



# Natural Gas

Smarter Power Today.

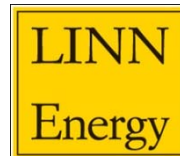
Perspectives on the Future of Regulatory Policy  
Illinois State University

Springfield, IL  
October 25, 2012



# ANGA Members

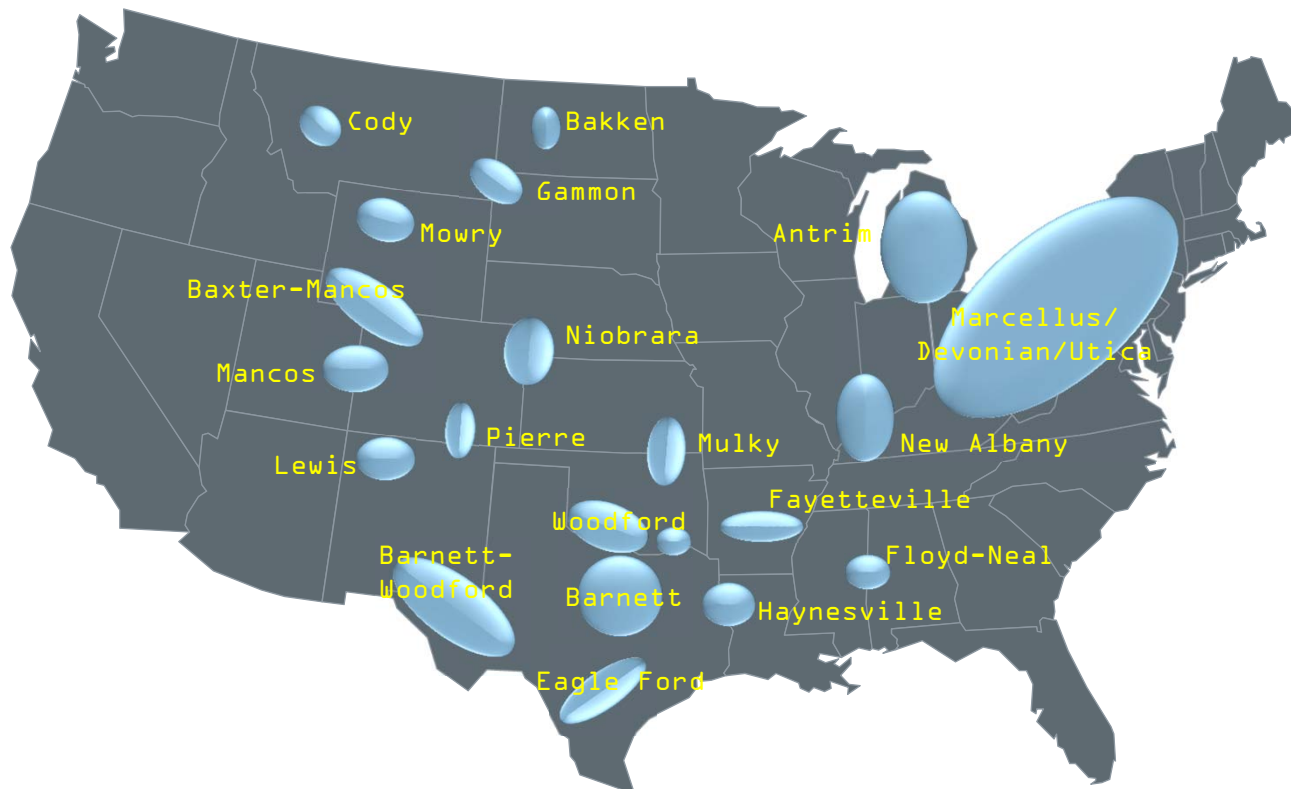
---





**ABUNDANCE &  
PRICE STABILITY**

# The Shale Gas Revolution



EIA: 2012

**542** TCF shale

**2,203** TCF total

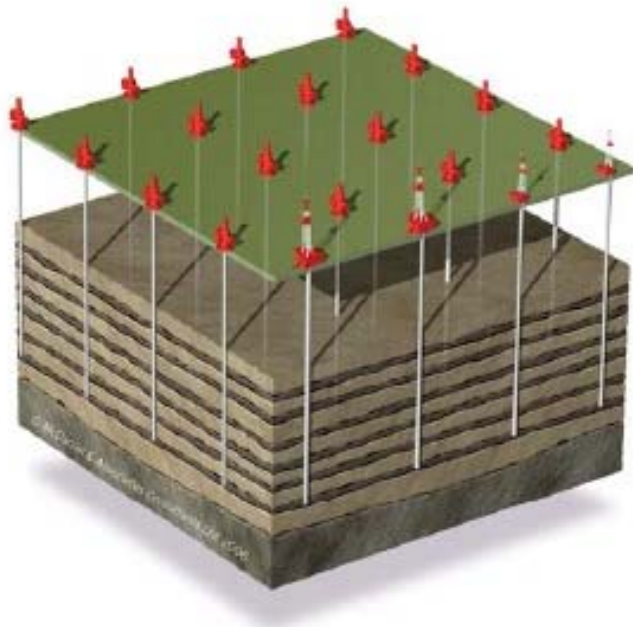
**38% INCREASE**  
in just four years

Source: EIA Annual Energy Outlook, 2008 to 2012

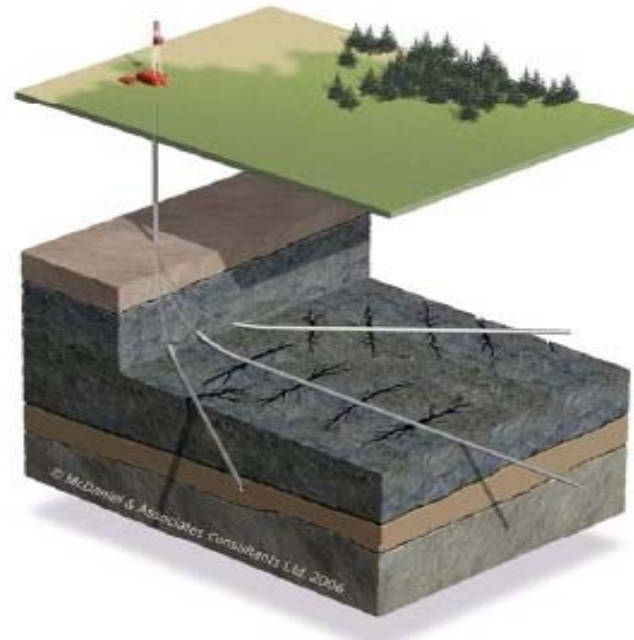


# Horizontal Drilling

---



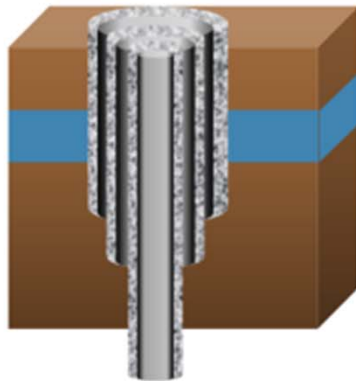
Traditional Wells



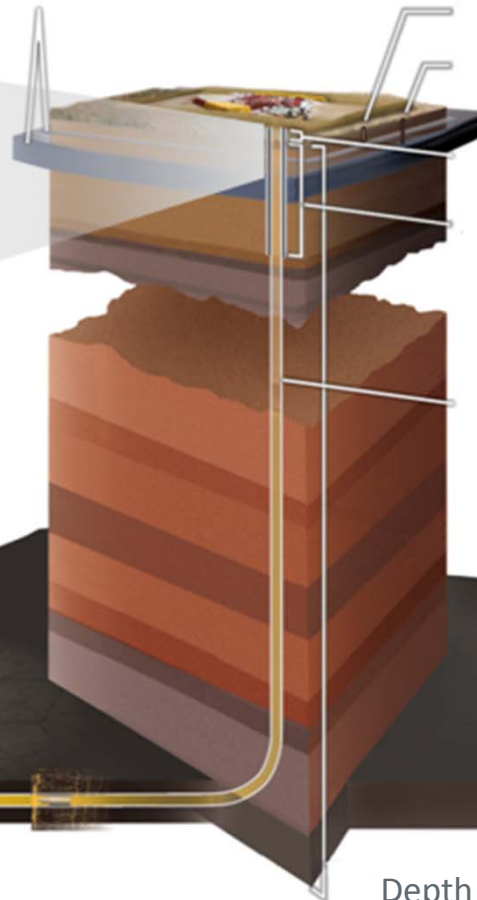
Horizontal Drilling

# Hydraulic Fracturing

Multiple protective layers extend from surface to below aquifers.



