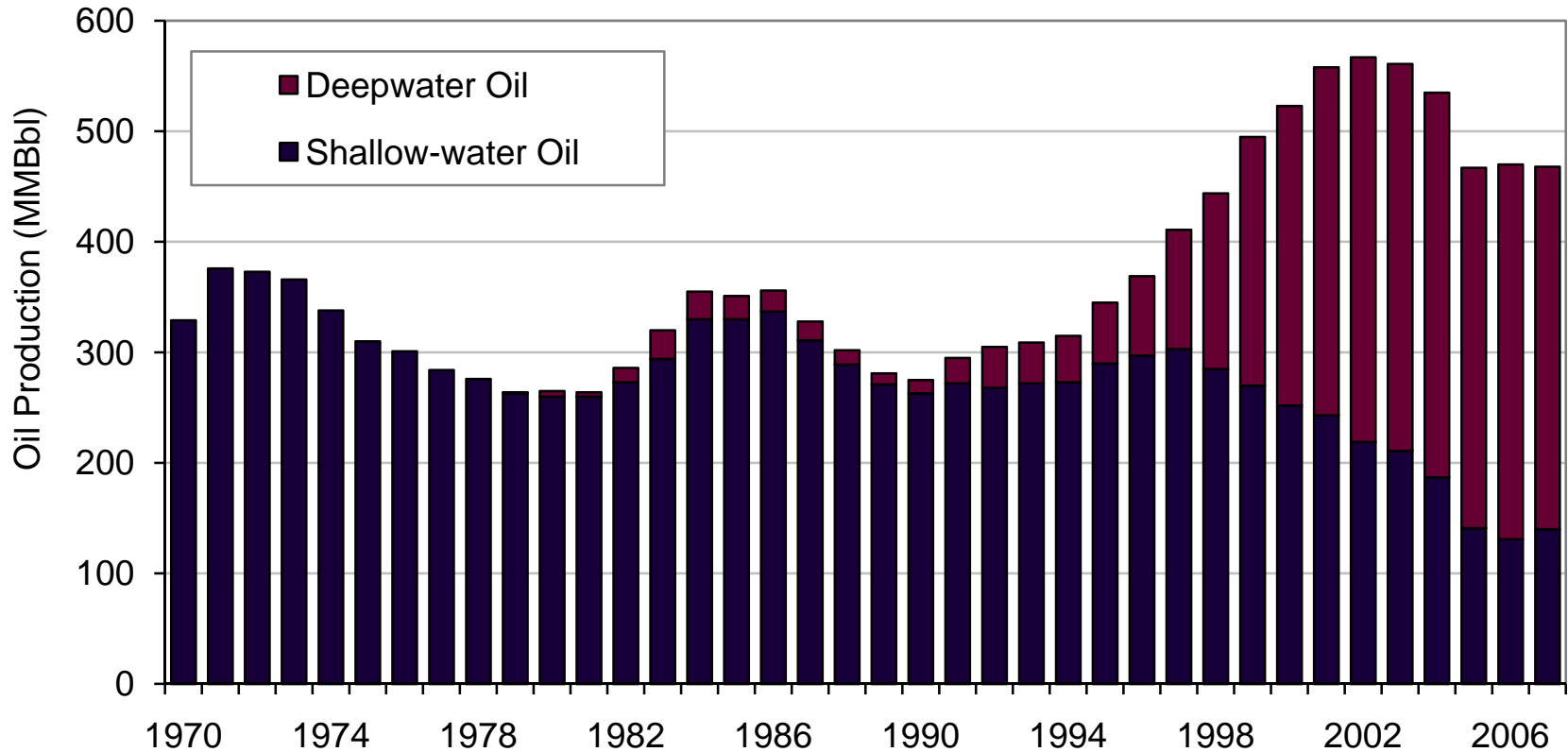
Active deepwater wells are down relative to the earlier part of the decade, but still make considerable contributions to OCS production levels.





