

# Legal Aspects of U.S. Energy Policy: Prospects for the Natural Gas Glut

**Paul B. Simon**

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Lorman Seminar on Oil & Gas Rights in Louisiana

# Who am I?



**Paul B. Simon**  
Lafayette office

9/27/2019

**GORDON**  
**ARATA** MCCOLLAM DUPLANTIS  
& EAGAN LLC

# The topic – the prospect developments in U.S. energy policy will ease the natural gas glut

## We will cover

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- U.S.
- Energy policy
- Natural gas

## We will not cover

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- International – U.S. shale experience unique
- Wisdom of policy from other perspectives – not a discussion about global warming or national security policy
- Other fuels:
  - other fossil fuels – oil doing fine
  - alternatives

# Sources

Unless otherwise noted

- All numbers from United States Energy Information Administration
- All graphs and figures my own

I am happy to share this presentation, but please ask before using.

# Agenda

- I. **The Problem** – low natural gas prices caused by massive supply increases
- II. **Overview of Solutions** – most popular solutions inadequate
- III. **“Real” Solution 1 – LNG Exports**
- IV. **“Real” Solution 2 – Electricity Generation**

# Agenda

**I. The Problem** – low natural gas prices caused by massive supply increases

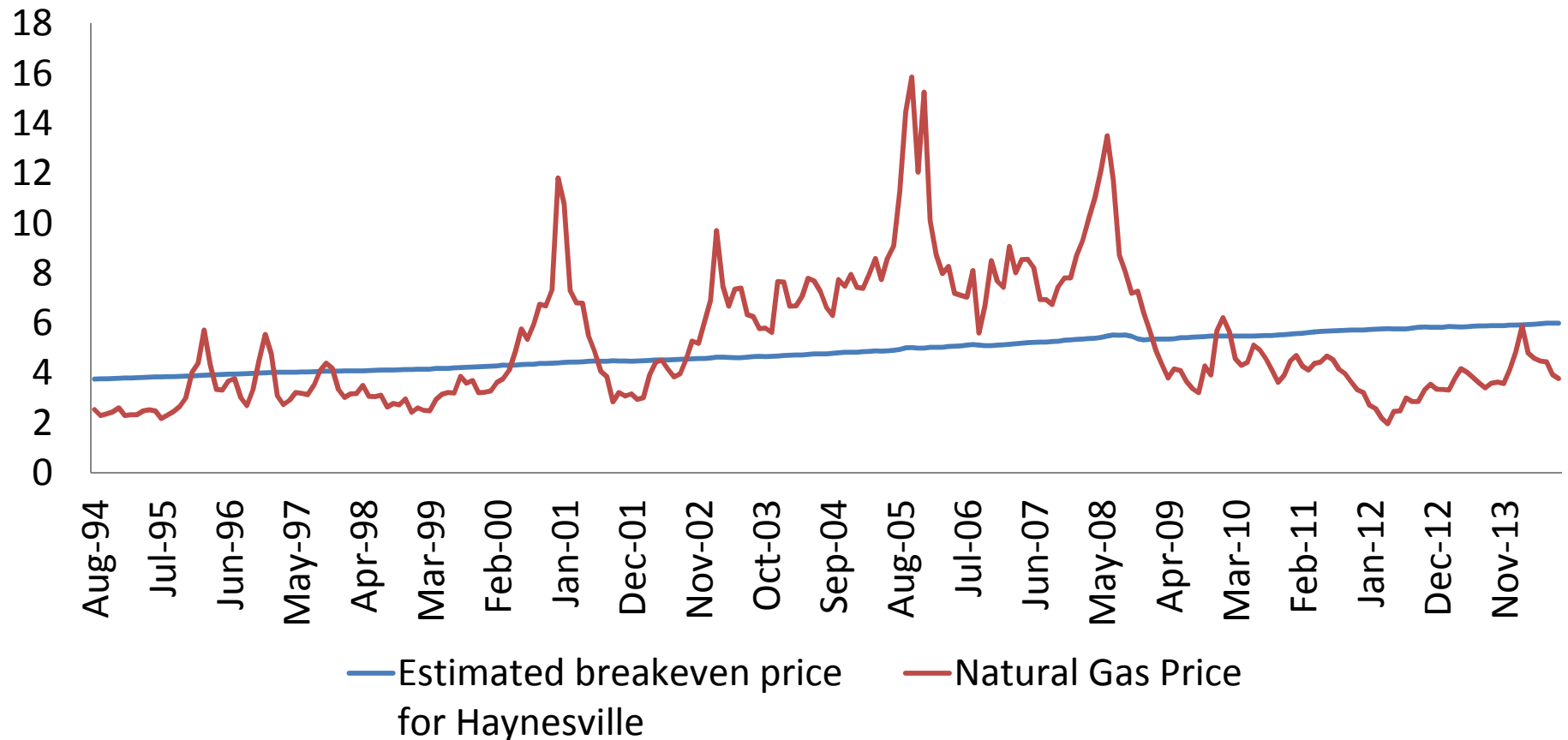
**II. Overview of Solutions** – most popular solutions inadequate

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# The problem— natural gas prices are unsustainably depressed

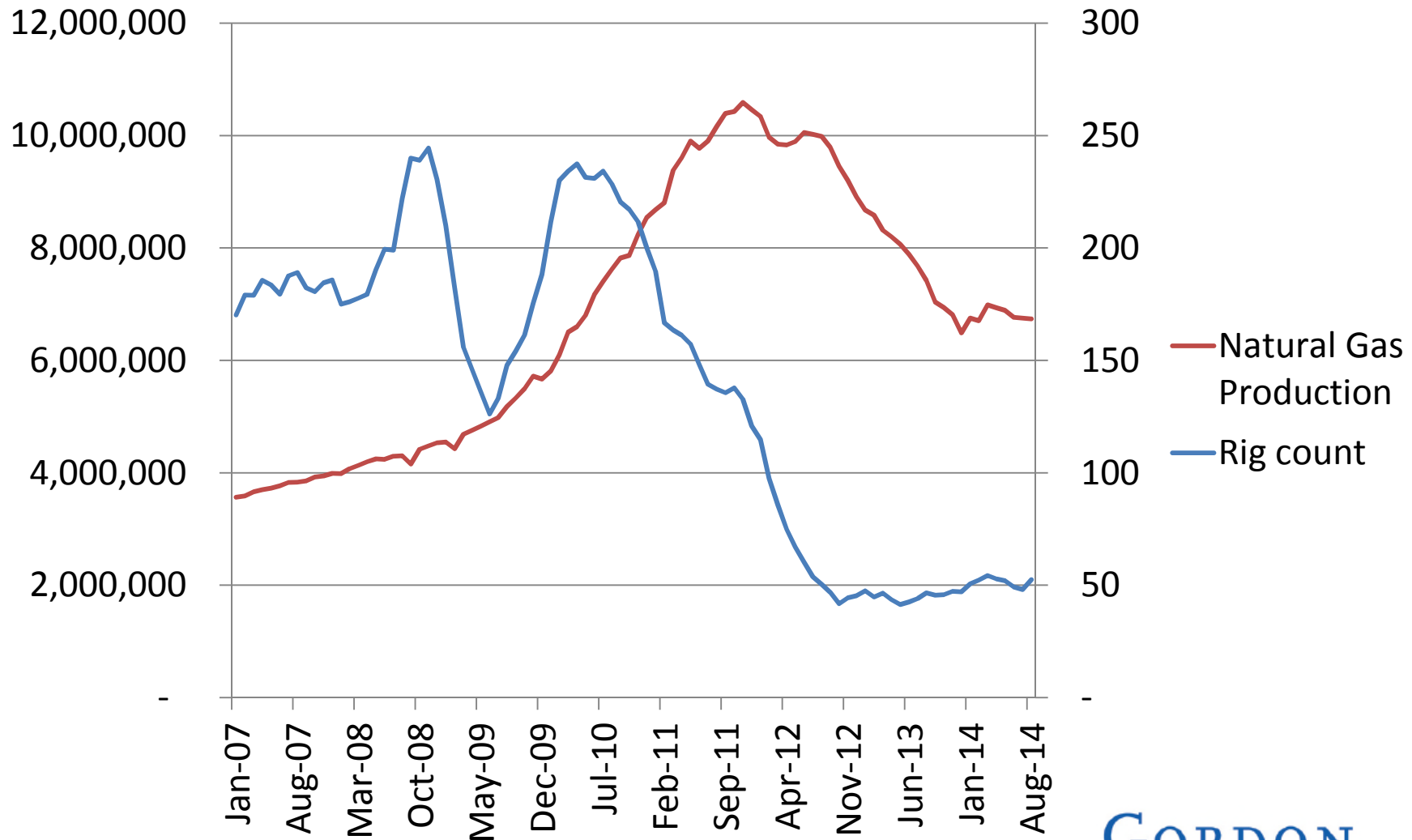
Henry Hub spot price of natural gas  
\$/ mcf, inflation adjusted