Groundwater aquifers



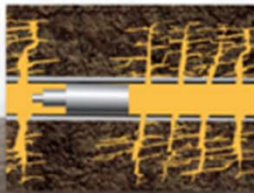
Private well, about 500 feet deep

Public well, about 1,000 feet deep

Several layers of steel tubes encased in cement protect groundwater supplies

Protective steel casing encased in cement extends to shale depth

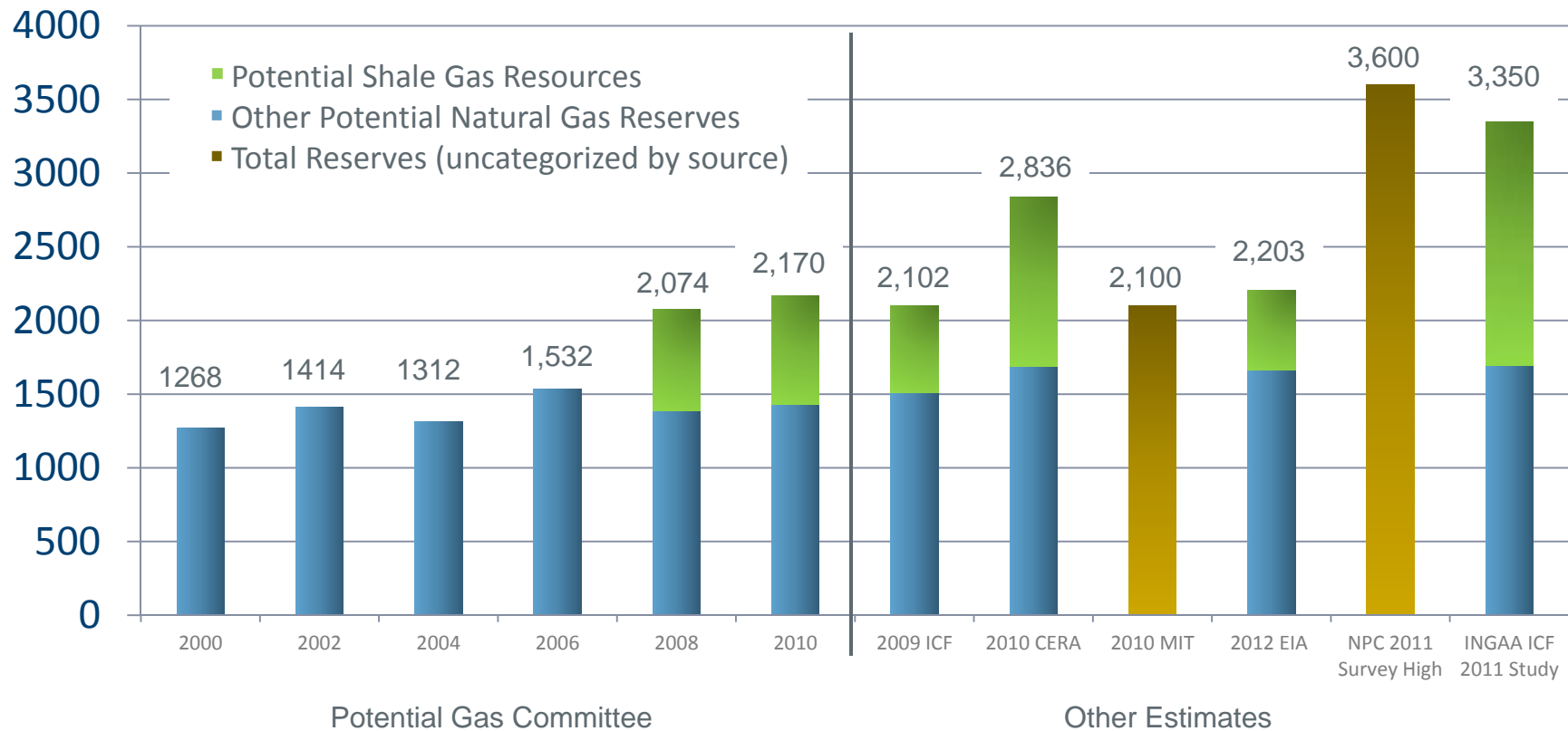
Shale Fractures



Depth from surface is typically more than a mile

# Abundant By Any Estimate

Estimates of U.S. Recoverable Natural Gas  
(TCF – trillion cubic feet)



Sources:

ICF: As reported in MIT Energy Initiative, 2010, The Future of Natural Gas, interim report ; Table 2.1

EIA: 2012 AEO, June 2012