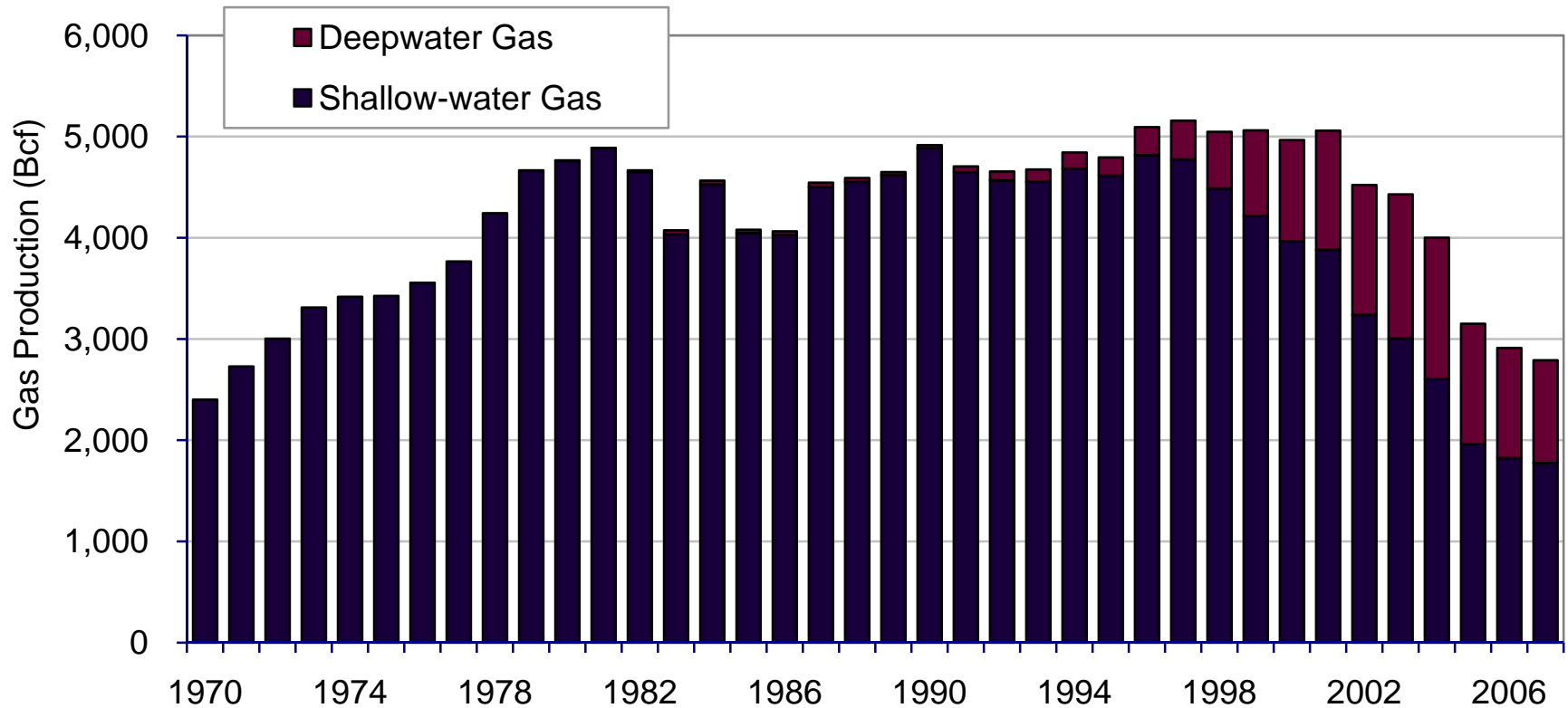
GOM OCS Deepwater Crude Oil Production

The significant increase in deepwater crude oil production has been a major new source of domestic crude oil supply.