SOURCE: EIA – all numbers come from Annual U.S. natural gas consumption

# Impact of low prices is seen in the Haynesville

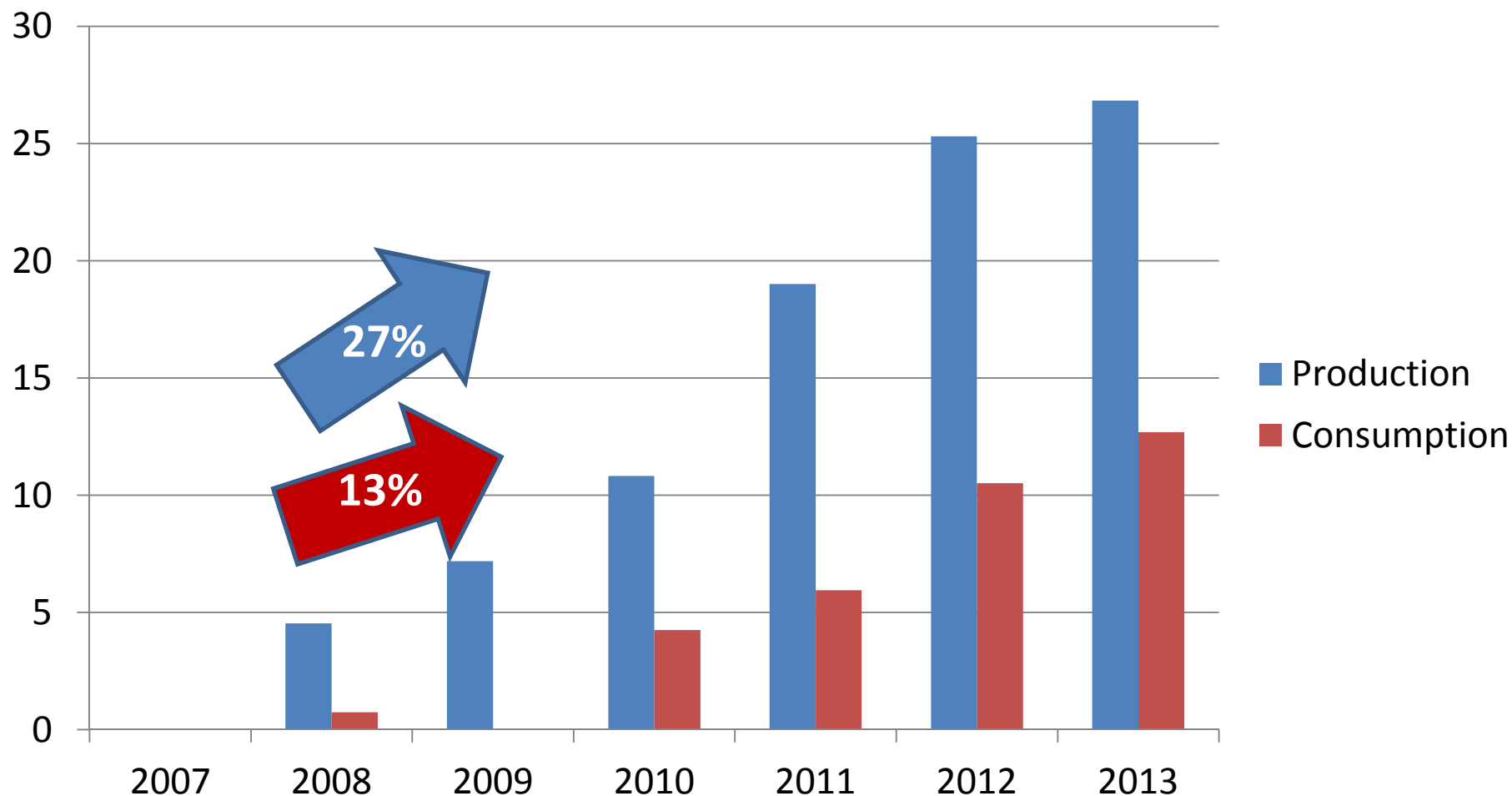
Natural gas production (mcf/day) and Rig Count  
Haynesville Shale region