PGC: Potential Gas Committee's Advance Summary and press release of its biennial assessment; see www.potentialgas.org

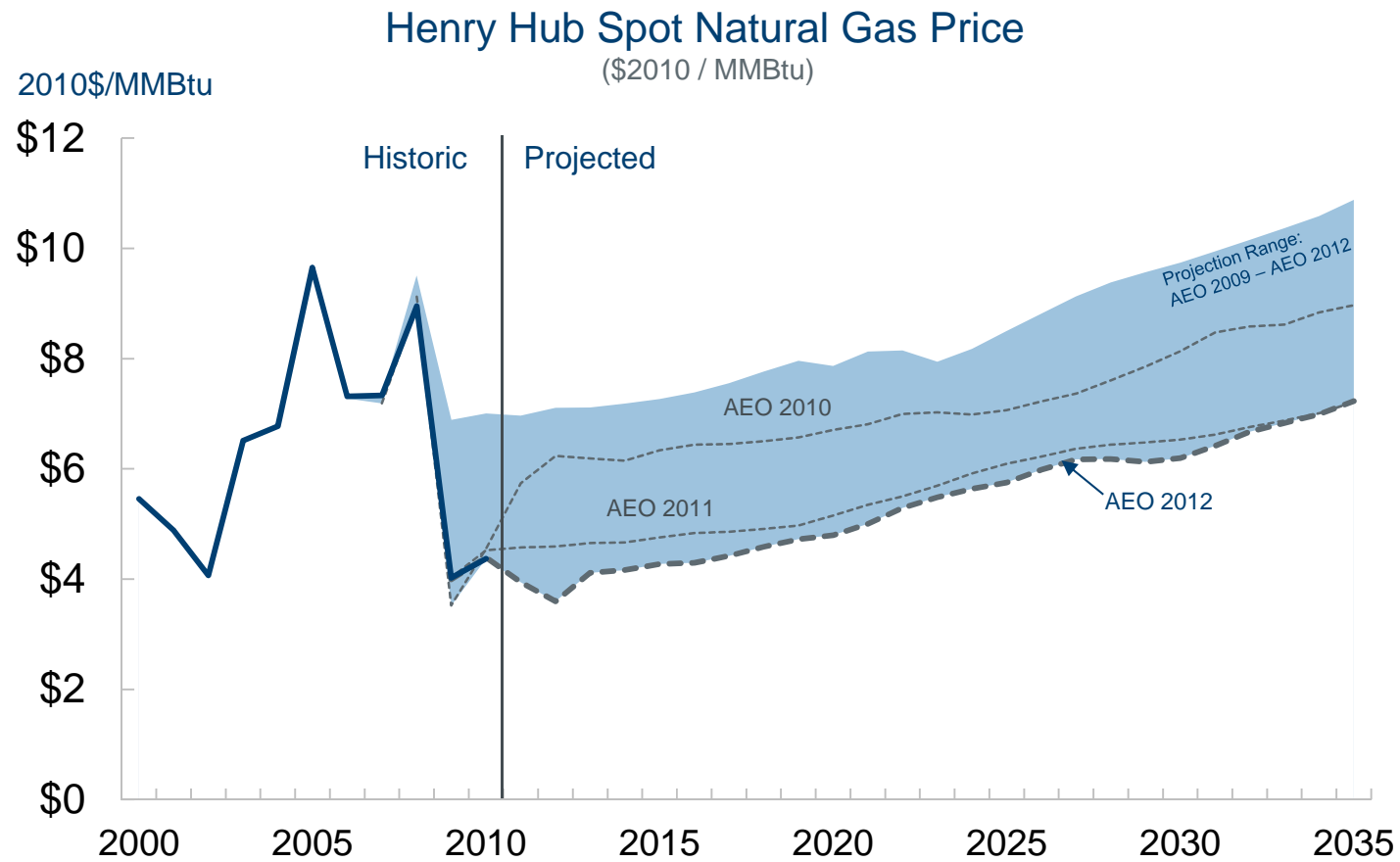
CERA: IHS CERA, 2010, Fueling North America's Energy Future: The Unconventional Natural Gas Revolution and the Carbon Agenda

MIT: MIT Energy Initiative, 2010, The Future of Natural Gas, interim report

NPC: Realizing the Potential of North America's Abundant Natural Gas and Oil Resources Johns Hopkins University ; Prudent Development Study 2011



# Long-Term Price Stability



Source: EIA Annual Energy Outlook: 2012 (Early Release), 2011, 2010, and 2009  
Henry Hub Spot prices (EIA reported actual prices included 2000 to 2010)