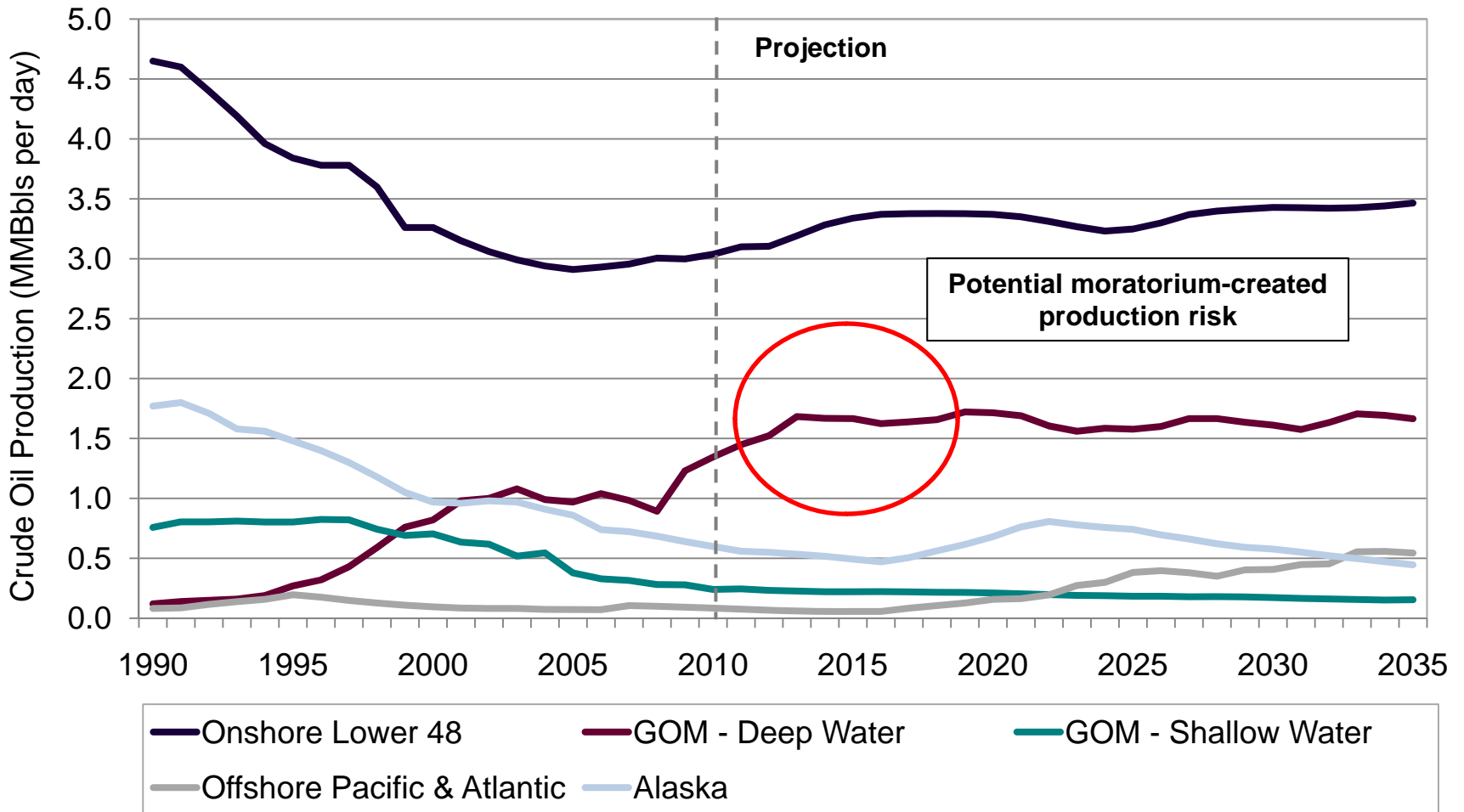
GOM OCS Deepwater Natural Gas Production

Deepwater natural gas production has remained relative constant in recent years, despite the overall GOM gas production plummet in 2002.