# The reason – production increases have outstripped consumption increases by ~2 to 1 margin

Cumulative increases, U.S. natural gas production and consumption



# Additional capacity added each year is equivalent to ~2.0% of all U.S. natural gas production

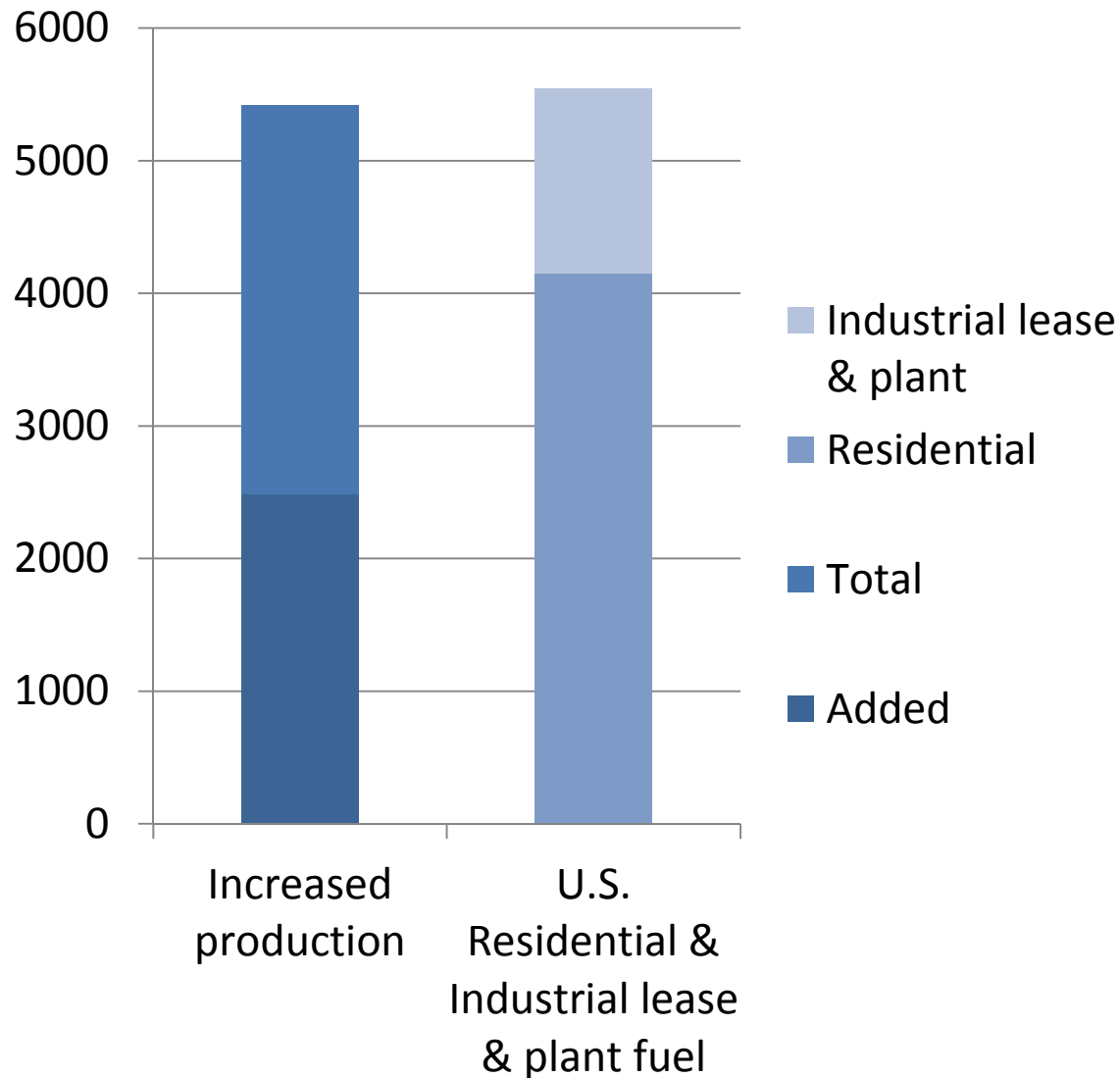
Average annual change  
past years through 2013

	Demand*		Supply	
	%	BNcf	%	BNcf
6 yrs:	2.1%	489	4.5%	903
3 yrs:	2.7%	650	4.5%	1,078

- Supply increased ~420 BNcf more than demand increased each year
- Additional capacity added each year equivalent to ~2.0% of all U.S. natural gas production (25,616 BNcf total marketed production in 2013)

\* Annual U.S. natural gas consumption

# Cumulative increase in supply / production is massive



- Increased production:
  - 5,420 BNmcf total
  - 2,487 *added* capacity
- Comparison:
  - Added capacity ~60% of all U.S. yearly residential consumption (heating)
  - total increase about equal to annual Residential and Industrial lease & plant fuel\* use combined

\* Lease use = gas used in well, field, and lease operations, including in drilling ops and field compressors  
Plant use = natural gas used as fuel in natural gas processing plants

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# Addressing the problem will require increasing demand, by appeal to interests other than health of oil & gas industry