# Beneficial Long Term Joint Contracts

---

- The Public Utility Commission of Oregon recently approved a deal for Northwest Natural to invest approx \$250 million over the next five years in Encana's Jonah field in Wyoming. - *Encana website*
  - Will provide NW Natural with secure, reliable and economic supplies of natural gas for a portion of the needs of its 674,000 customers.
- The Public Utility Commission of Colorado approved a 10-year term natural gas purchase contract with Xcel Energy and Anadarko set to begin this year. - *Federal Coordinator Larry Persily report on the 2011 National Association of Regulatory Utility Commissioners meetings*
  - Cost to the utility will average about \$5.80 per thousand cubic feet over the 10 years.
- Oklahoma Corporation Commission unanimously approved rules supporting the long term contracting of natural gas supplies. – *Oklahoma Corporation Commission (March 26, 2012)*
  - Allows utilities to enter into contracts of up to five years using managerial discretion
  - Utility will be granted “look back” protection by the Commission if the utility is willing to undergo a robust request for proposal (“RFP”) process prior to executing the contract with approval by the Commission

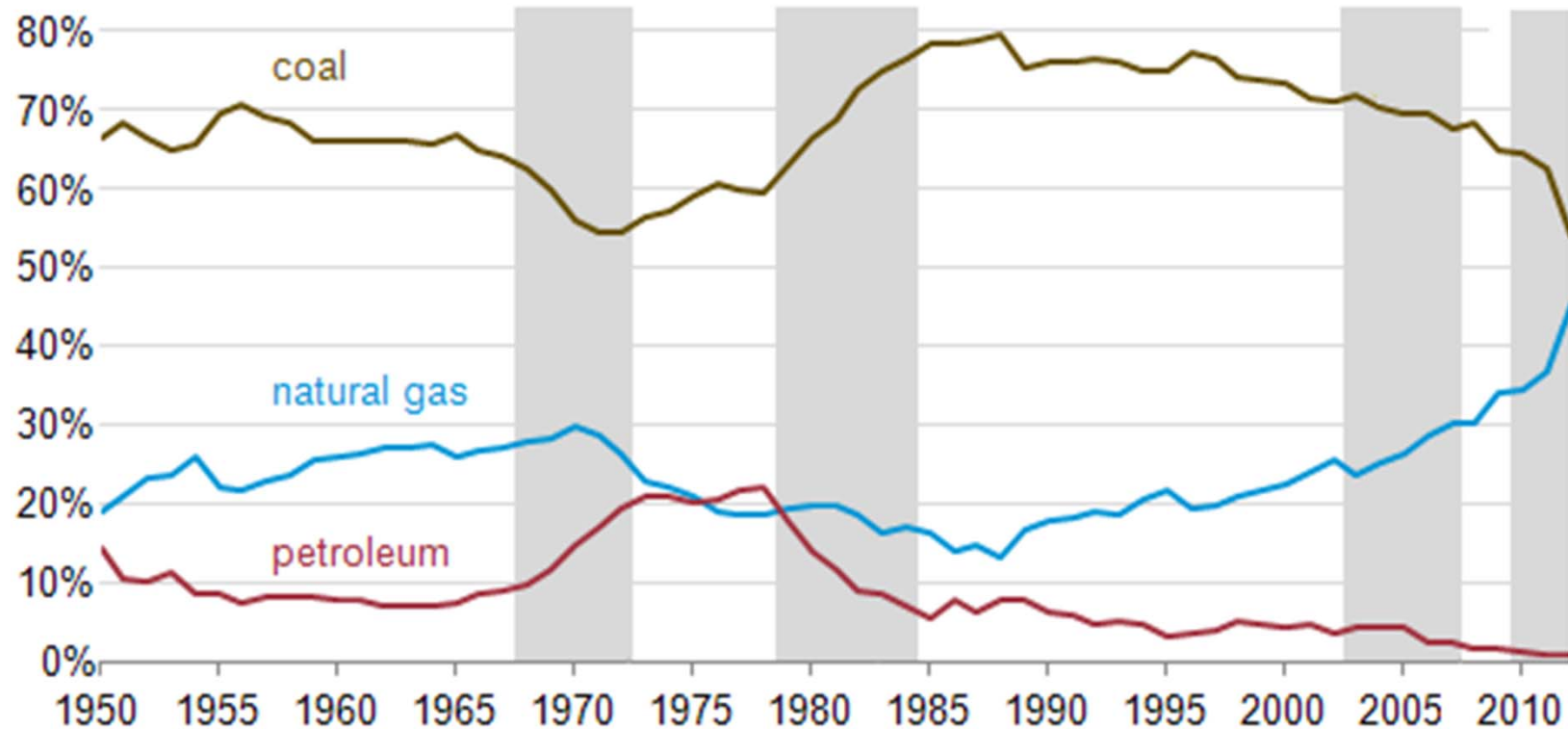


# POWER GENERATION

# Growth of Power Generation



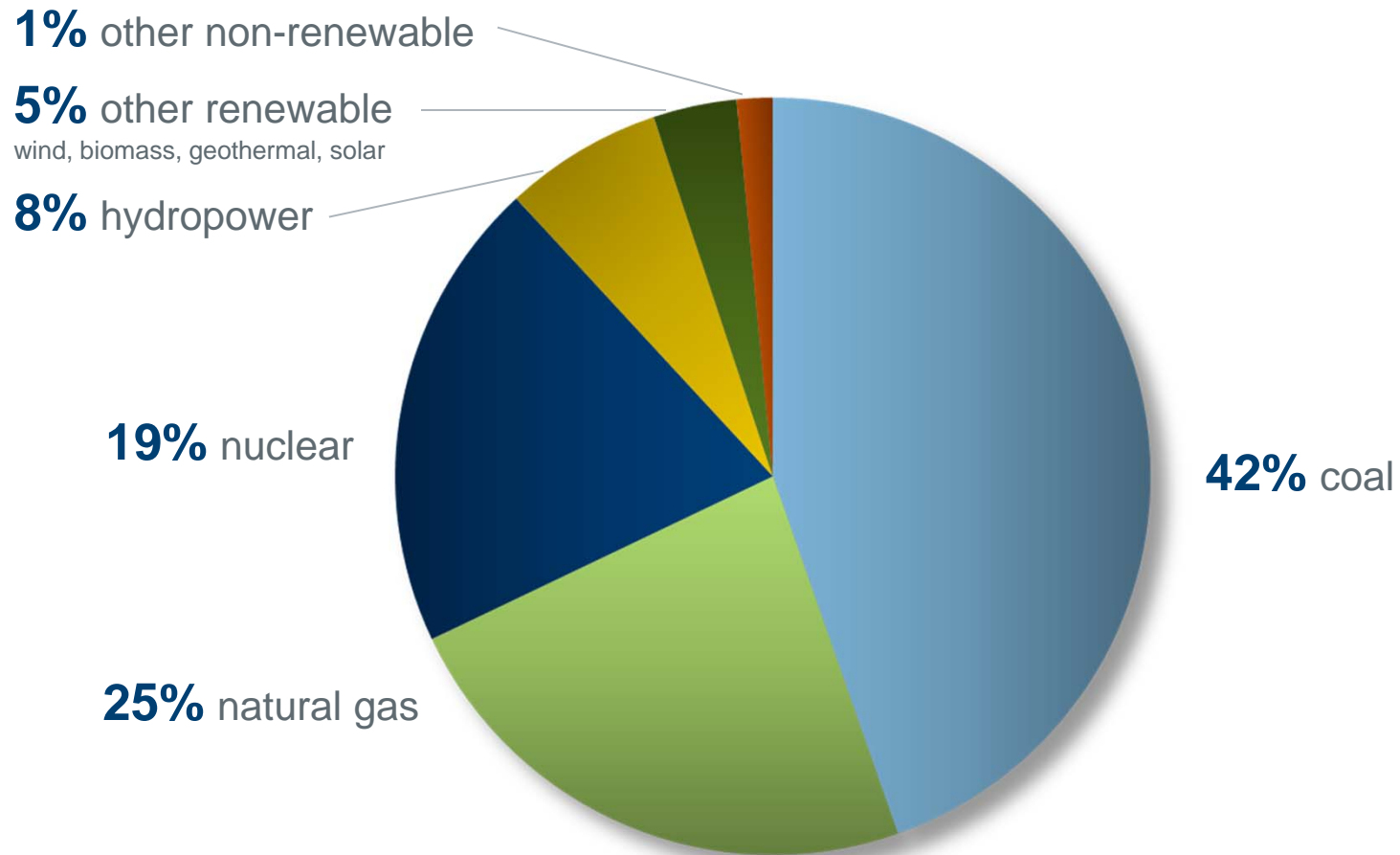
Annual share of fossil-fired electric power generation, 1950 - 2012\*



Source: EIA Annual Energy Review (2012);; Electric Power Monthly.

# Today's Electricity Mix

---



Source: EIA, Short Term Energy Outlook, August 2012

# 2017 Expected Costs

## Levelized Cost of New Generating Technologies – Entering Service in 2017

Plant Type	Capacity Factor (%)	Total System Levelized Cost (¢ per KWH)
Natural Gas – Combined Cycle	87	6.55
Natural Gas – Conventional	87	6.86
Natural Gas – Combined Cycle with CCS	87	9.28
Coal – Conventional	85	9.96
Coal – Advanced	85	11.22
Coal – Advanced with CCS	85	14.07
Wind – Onshore	34	9.68
Wind – Offshore	27	33.06
Solar – PV	25	15.69
Solar – Thermal	20	25.10
Biomass	83	12.02
Nuclear	90	11.27

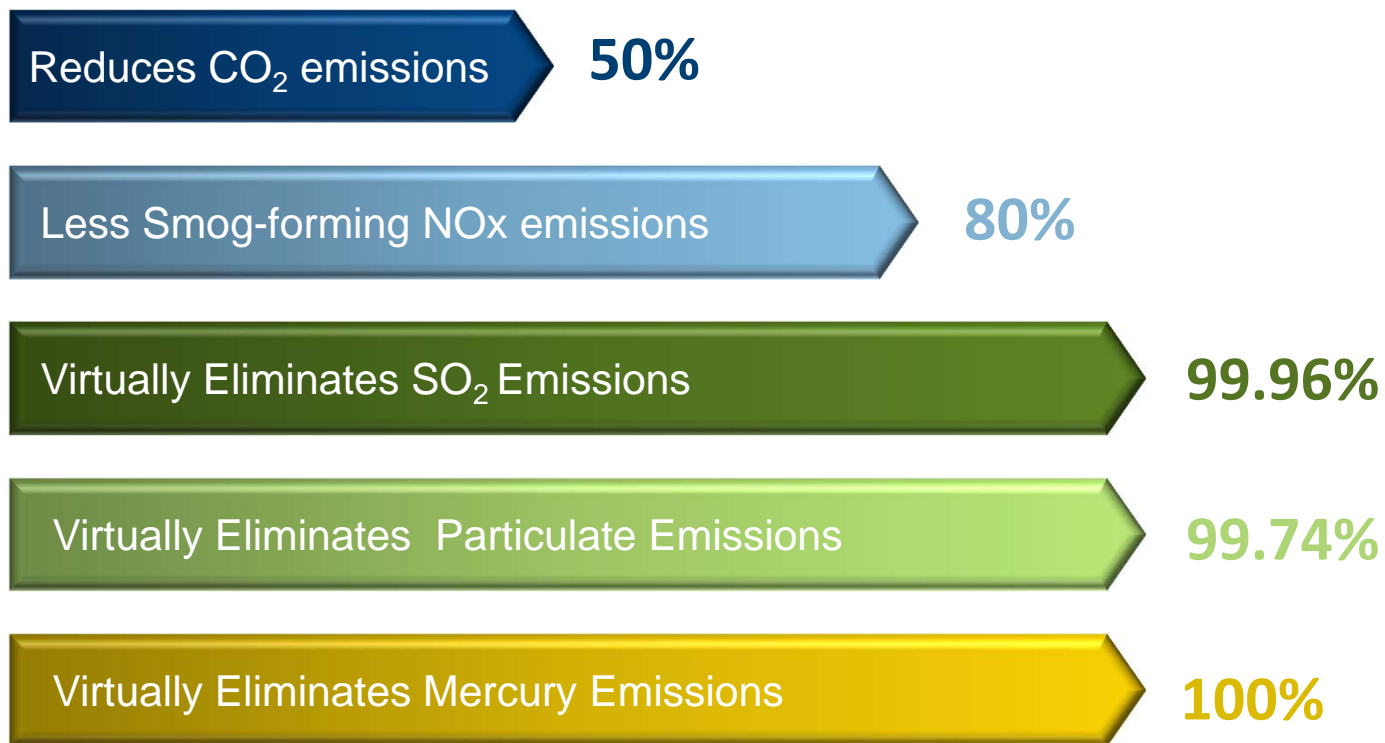
Source: Institute for Energy Research, using data from EIA Annual Energy Outlook 2012.  
All ¢/KWH in 2010 dollars.





