Natural Gas

Accelerating Growth & Clean Air Goals

Energy Huntsville – Monthly Meeting
U.S. Space and Rocket Center, Huntsville AL
August 20, 2013

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ENERGY HUNTSVILLE

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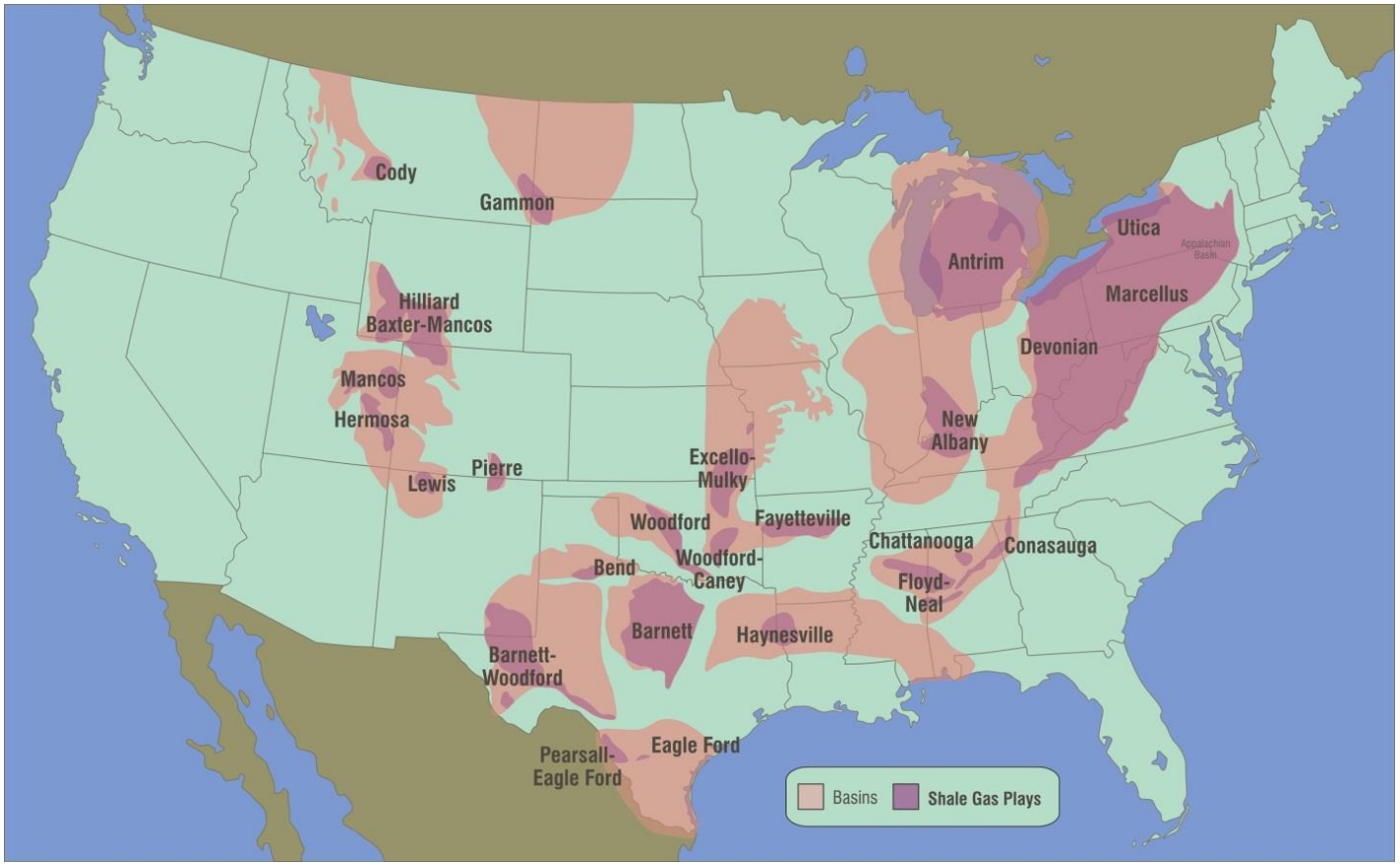
PRODUCTION

The Shale Gas Revolution



Source: EIA

PGC: 2012

1,073 TCF shale

2,689 TCF total

24% INCREASE
in just two years

Source: Potential Gas Committee
(Includes Proved Reserves)

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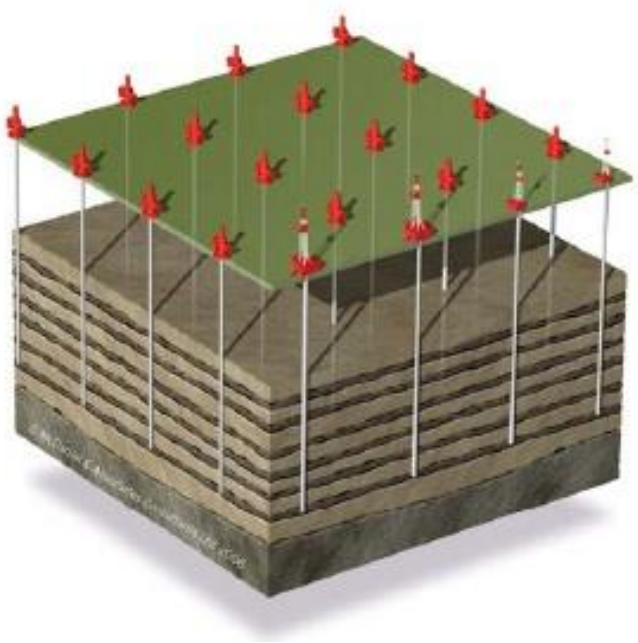
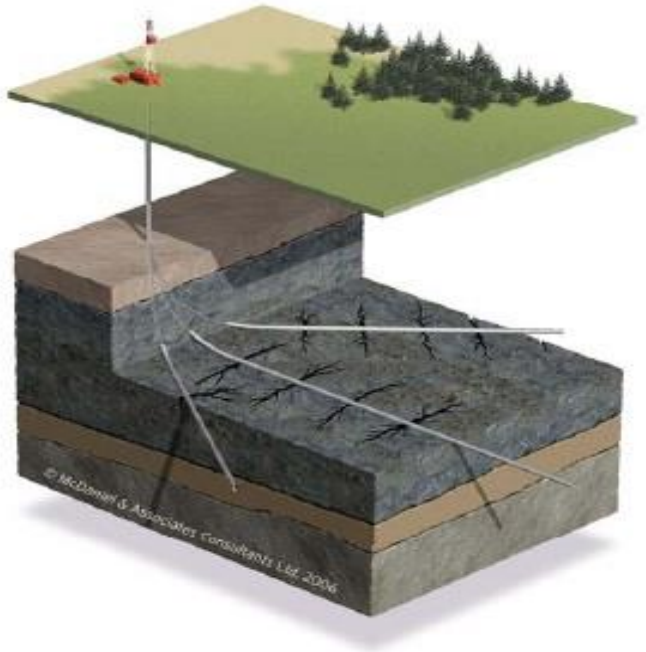
Horizontal Drilling