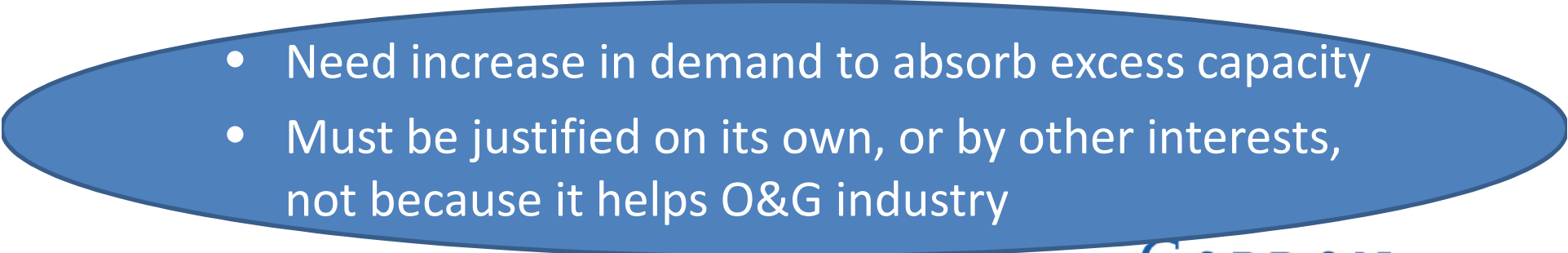
## Traditional priorities

- National security
- The environment
- Low prices

## Not a priority

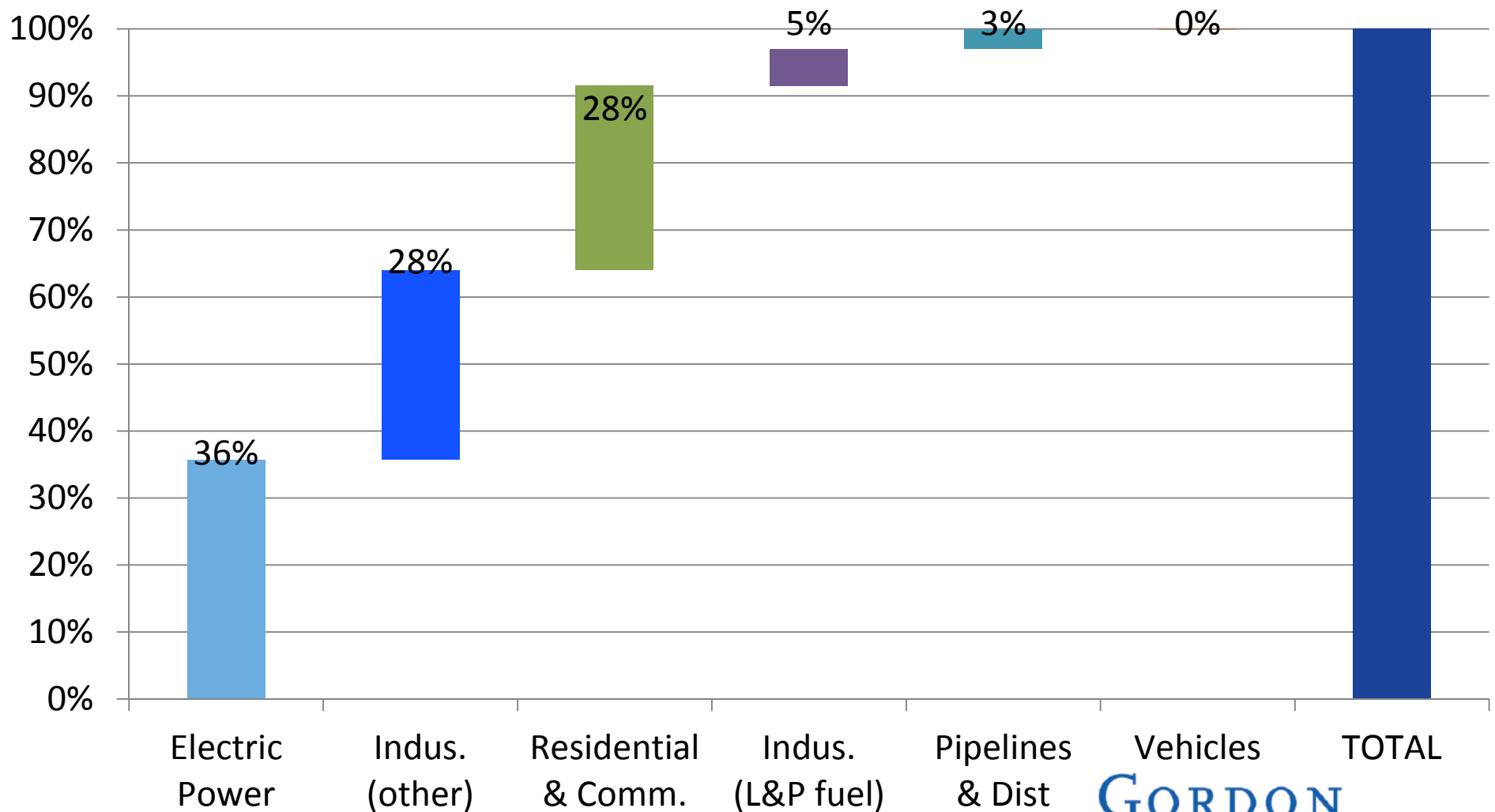
- Health of O&G industry

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- Policymakers will not help the industry for its own sake, need other motivations

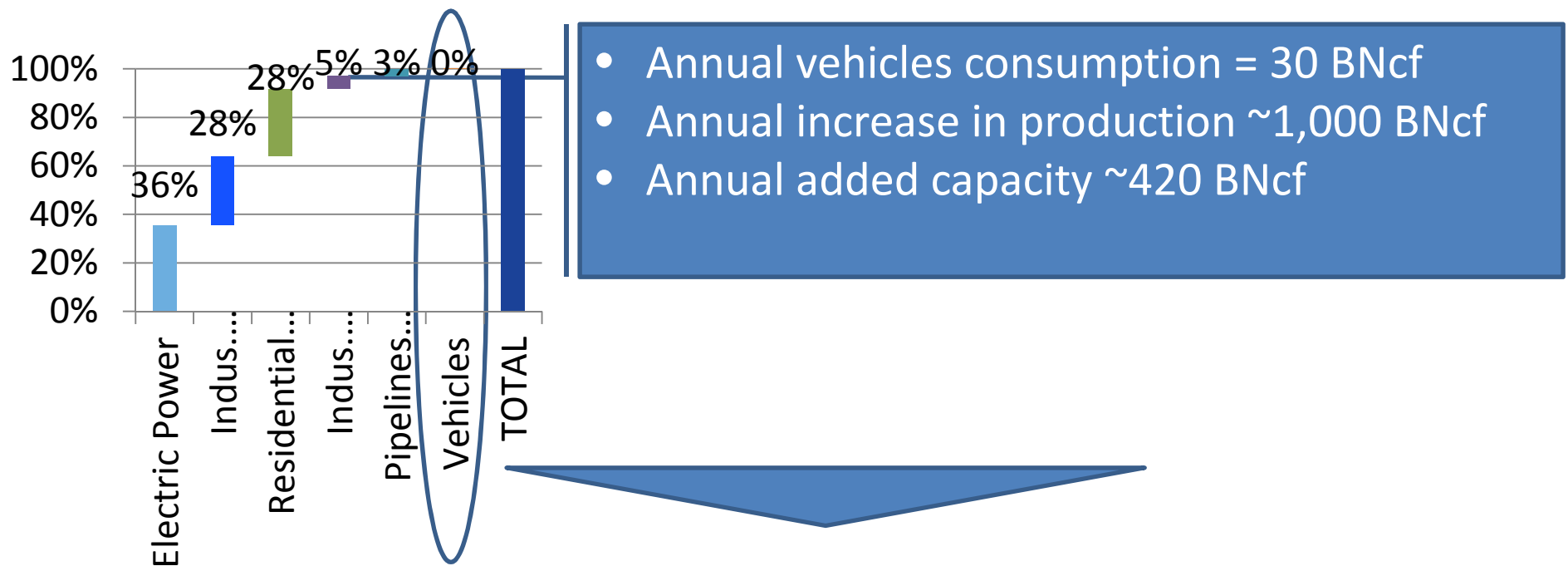
- 
- Need increase in demand to absorb excess capacity
  - Must be justified on its own, or by other interests, not because it helps O&G industry