# Cleaner For Power Generation

When used to generate electricity, natural gas burns cleaner than other fuel sources.



Source: U.S. EPA, eGRID 2000; EIA Natural Gas Issues and Trends



# Natural Gas Helps Lower CO2 Emissions

---

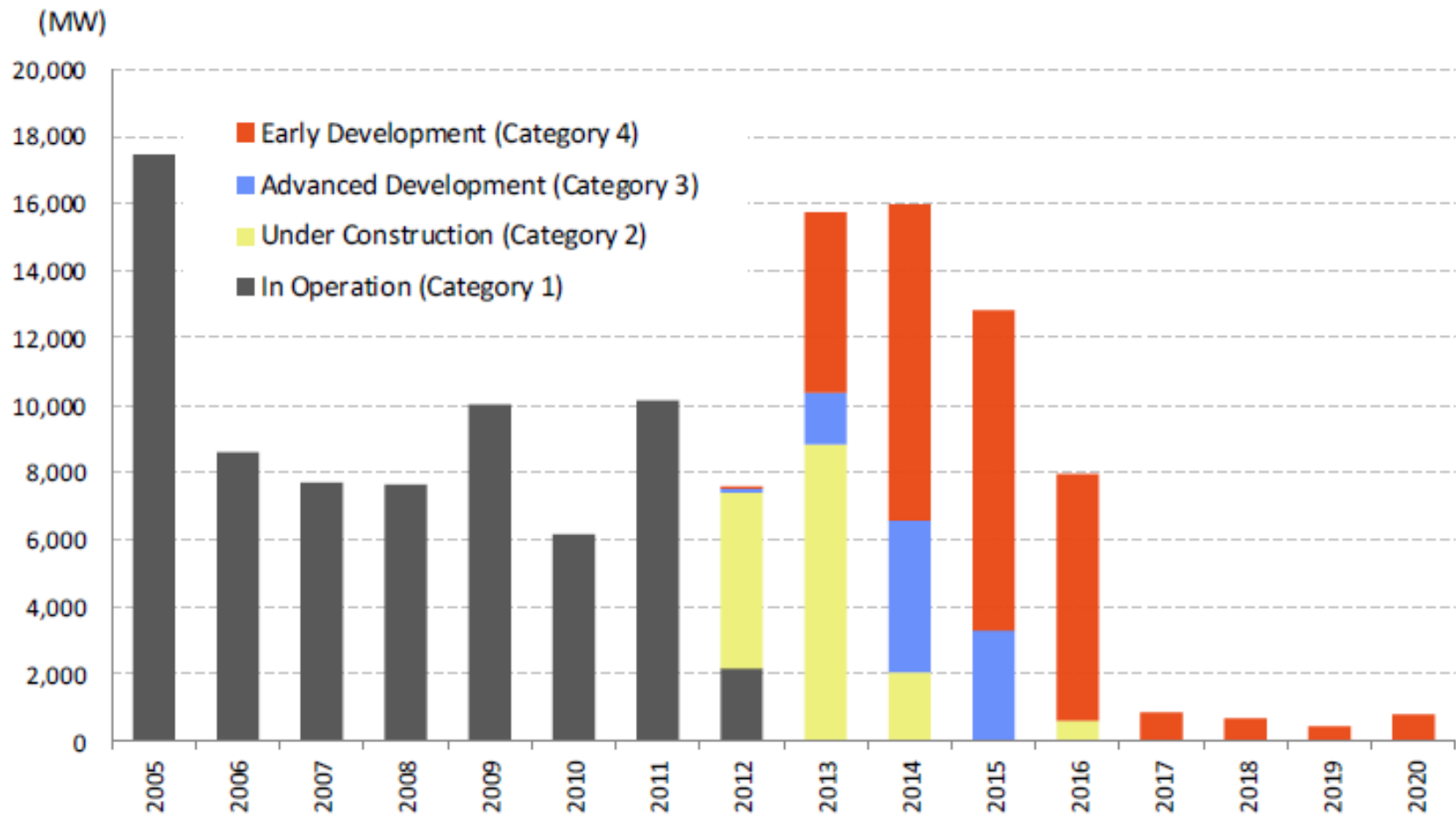
## The Washington Post

### AP IMPACT: CO2 emissions in US drop to 20-year low

August 16, 2012

*"In a surprising turnaround, the amount of carbon dioxide being released into the atmosphere in the U.S. has fallen dramatically to its lowest level in 20 years, and government officials say **the biggest reason is that cheap and plentiful natural gas has led many power plant operators to switch from dirtier-burning coal.**"*