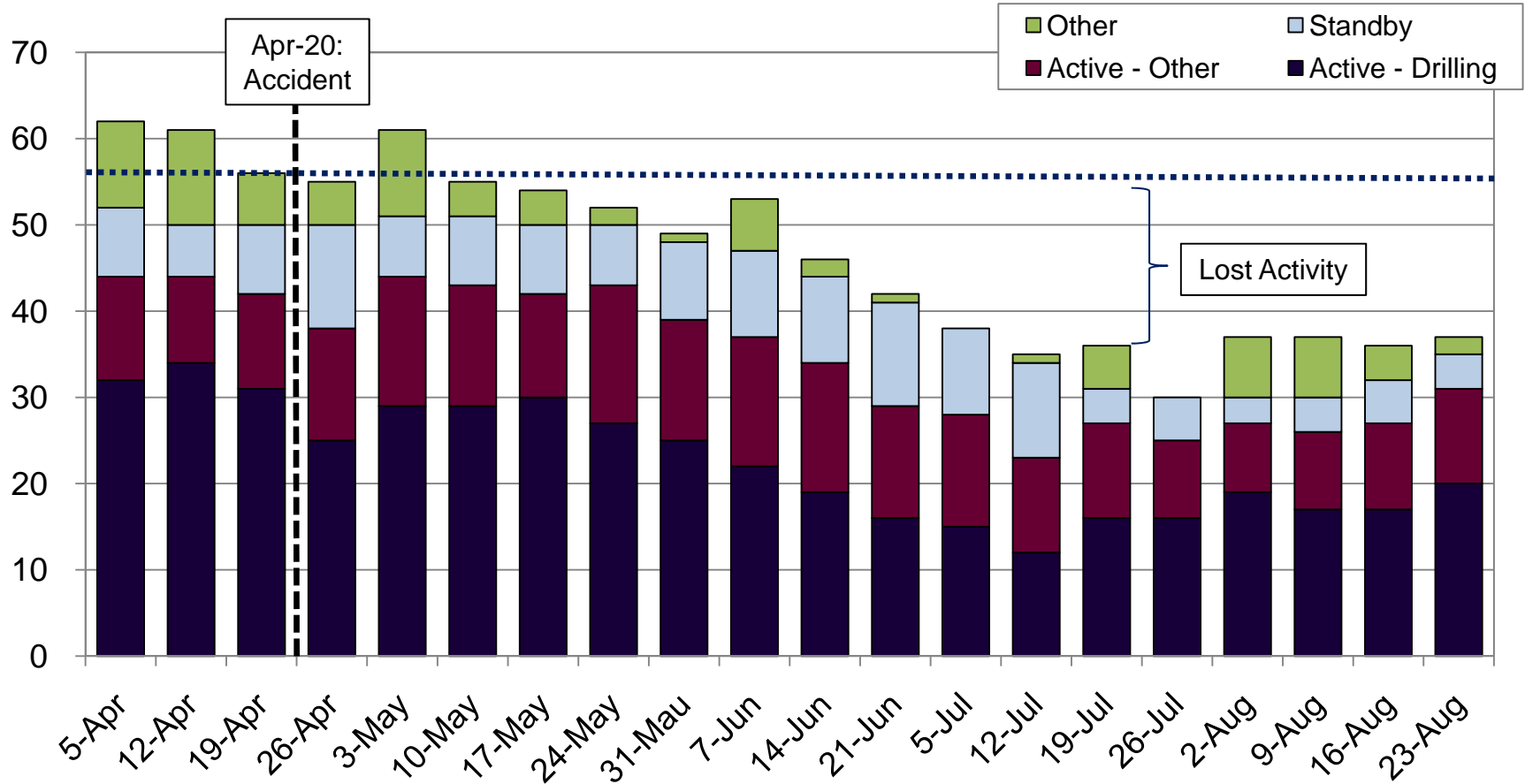
U.S. Crude Oil Production Forecast

Deepwater production is forecast to increase by almost 20 percent between 2010 and 2030.



Moratorium Impacted Rigs

Total pre-spill shallow-water activity currently down by about 31 percent.



Note:

“Active-Other” includes Completion; Recomplete; and Workover categories;