# Electric power, industrial, and residential use dominate U.S. natural gas consumption

% of total U.S. natural gas consumption, 2012

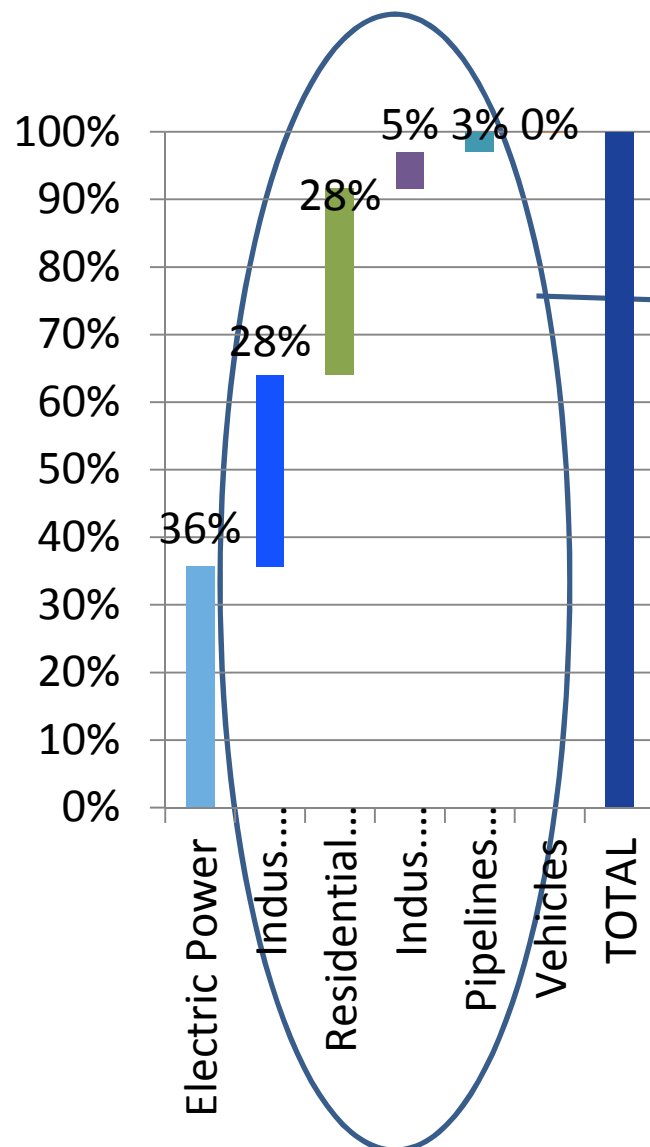


# Low starting point means some popular solutions do not scale



Even if natural gas used in vehicles increased massively each year, would not make a dent in excess capacity

# Most other segments either highly price sensitive, or dependent on variables outside of human control



- Industrial uses highly price sensitive
  - can increase demand some
  - not sufficient to support sustainable price
- Residential & Commercial uses
  - mostly heating – dependent on weather
  - other substitutions price dependent



# Two solutions different – LNG exports and electricity generation

	Annual use	Why scalable...?	Not price sensitive?
<b>LNG Exports</b>	<ul style="list-style-type: none"> <li>• 1,619 BNcf (2012)</li> <li>• 1,572 BNcf (2013)</li> <li>• ~6% of annual U.S. consumption</li> </ul>	<ul style="list-style-type: none"> <li>• Foreign demand essentially unlimited</li> </ul>	<ul style="list-style-type: none"> <li>• Spread between U.S. and foreign prices</li> <li>• Can't put natural gas in bucket, so location critical</li> </ul>
<b>Electricity Generation</b>	<ul style="list-style-type: none"> <li>• 9,111 BNcf (2012)</li> <li>• 8,153 BNcf (2013)</li> <li>• 36% &amp; 31% of annual U.S. consumption respectively</li> </ul>	<ul style="list-style-type: none"> <li>• Modest annual increases (5%-8%) absorb essentially all excess capacity</li> <li>• New generation capacity needed in coming years</li> </ul>	<ul style="list-style-type: none"> <li>• Environmental advantages versus coal</li> <li>• Issues with most renewables</li> </ul>

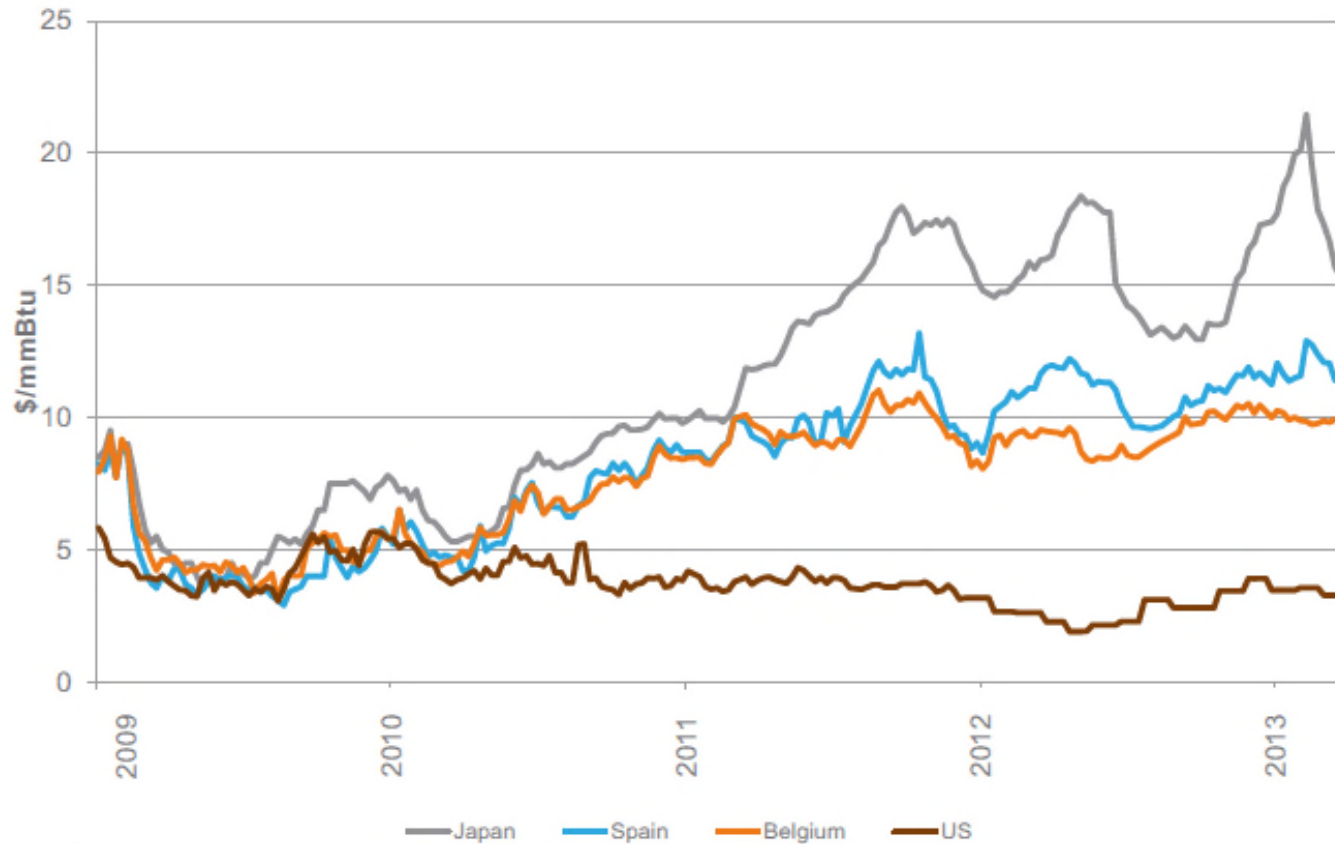
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# Price spreads between U.S. and international LNG markets significant and persist



- EU LNG prices 3 to 4 times higher than US
- Asia even greater
- No similar spread for oil

Source: Presentation of Pieterjan Renier of Fluxys, on Zeebrugge LNG terminal,

# Spread persists because LNG not part of WTO system, need permit to trade

- Only items not part of GATT / WTO regime:
  - armaments
  - energy
- To export essentially to all countries but Mexico and Canada, need permit from Department of Energy (DOE)
- Natural Gas Act of 1938 – DOE must determine that exporting LNG is “in the public interest”

# Applications for permits to export LNG are booming and would solve supply glut if granted

37 applications submitted

- 2 in 2010
- 5 in 2011
- 14 in 2012
- 15 in 2013
- 6 in 2014



- 40.96 BNcf/day in total export capacity applied for
- If all granted and all worked at capacity, would export:
  - 14,950 BNcf / year
  - 58% of total U.S. marketed production (25,616 BNcf in 2013)
- Would solve supply glut...