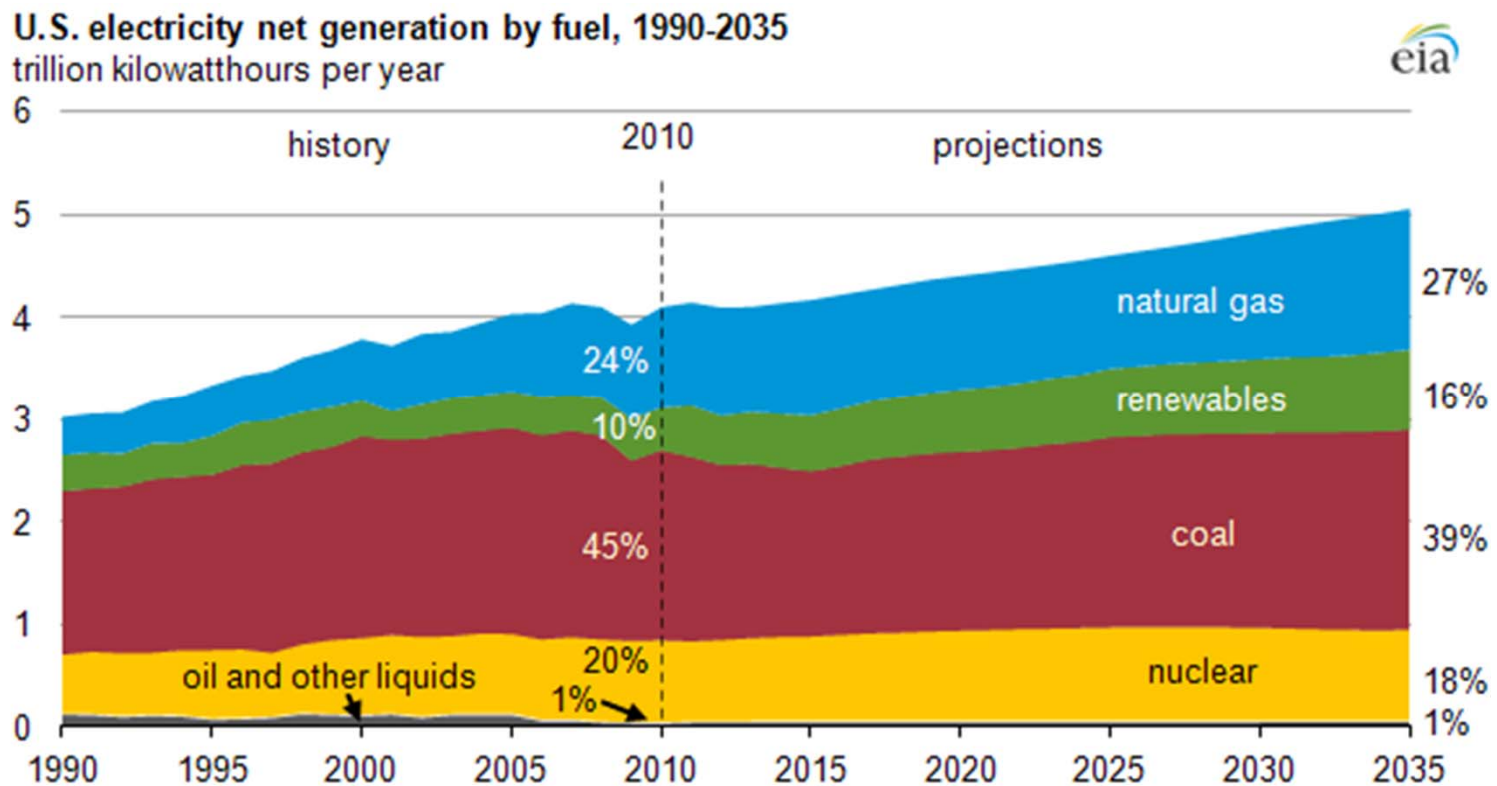
# Natural Gas Capacity Additions



Source: Electric Power Research Institute (2012); EVA 2012

# Growth Projections for Natural Gas

For electricity generation, natural gas and renewable energy are the only fuel sources projected to grow over the next 25 years.



Source: U.S. Energy Information Administration, Annual Energy Outlook Early Release 2012