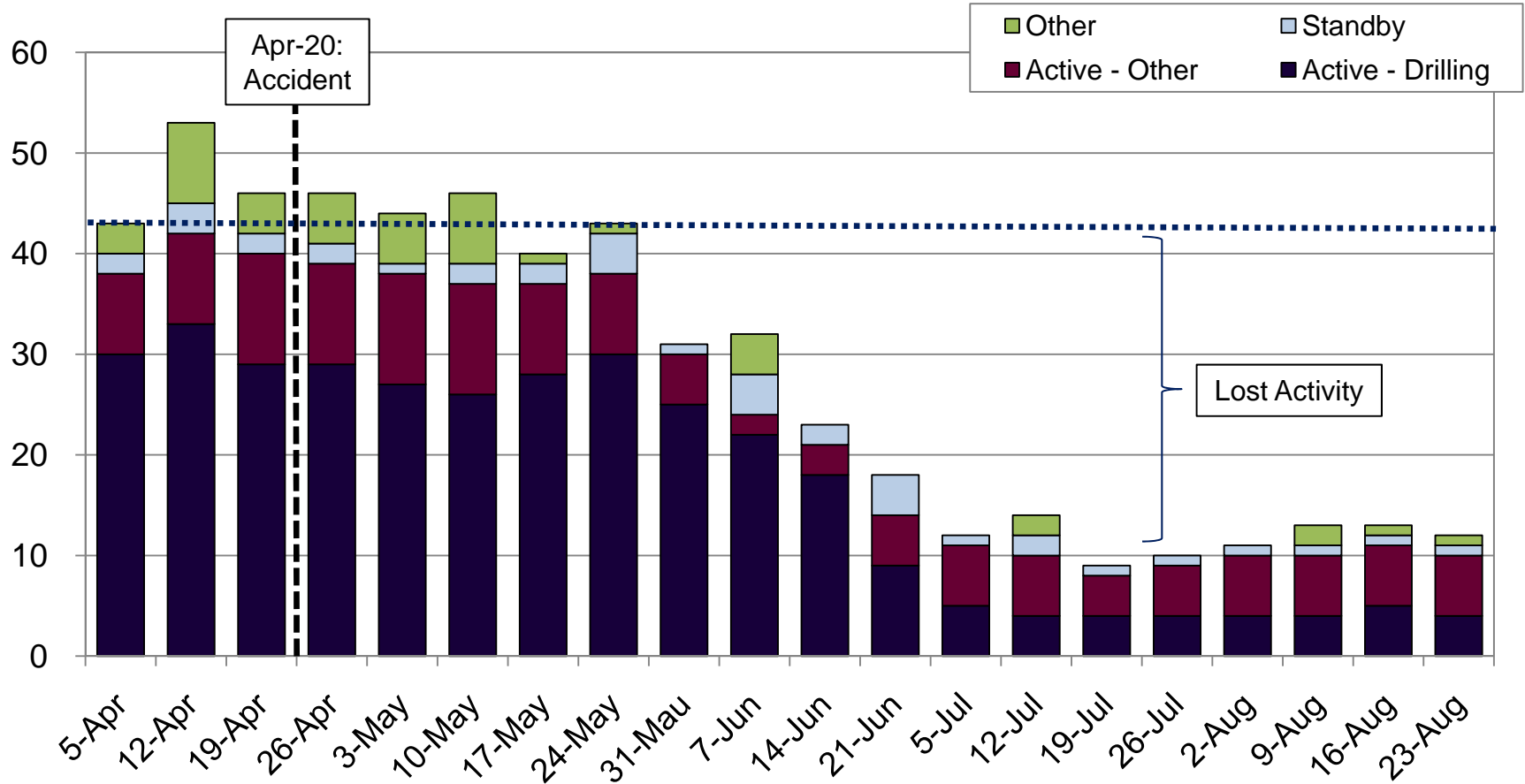
“Standby” includes Assigned; Circulate; Under Tow; Waiting on Location; Orders or Weather; Mobilizing, Monitoring and Standby categories.

“Other” includes Plug & Abandon; Run Casing; Rigging Up; Logging; Moving On and Other categories.

Source: RigData.

Moratorium Impacted Rigs

Total pre-spill deepwater activity currently down by about 72 percent.



Note:

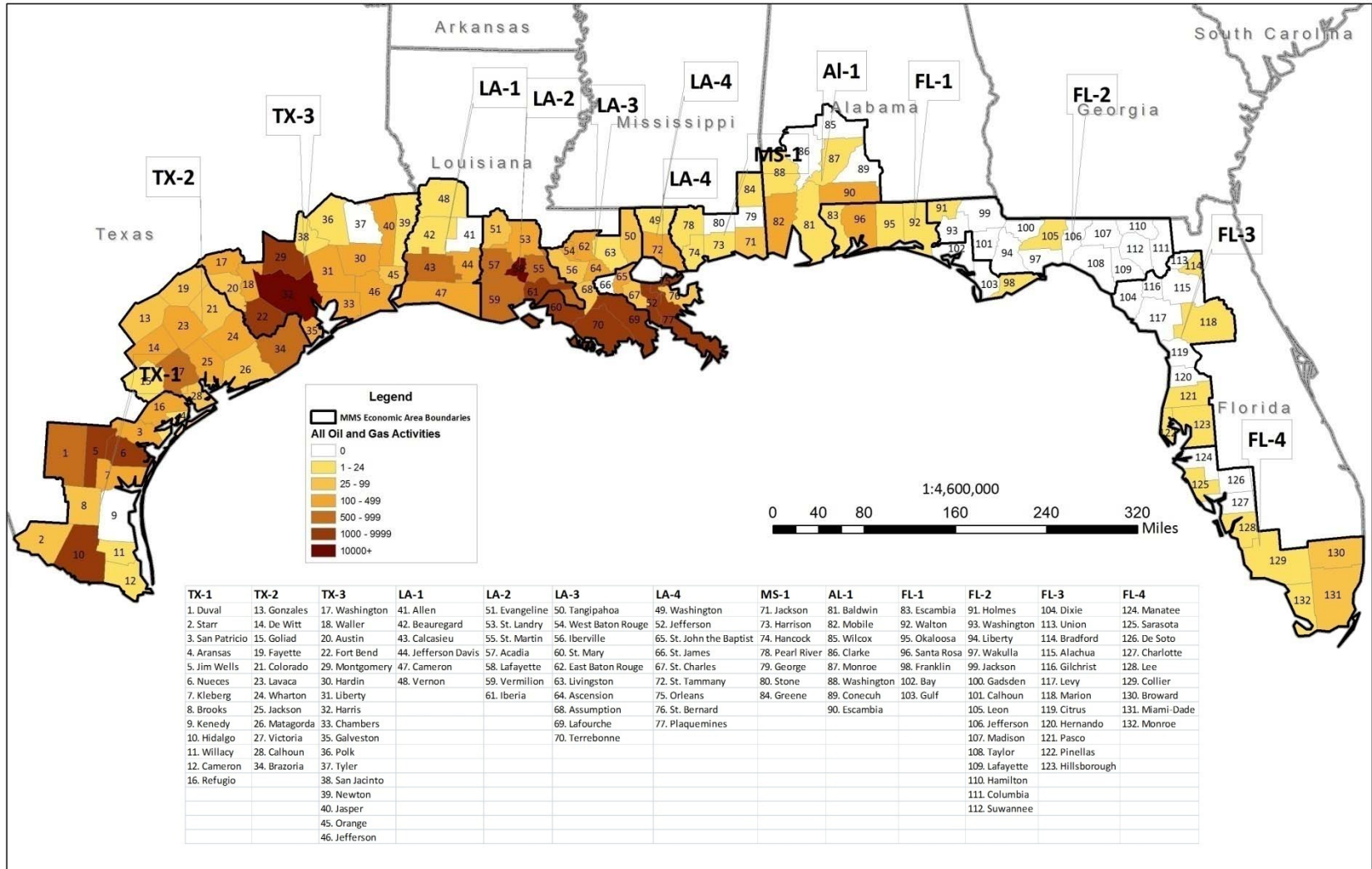
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Source: RigData.

Gulf Coast Oil and Gas Employment – All Activities



**Long Run Issues Associated with Spill**

**Some longer-run issues for Louisiana and Gulf Coast include:**

- **Intermediate-run implications (12-36 months) of current drilling moratoria and the decreased economic activity.**
- **The impacts that likely regulatory changes will have on GOM operations and costs that will impact investment profitability.**
- **Changes in operator liability requirements and the cost of insurance for GOM operations, particularly for independent operators that have a relatively large (in total) economic presence in Louisiana than the majors.**
- **New excise taxes, fees, surcharges, and the elimination of drilling incentives such as the Deepwater Royalty Relief Act and Energy Policy Act of 2005 EPA deep-gas drilling incentives (shallow water, well depths in excess of 20,000 feet).**
- **Impacts on opening the Eastern GOM and elimination of potential economic opportunities for Louisiana service ports (Venice, Fourchon) and LA-based service companies.**

## Conclusions



**Take-Away Points**

- **Understatement to note shale is a game changer – the large unknowns are to what extent, and how far, these opportunities can spread – particularly abroad. LNG will always provide discipline to the market (margin cost of importing can be very low).**
- **Existing opportunities (Rockies, Alaska, deepwater) are still there and new opportunities (frontier areas, deep drilling) continue to materialize (i.e., substitutes and alternatives). However, Deepwater Horizon accident likely to keep these opportunities from materializing anytime soon.**
- **Demand (recovery) big unknown at this point. New technologies likely to have significant and unknown impacts on markets.**
- **Policy still has an impact, several initiatives that could unwind resource gains. Opportunities for big gains, big contractions.**

Questions, Comments and Discussion

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