Traditional Wells



Horizontal Drilling

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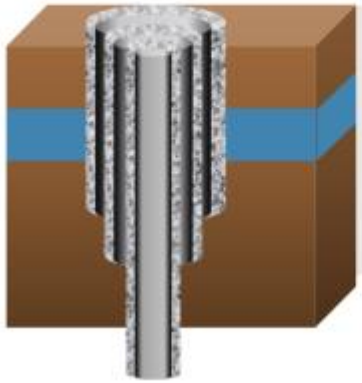
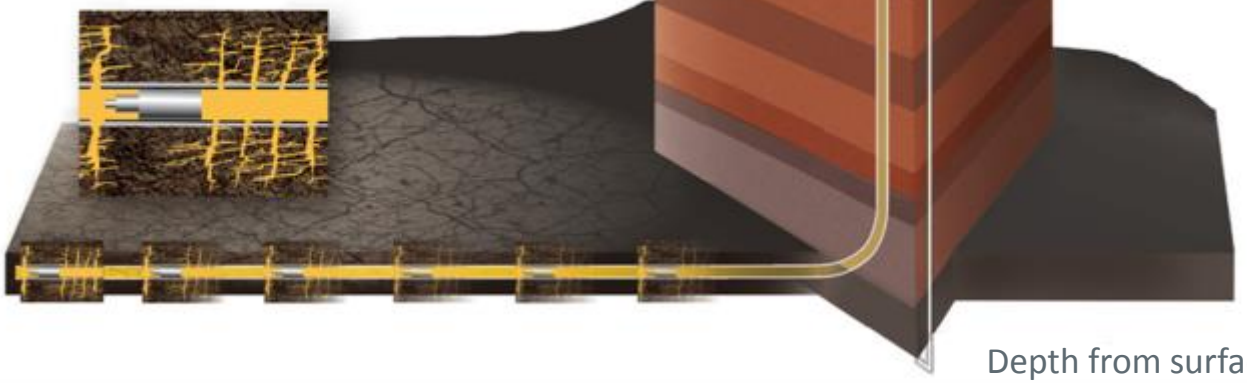
Hydraulic Fracturing

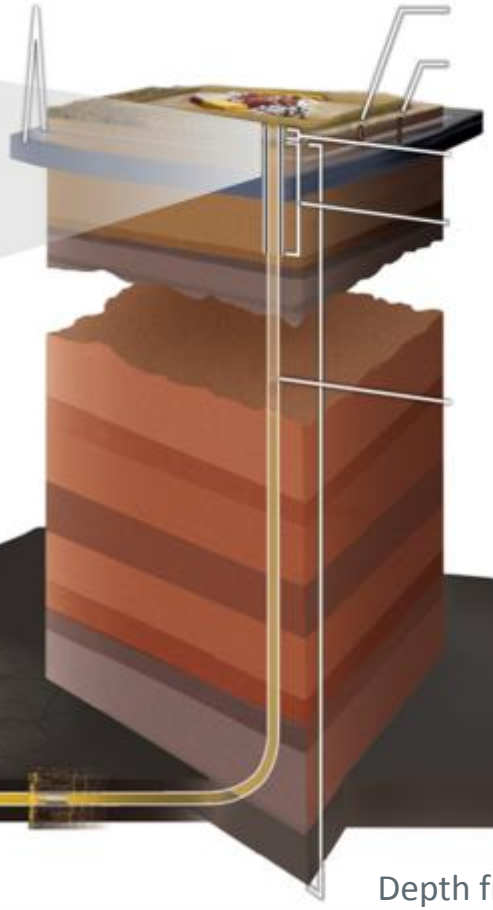
Multiple protective layers extend from surface to below aquifers.



Shale Fractures



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

Depth from surface is typically more than a mile

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Small Environmental Footprint

Drilling
2 – 4 weeks

Fracturing
3 – 5 days

Producing
for decades
surrounding land reclaimed

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Production: The Power of Progress

- Smaller surface impact.
  - The average well site today is just 30% of the size of its 1970s counterpart—and today's wells can access over 60 times more below-ground area.
- Fewer wells, more clean energy.
  - Half as many wells are needed to produce the same amount of clean energy as 20 years ago.
- Less waste.
  - We can retrieve the same amount of gas while producing 30% less waste than a decade ago.
- Fewer air emissions.
  - More efficient operations also means less energy consumption, and thus less air emissions, per unit of natural gas produced.

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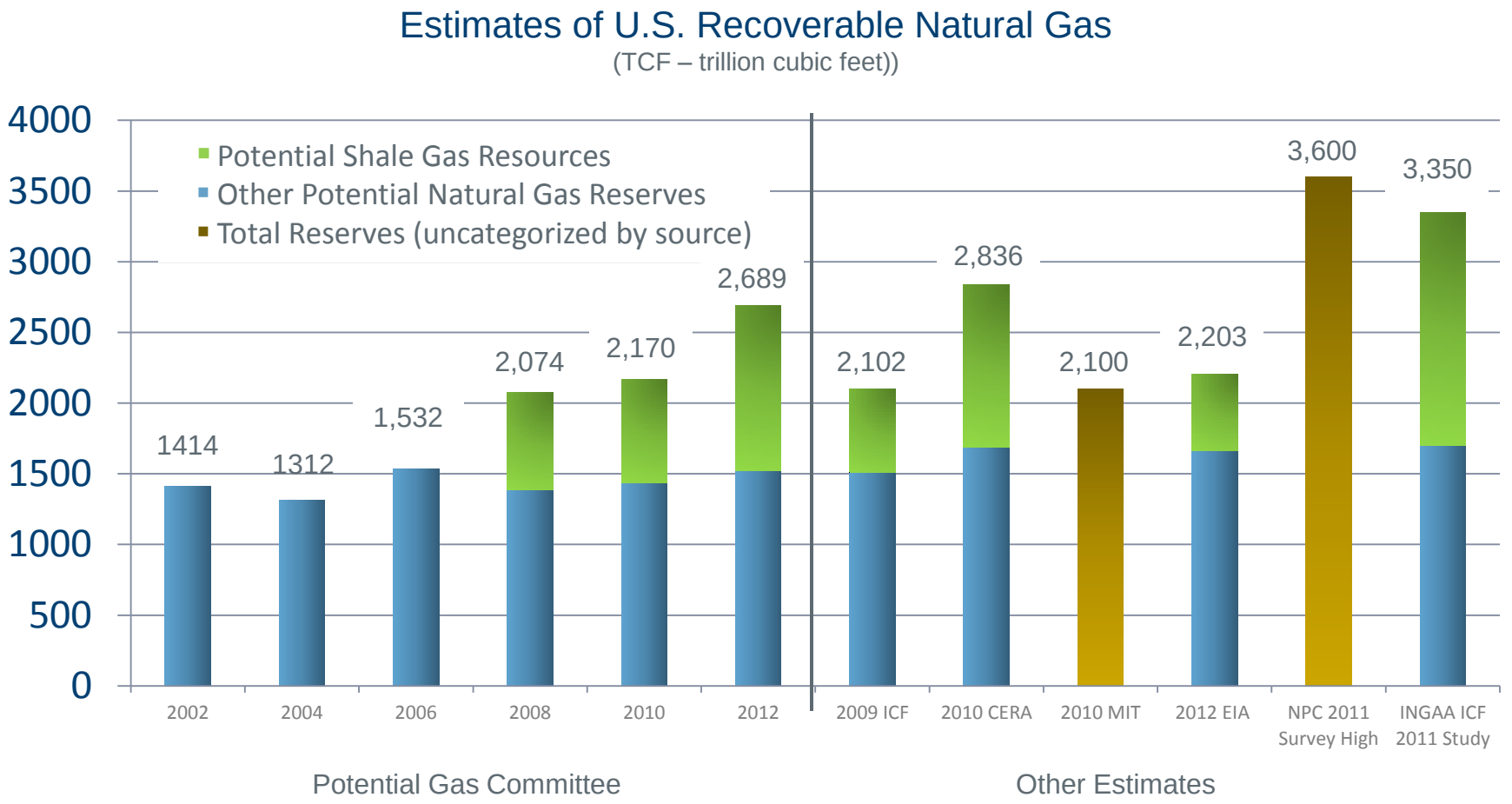
ABUNDANCE &
PRICE STABILITY