# Issue – export permits were not being granted

- Until this past summer, DOE essentially had halted granting of applications – had only conditionally approved 5 of 37 applications
- Reason – pressure from interest groups
  - environmental
  - industry that enjoys low natural gas prices

# Recent improvements with two final approvals, including one in Louisiana

- Cameron LNG in Louisiana
  - Project of Sempra Energy
  - For 1.7 BNcf / day (621 BNcf / yr, 2.5% of U.S. marketed production)
  - \$10 bln project, 3,000 temp & 200 permanent jobs
  - 2018 – first exports planned
- Joins Sabine Pass Liquefaction – previously approved
  - Cheniere Energy, Inc.
  - 2.2 BNcf / day, ~800 BNcf / year, (~3% of U.S. production)
  - Late 2015 begin exports
- Third approval for Caribe Energy, 0.4 BNcf / day (146 BNcf / year), in Florida

# Prospects for future hopeful but uncertain

## Hope

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- Modest approvals make dent in supply –
  - Sabine & Cameron: each absorb 2-3 yrs of excess supply
- DOE report:
  - plan to increase supply at:
    - 1.5% of U.S. consumption / yr, to 8.5% of total, or
    - 4% per yr, to 17% of total

## Uncertainty

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- Unclear how DOE will handle remaining applications
- Political price sensitivity
- DOE report:
  - plan only to allow total price increase of 8 to 18% per year long-term
  - Essentially \$0.50-\$1.00 above current prices

• Exports helpful but insufficient

• No external political motivation for price increases



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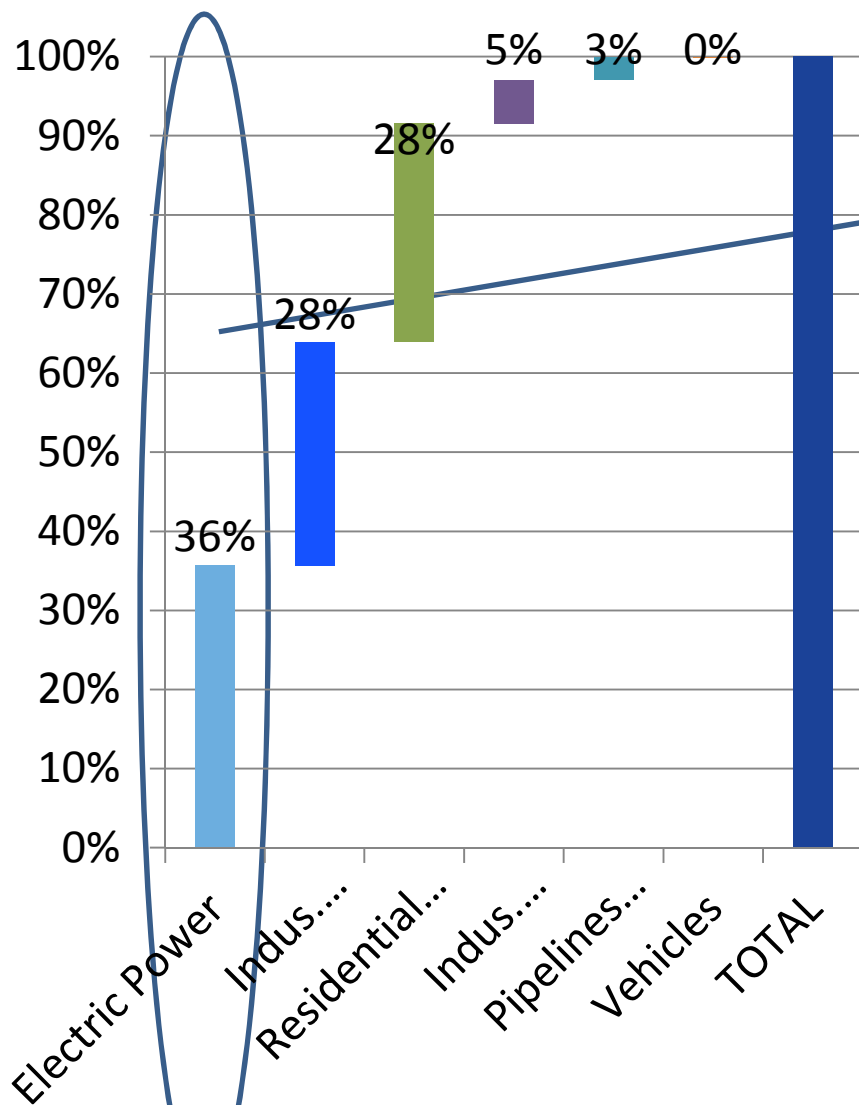
IV. **“Real” Solution 2 – Electricity Generation** – promising for three reasons:

– **High starting point**

– Natural gas comparatively useful and affordable

– Potentially little price sensitivity – the Clean Air Act

# Most other segments either highly price sensitive, or dependent on variables outside of human control



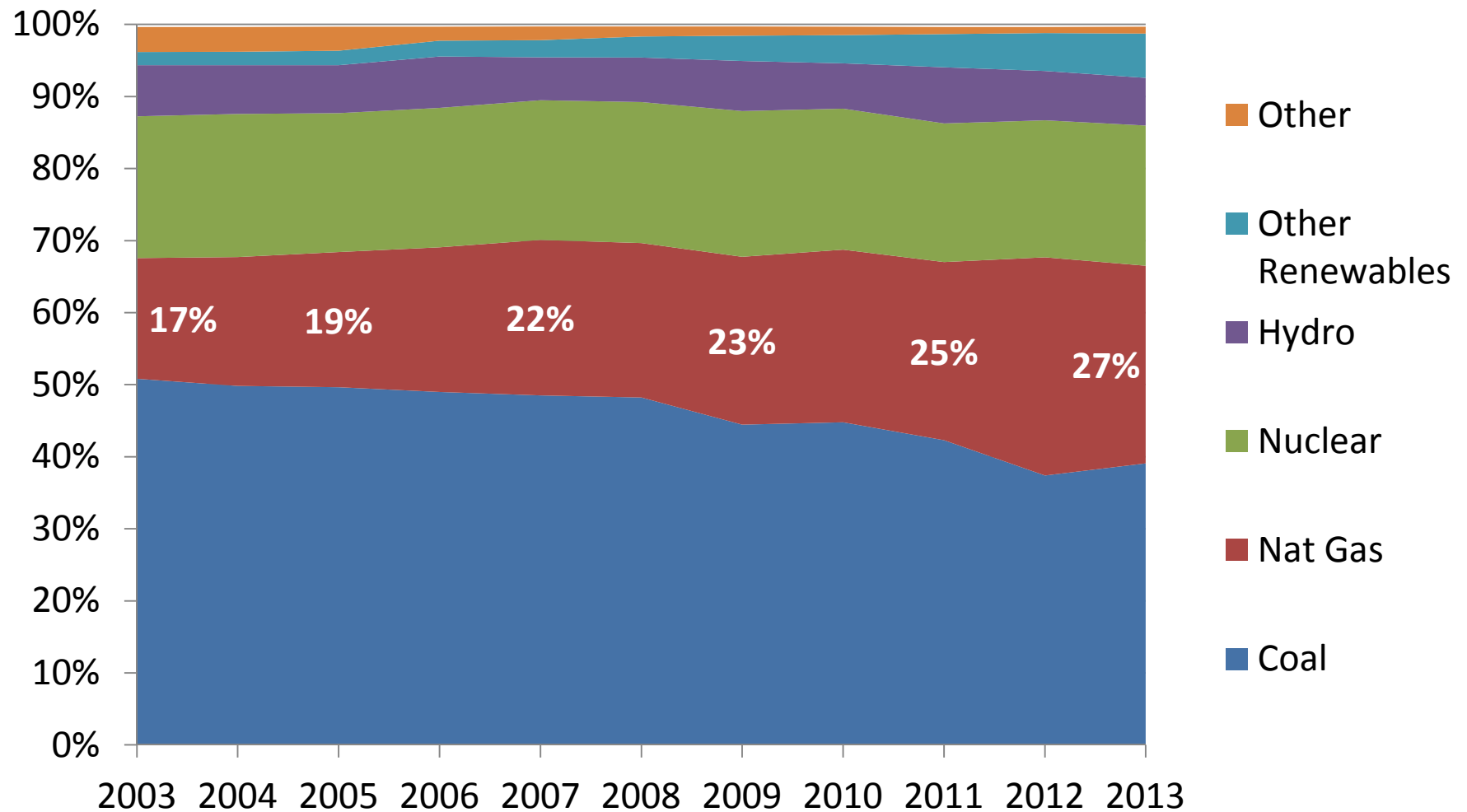
- 8,000-9,000 BNcf currently consumed annually in electricity generation
- Added supply is ~420 BNcf annually
- Modest increases of 5% annually can absorb added capacity
- Still reasonable increases of 10% annually can begin to reduce oversupply