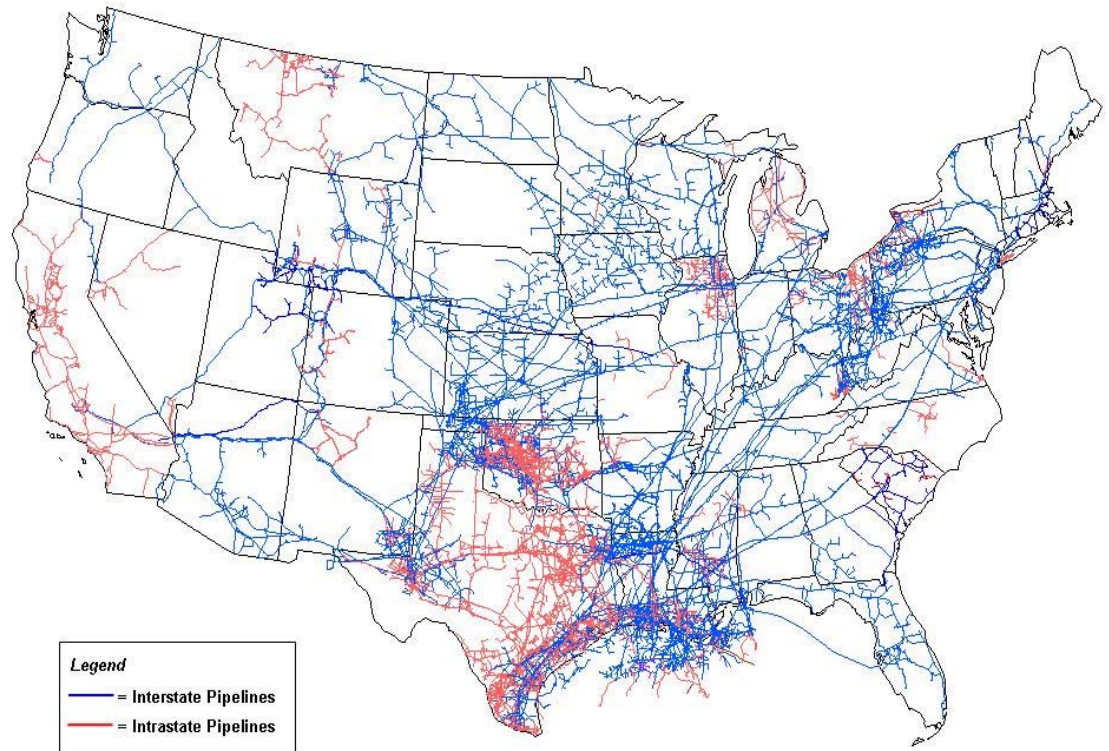


# PIPELINES



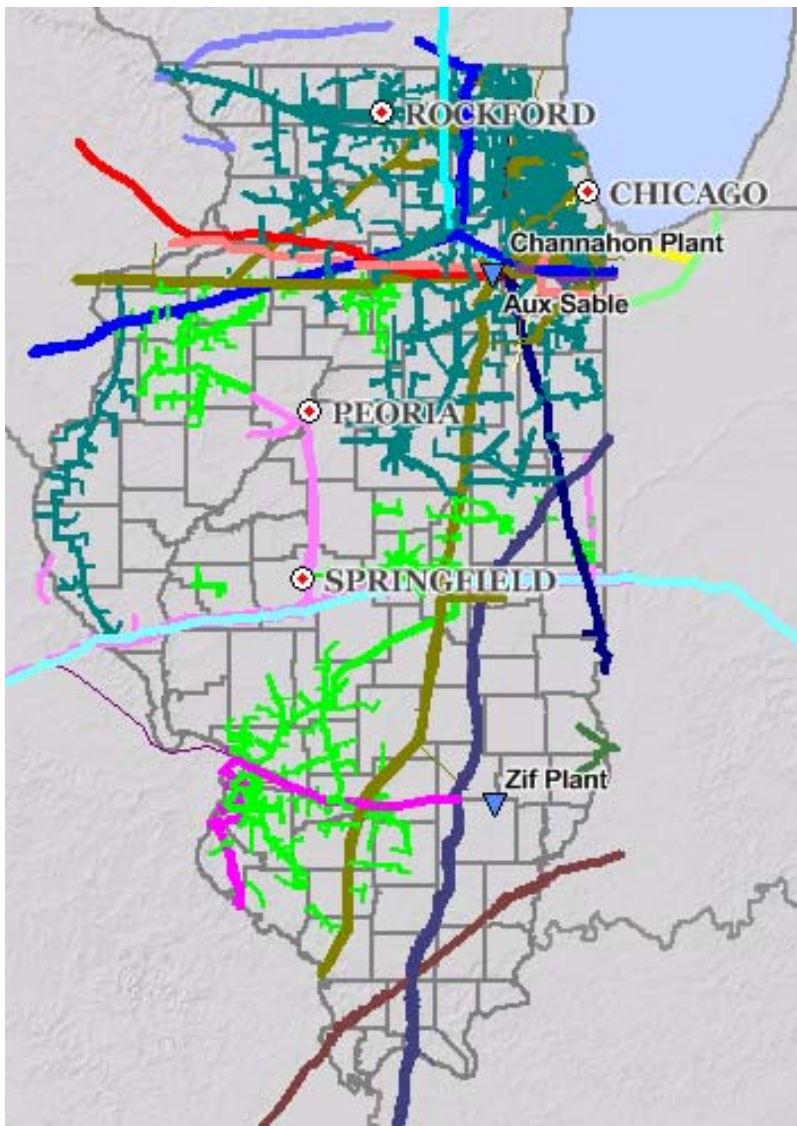
# Pipeline System Extensive and Expanding at Record Pace

- Between 2000 and 2010, the FERC approved more than 16,000 miles of new interstate pipeline, with capacity to move an additional 113 Bcf per day
- Pipeline system connects U.S. with Canada and Mexico
- Storage capacity grew 22% from 2006 - 2010
- Half of new storage is flexible high-turnover salt dome and is closer to customers

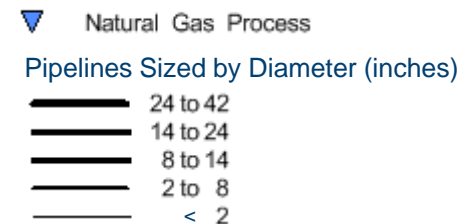


Source: Energy Information Administration, Office of Oil & Gas, Natural Gas Division, Gas Transportation Information System

# Illinois Natural Gas Infrastructure



- Illinois has 22 interstate pipelines, 4 intrastate pipelines, and 9 major local distribution companies.
- Over 12,000 miles of interstate and intrastate pipelines serve the state, supported by a combination of aquifer and depleted reservoir storage and LNG peaking
- Home to two major trading hubs for natural gas – ANR Joliet Hub and Chicago Hub



# Deloitte: Exports Impact Prices Little

## Made in America

### The economic impact of LNG exports from the United States

A report by the Deloitte Center for Energy Solutions and Deloitte MarketPoint LLC



## Findings:

- Abundant shale gas resources mitigate the price impact; in fact most of the incremental supply comes from shale gas production.
- Assuming 6 Bcf/d (approx. total volumes of the three LNG export applications at Sabine Pass, Freeport and Lake Charles), the weighted-average price impact is forecast at only \$0.12/MMBtu on U.S. prices from 2016 to 2035.

## Bottom Line:

- The North American gas market is dynamic. Given the assessment's assumptions, the magnitude of domestic price increase that results from export of natural gas in the form of LNG is likely quite small.
- If exports can be anticipated, then producers, midstream players, and consumers can act to mitigate the price impact.

# Lower Energy Prices For Consumers

---

- Thanks to lower natural gas prices, U.S. households will save an average of **\$926** per year in disposable income between 2012 and 2015.
- Shale gas production has resulted in a **10 percent** reduction in electricity costs nationally.



Source: IHS, "Economic and Employment Contributions of Shale Gas in the United States." 2011





[www.anga.us](http://www.anga.us)  
twitter @ANGAus

Paul Smith  
Director, Business Development  
[psmith@anga.us](mailto:psmith@anga.us)