Abundant Supply & Growing



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

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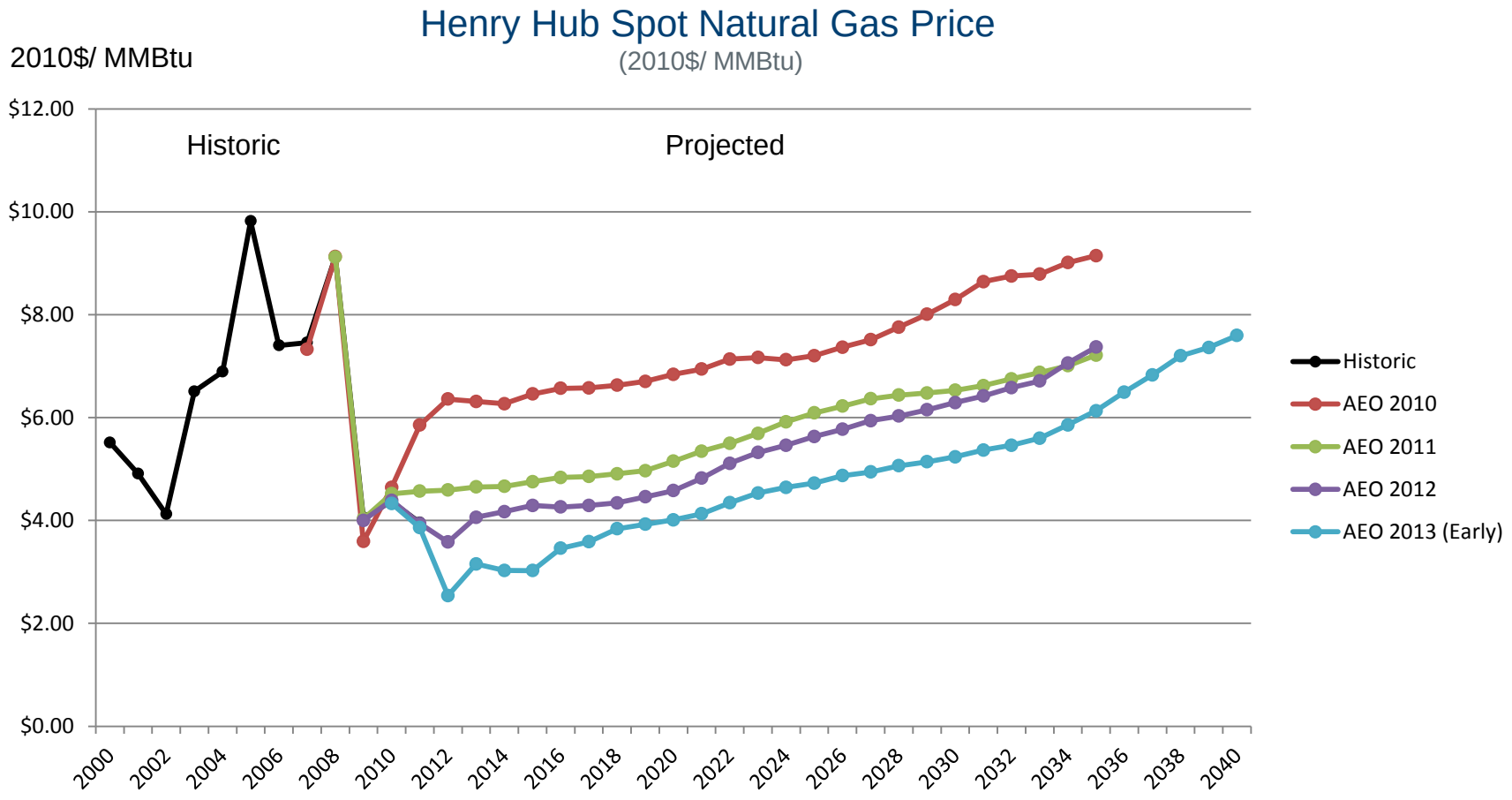
Long-Term Price Stability



Source: EIA Annual Energy Outlook: 2013 (Early Release), 2012, 2011, 2010, and 2009
Henry Hub Spot prices (EIA reported actual prices included 2000 to 2010)