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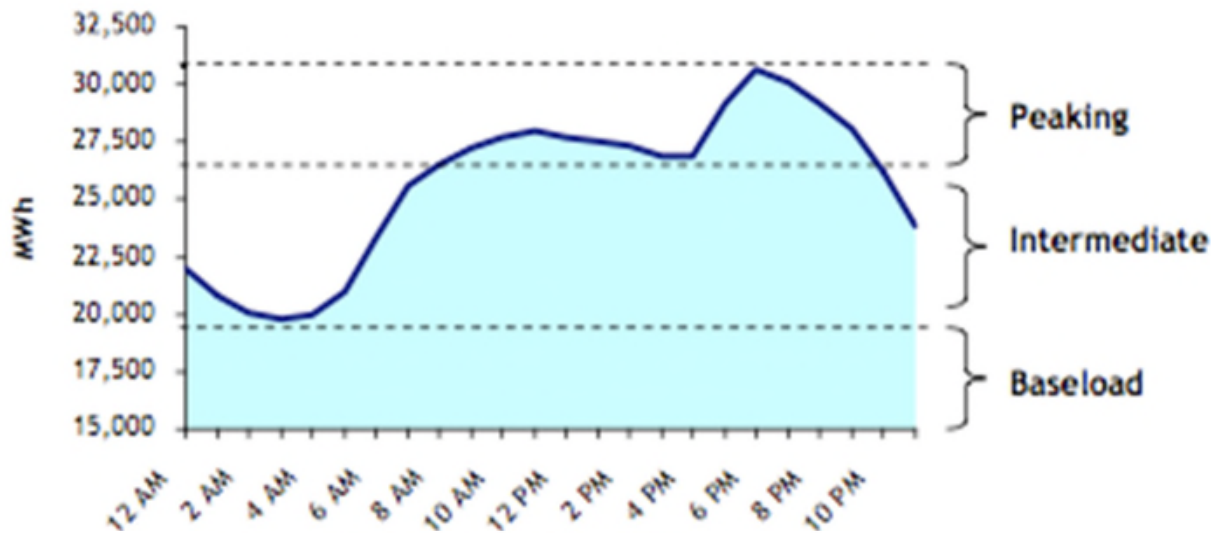
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  - **Natural gas comparatively useful and affordable**

# Natural gas already a growing source of electricity generation

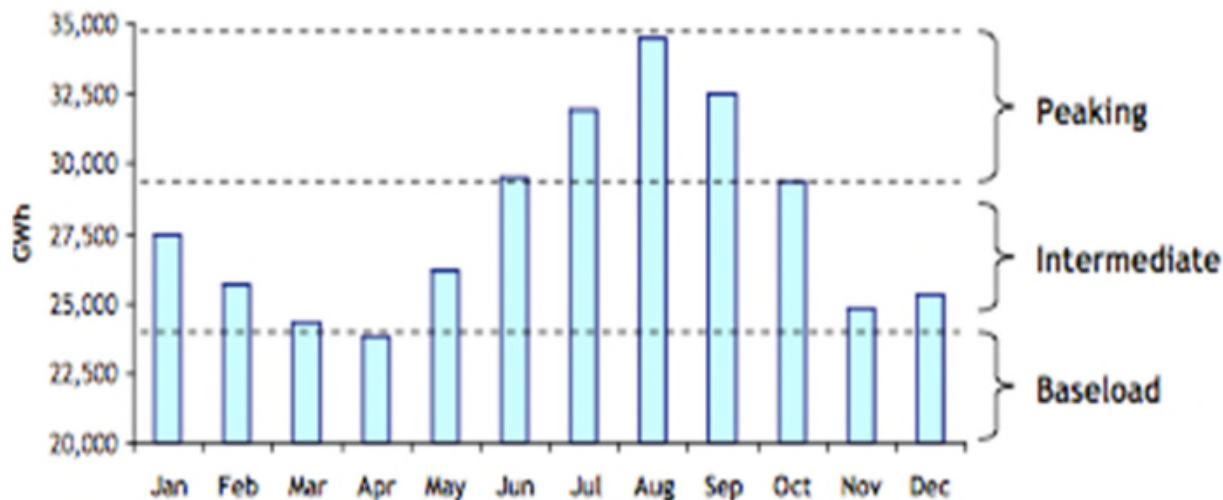


# One reason – natural gas flexible, usable with renewables

Demand Curve by Hour, California



Demand Curve by Month, Texas



## ■ **Baseload**

- runs around clock
- lowest variable fuel costs & hard to start & stop plants
- Traditionally nuclear & coal

## ■ **Intermediate**

- runs 30-50% of time
- efficient combined cycles
- gas-fired plants

## ■ **Peakers**

- runs 5-10% of time
- Small units can be started and stopped quickly
- gas-fired plants

- Optimal fuel also varies by:
  - local source availability
  - variety & supply risk
  - capital restrictions