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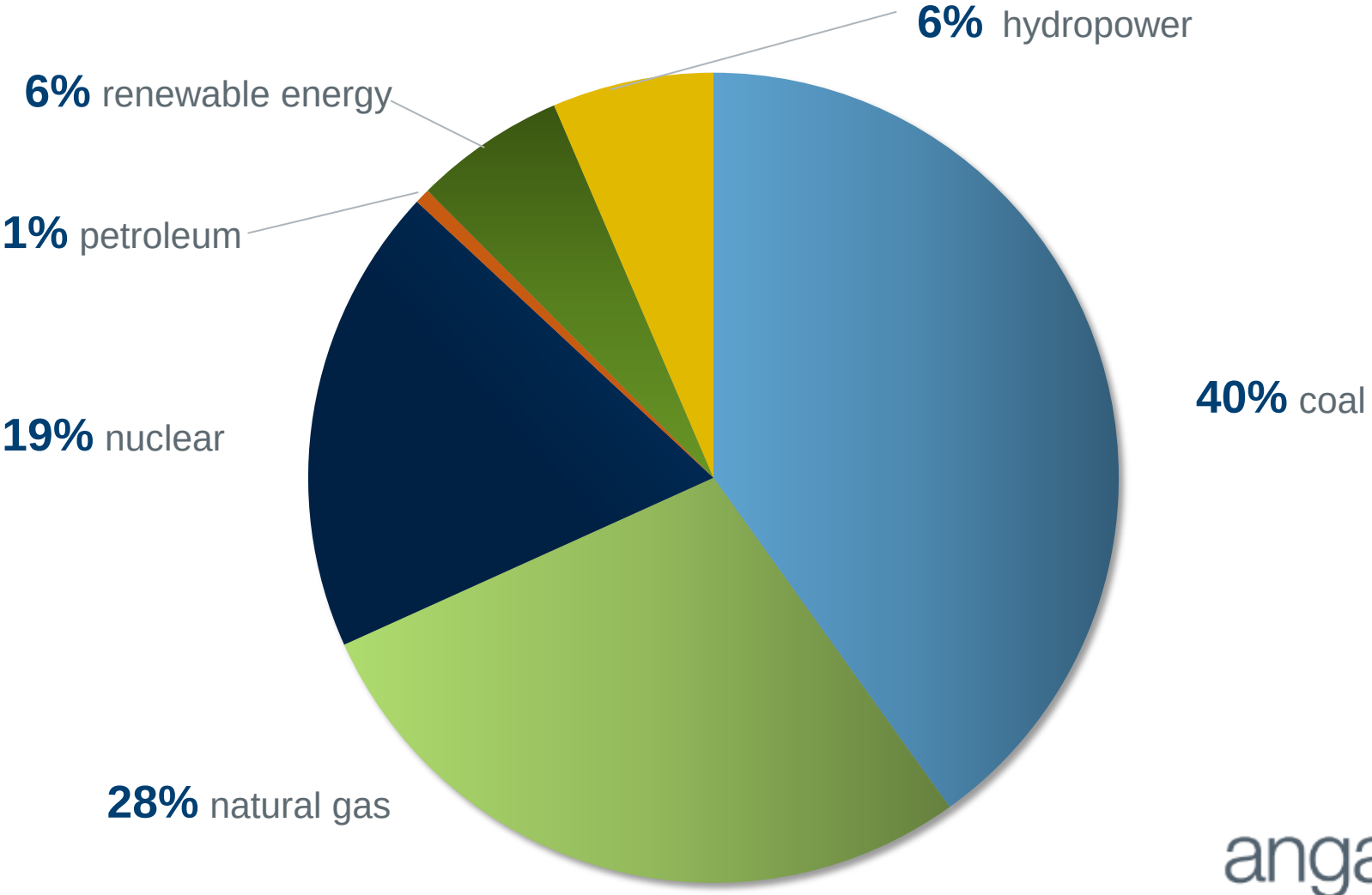
POWER GENERATION

U.S. Electricity Mix



Source: EIA, Short Term Energy Outlook, April 2013

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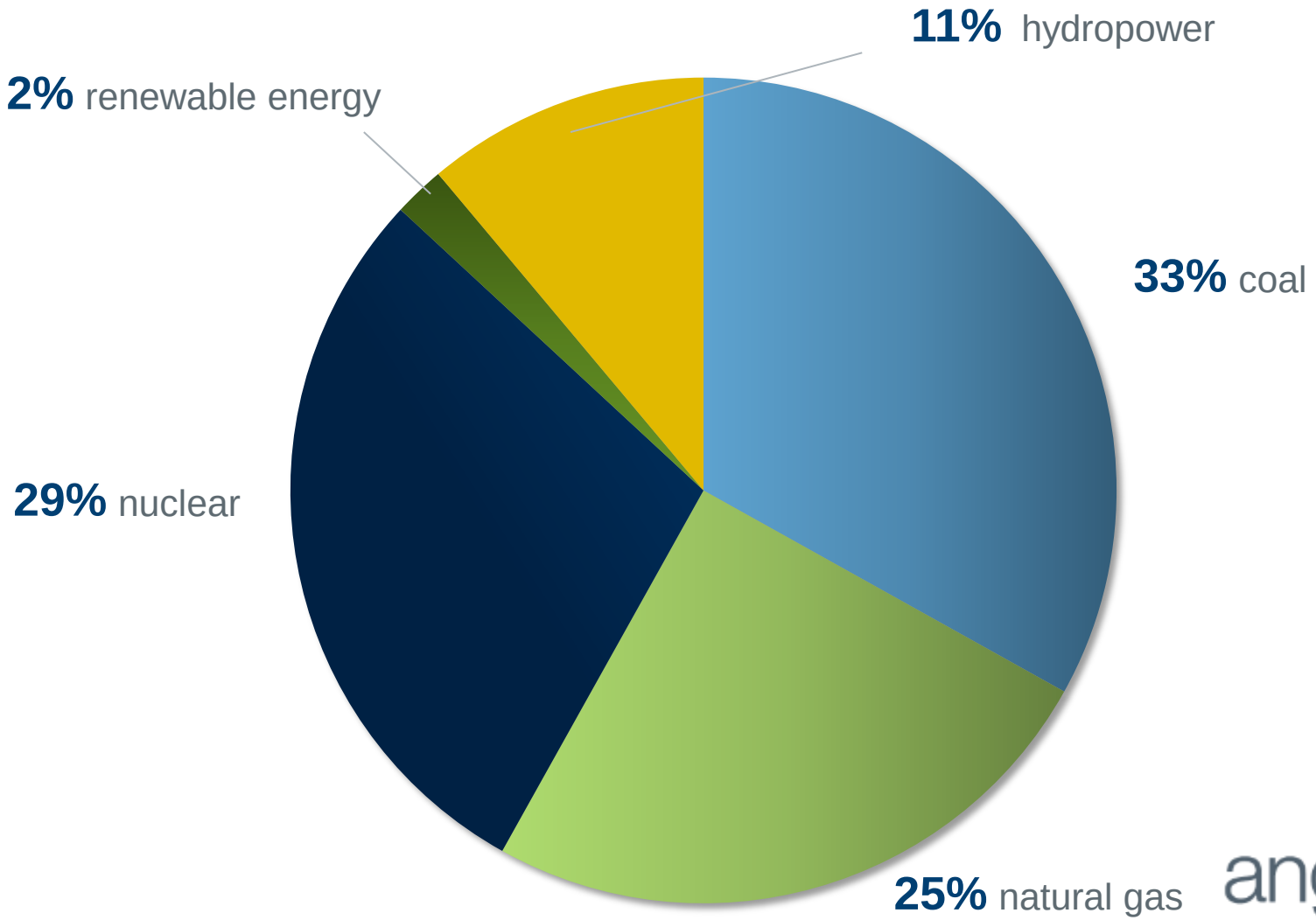
Alabama's Electricity Mix



Source: EIA, Short Term Energy Outlook, May 2013

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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.

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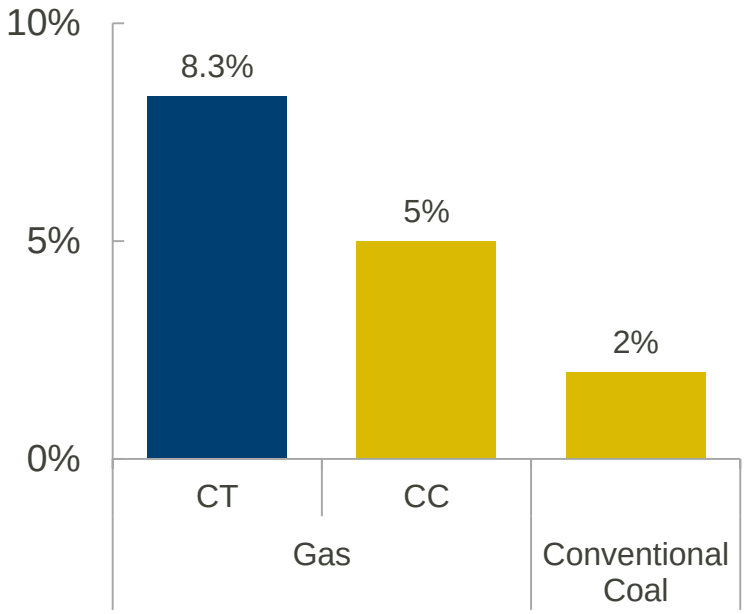
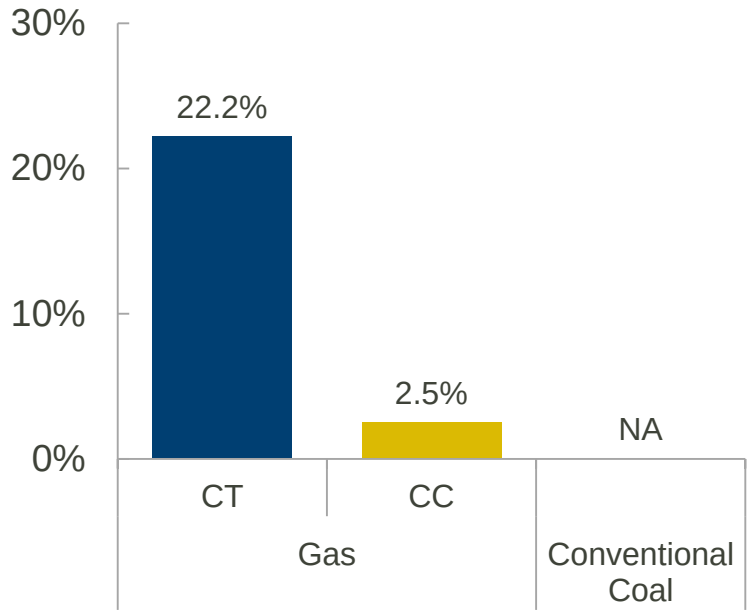
Reliability: Natural Gas Turbines Can Ramp Up Quicker Than Other Resources

Spin[1] Ramp Rate
(% of capacity per minute)



Quick Start[2] Ramp Rate
(% of capacity per minute)



CT: Simple Cycle Combustion Turbine CC: Combined Cycle

[1]Spinning ramp rates reflect the rate at which a unit can ramp up capacity when its turbine is already spinning and synchronized with the grid.
[2]Quick start ramp rates reflect the rate a which a unit can ramp up when its turbine is not synchronized with the grid.

Source: Black & Veatch

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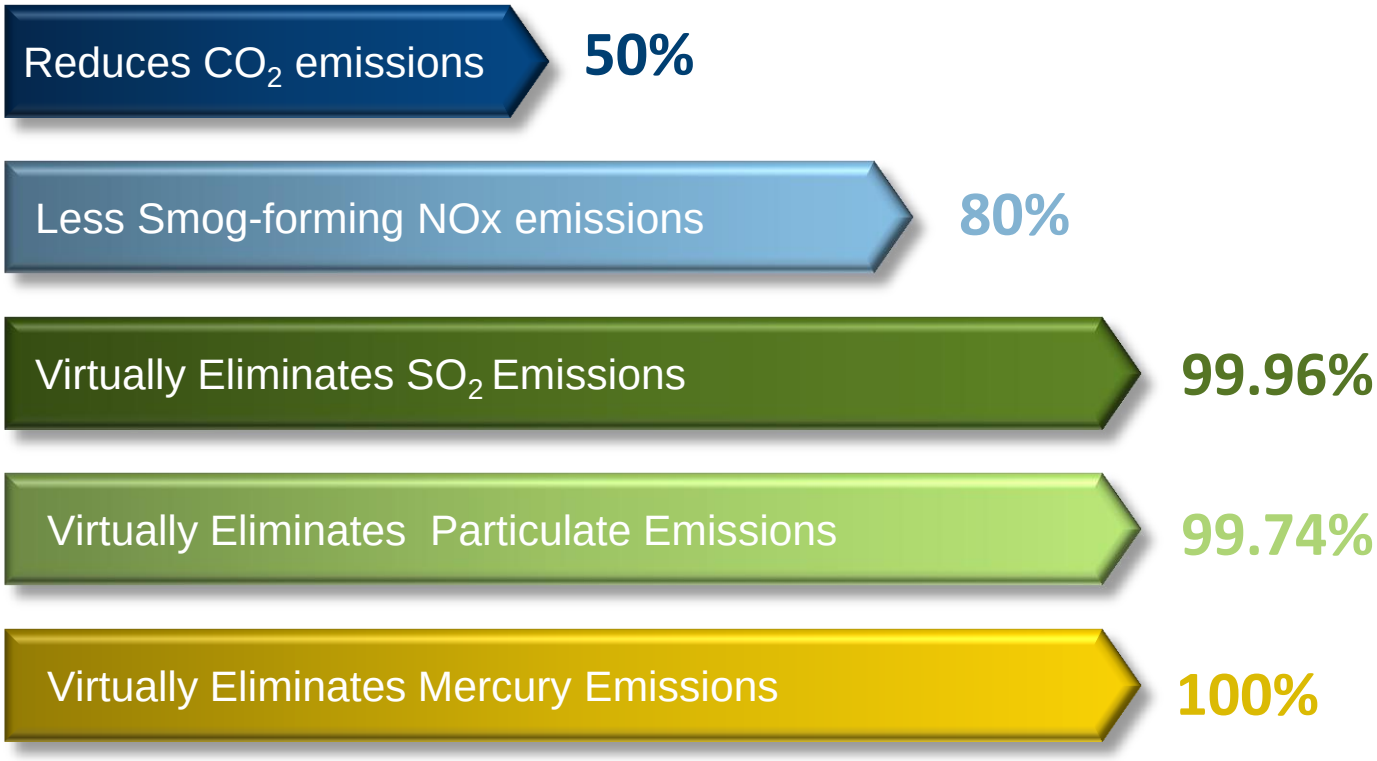
Cleaner For Power Generation