# Natural gas plants also affordable, both in total costs and initial investment...

<i>Basic Generation Economics (Per 1 MW of Capacity)</i>						
<i>\$000 except where noted</i>						
	Coal*	Intermediate Gas-Fired**	Peaking Gas-Fired***	Wind	Solar	Nuclear
Capital Costs	\$2,200	\$1,000	\$800	\$2,500	\$4,500	\$5,000
Capacity Factor	90%	60%	10%	25%	25%	95%
Production (MWh)	7,884	5,256	876	2,190	2,190	8,322
Fuel	\$213	\$276	\$66	\$0	\$0	\$50
O&M	<u>70</u>	<u>23</u>	<u>16</u>	<u>30</u>	<u>11</u>	<u>72</u>
Total Cost of Production	283	299	81	30	11	122
Return on Capital (10%)	<u>220</u>	<u>100</u>	<u>80</u>	<u>250</u>	<u>450</u>	<u>500</u>
Required Revenue	\$503	\$399	\$161	\$280	\$461	\$622
Required Power Price (\$/MWh)	\$64	\$76	\$184	\$128	\$211	\$75
2010 Forward Price - Texas (\$/MWh)	\$40	\$40	\$40	\$40	\$40	\$40

- Lowest capital costs:
  - less than half price of coal
  - fraction of nuclear
- And nearly lowest total, capitalized cost

- For intermediate gas-fired, at \$6 mcf, cost of production falls to \$260, required revenue to \$45, versus \$64 for coal, \$75 for nuclear, and \$100+ for renewables
  - At \$4, cost falls to \$158, revenue to only \$30 / MWh
  - Sub \$4, don't even need \$30

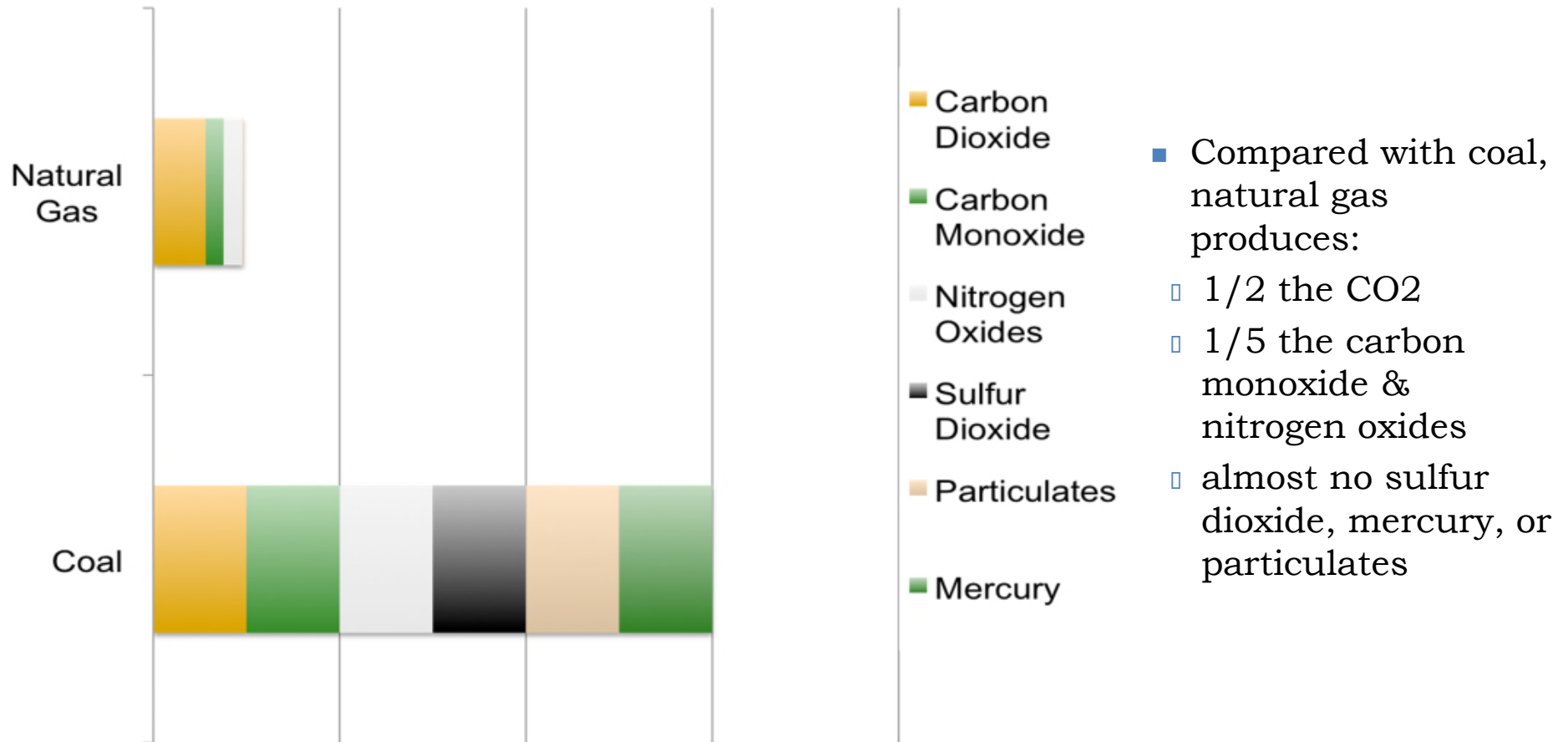
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  - **Potentially little price sensitivity – the Clean Air Act**

# Natural Gas is significantly cleaner than coal

pollution, pounds per billion btu of energy input,  
coal = 100



- Objective, external reason to tolerate a higher price



# Clean Air Act facilitates improved prices for natural gas for electricity generation

## Clean Air Act hammering coal

- Stricter pollution rules applied to more plants
- Grandfathered coal plants done
  - new source review
  - ~60% past 40 yr life, depreciated
  - ~35% more next 20 yrs
- 40-60% of coal capacity in 5-10 yrs, >80% in 20, must:
  - retire,
  - retrofit – at cost of \$100's mlns, blns, or
  - “Refuel” – to nat gas



## The Opportunity

- At least 60% more natural gas used in electricity, 20-25% more used total:
  - ~5,500 BNcf / year
  - 10+ years of excess supply
- 50-80% impact on price
- *Plus* new capacity & natural growth
- **Requires** – standards, enforcement, & support for nat gas

# 3 policies causing more coal to natural gas conversion

## Description

## Opportunity / takeaway

### New “Source Review” Rules

- EPA will regulate CO2
- States will receive target for CO2 reduction
- Flexibility for how to reach

- The overwhelmingly largest source of CO2 reduction, and most affordable way to hit targets, is converting coal plants to natural gas

### Natural gas in consent decrees

- Power companies in violation of Clean Air Act
- Traditionally, had to apply scrubbers to clean coal plants

- *U.S. v. Am. Elec. Power Svc. Corp.* (S.D. Ohio 2013) – allowed to use cheaper sulphur control, agreed to “refuel” coal plants to natural gas
- First time environmental benefits of natural gas used by EPA

### Stricter enforcement of Clean Air Act

- One man’s “routine maintenance” is another man’s “modification”.
- More strictly enforcing rules against older coal plants

- Many power companies will stay with coal plants, but will switch to natural gas if they have to retrofit anyway

# Questions?

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