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

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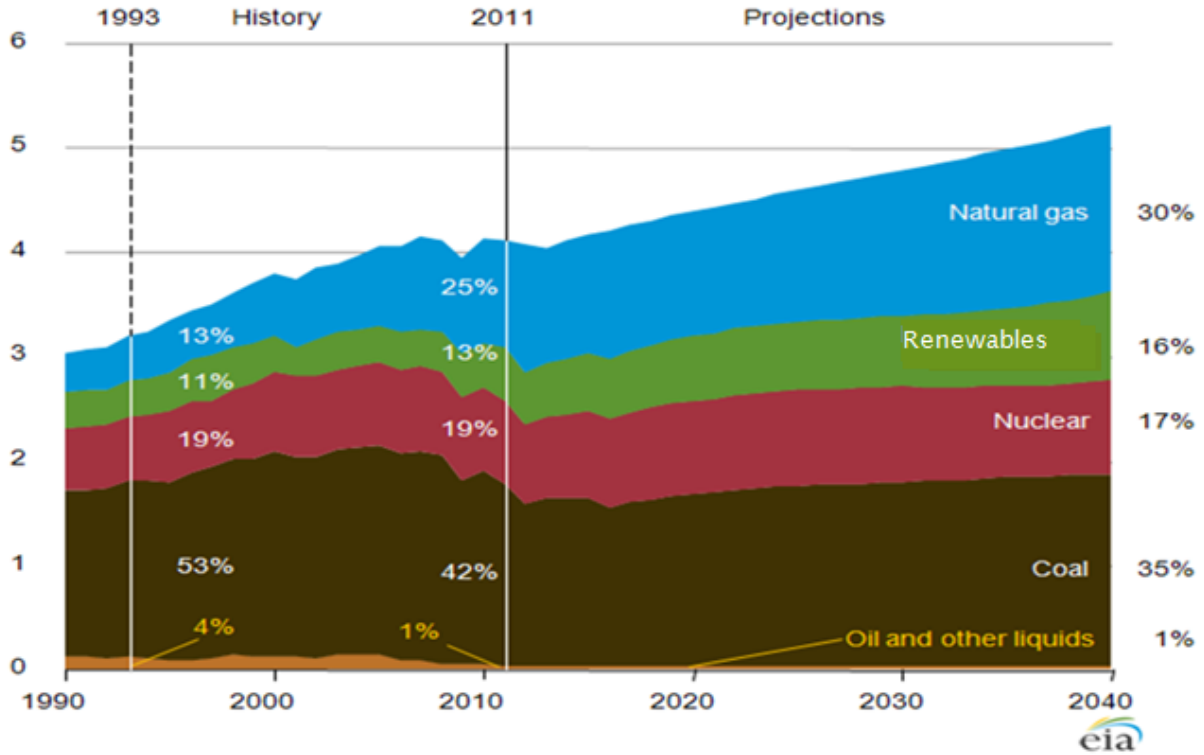
A Cleaner Energy Future on the Way

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 2013

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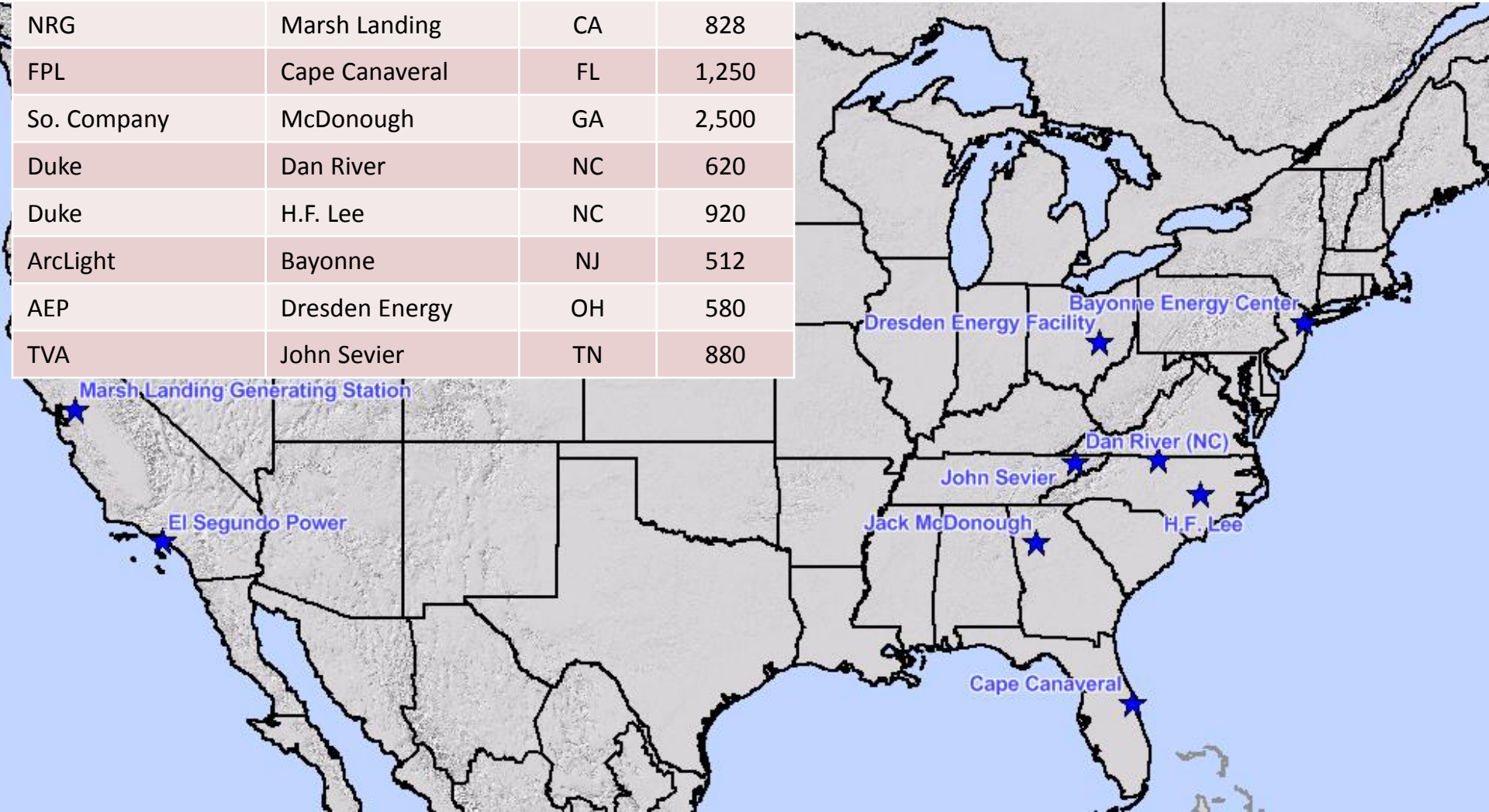
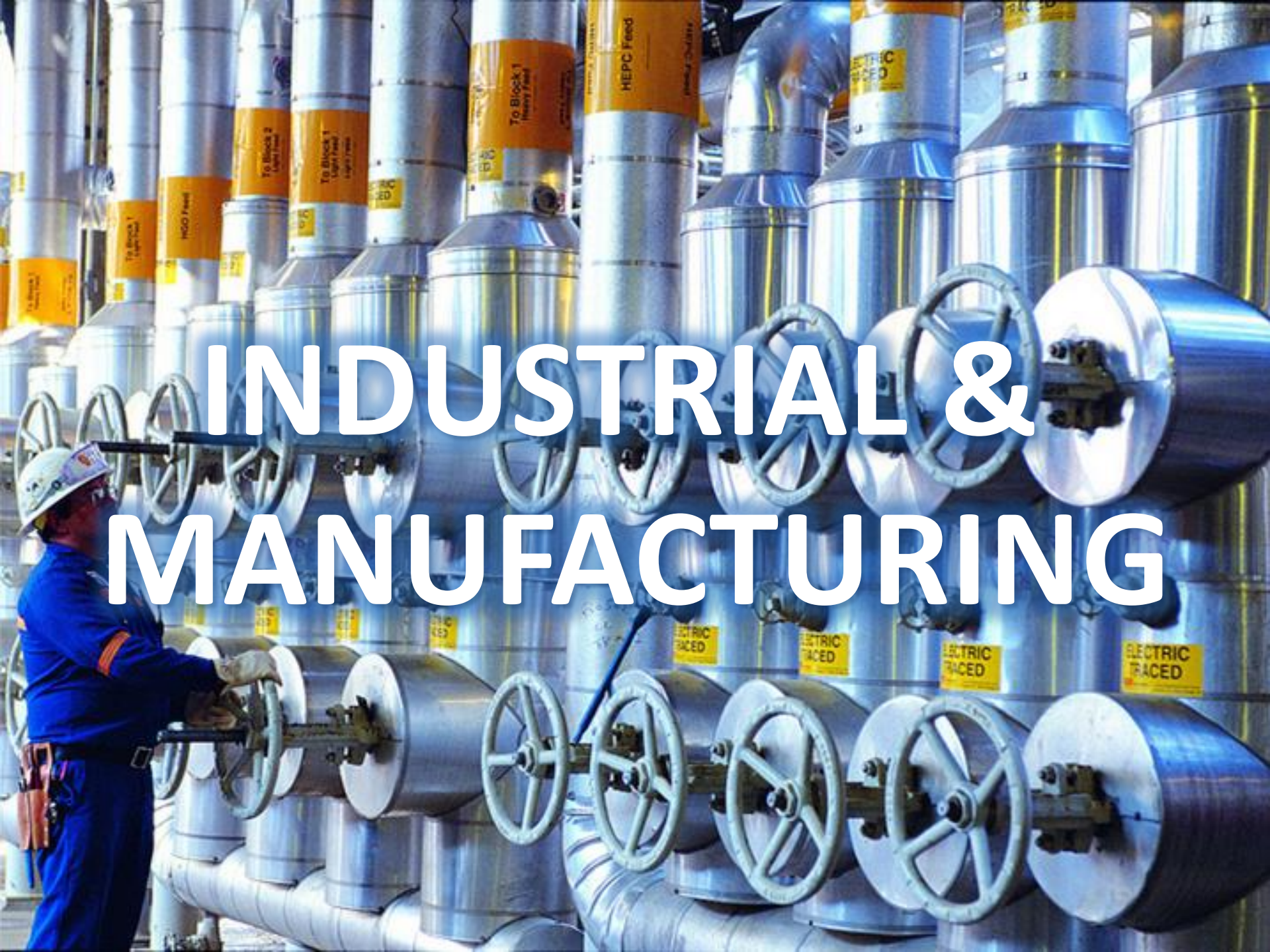
NGCC Power Plants > 500 MW (2012-2013)

Developer	Plant Name	State	Capacity
NRG	El Segundo	CA	550
NRG	Marsh Landing	CA	828
FPL	Cape Canaveral	FL	1,250
So. Company	McDonough	GA	2,500
Duke	Dan River	NC	620
Duke	H.F. Lee	NC	920
ArcLight	Bayonne	NJ	512
AEP	Dresden Energy	OH	580
TVA	John Sevier	TN	880




INDUSTRIAL &
MANUFACTURING

Natural Gas: An Industrial Renaissance

- The abundance of stably priced natural gas has provided many American companies the opportunity to revitalize their workforce and bring manufacturing operations back to America.

United States Steel

Formosa Plastics

DOW

NUCOR

McGean
Specialty Chemicals Division

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Combined Heat and Power (CHP)

- CHP provides an opportunity to better utilize the conversion heat generated from fossil-fired power generation sources.
- Attractive opportunities exist for industrial, commercial, institutional and agricultural customers
- Market Drivers:
  - Growing recognition of CHP benefits by state and federal policymakers
  - Emissions regulations impacting non-utility boilers
  - Upward pressure on electricity prices
  - Favorable natural gas outlook

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TRANSPORTATION

NGVE Benefits

- Economic Benefits
  - Lower cost fuel than diesel or gasoline
  - Significant lifetime cost savings associated with NGVE
  - Lower engine maintenance costs possible
  - Jurisdiction dependent grants / credits
- Environmental Benefits
  - Environmentally better fuel than diesel
  - Positive impact on regional air quality
  - Lower engine noise
- Energy Security Benefits
  - Domestically produced energy
  - Economic benefits through value chain
  - Displaces foreign oil

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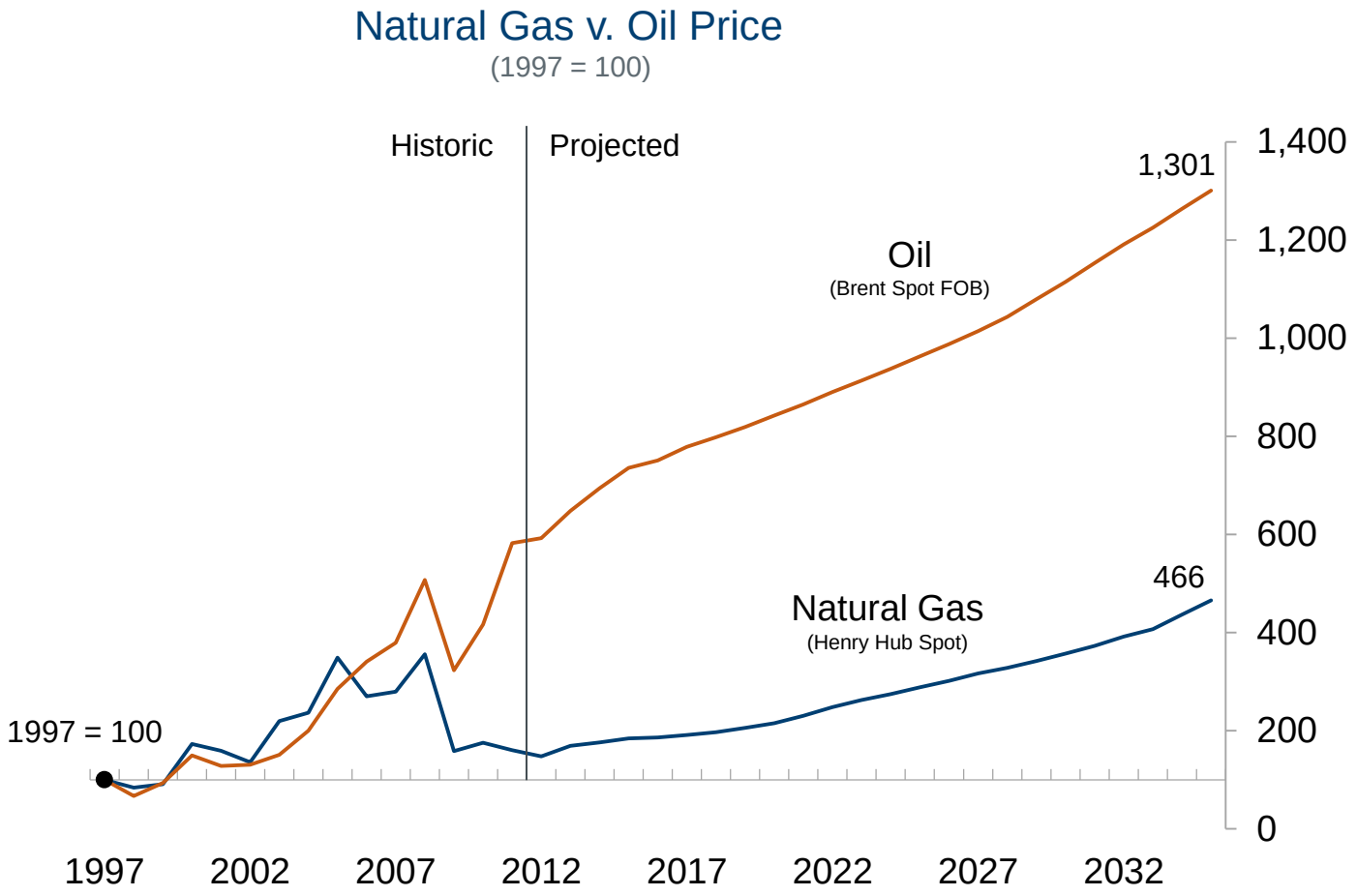
Natural Gas And Oil Prices Have Decoupled



Source: Projected Prices: EIA Annual Energy Outlook: 2012
Historic Prices: EIA reported spot prices

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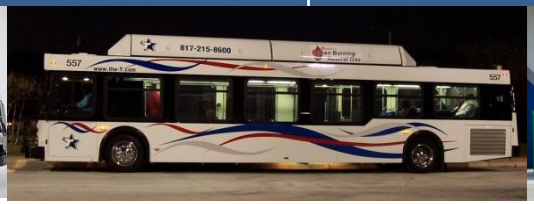
U.S. Transportation Sector Opportunity

Medium to Heavy Duty	Refuse, Public Transit, & Ports	4 Bcf/D

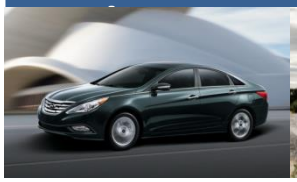




Heavy Duty On-Road	Heavy Duty Trucks	13 Bcf/D


Heavy Duty Off-Road	Mining, Marine, Rail & Construction	16 Bcf/D



Light Duty Mass	6X6 Vehicle Platform & Home Refueling	57 Bcf/D






Fleet Snapshot: AT&T

- In 2009, AT&T made a $565 million commitment to deploy approximately 15,000 AFVs over a ten-year period through 2018.
- By the end of 2011, they had
  - 3,469 CNG vehicles in service and a new private CNG station
- 2012 CNG progress
  - 1,200 Chevy Express vans (IMPCO), largest-ever CNG order for GM
  - 672 CNG Ford Transit Connect vehicles (BAF) as of May 2012…and counting.

Fleet Snapshot: Waste Management

- **Announced it will convert 100% of its nationwide fleet to CNG (18,342 trucks)**

“The company will spend about $30,000 more than the sticker price for a comparable diesel truck. The company's CNG business model is **profitable without government subsidies… The economics and payback of natural gas are so strong that it dwarfs any other technology**…This goes right to the heart of the business and the margin.**”**

- Eric Woods, Vice President of Fleet and Logistics

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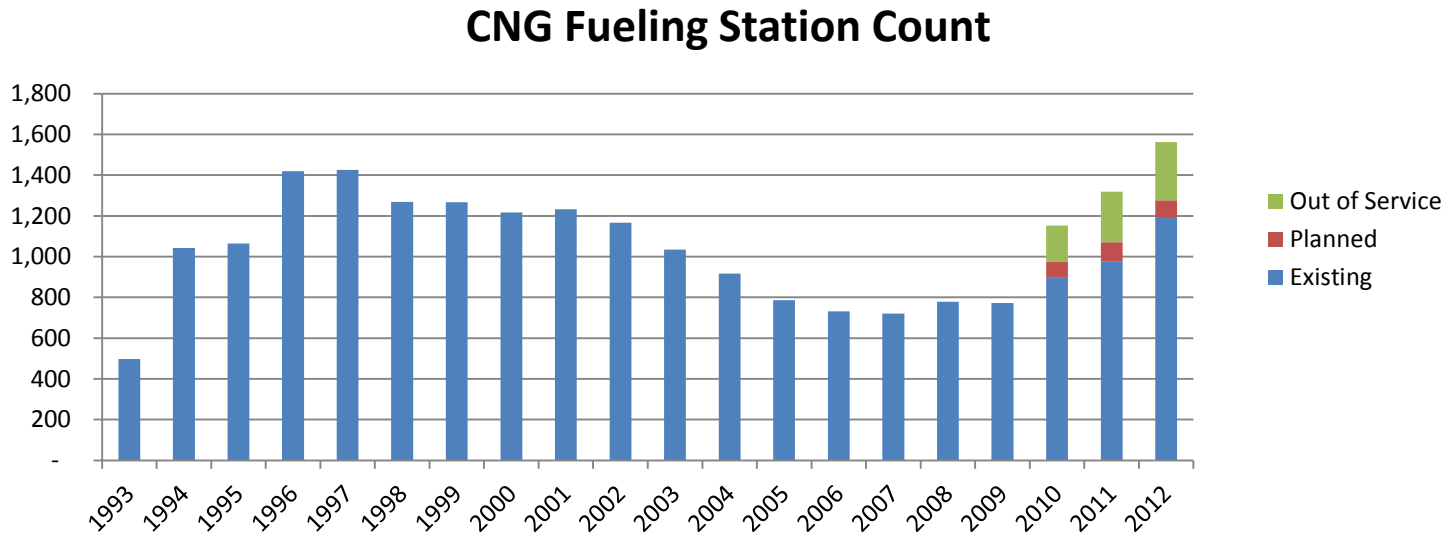
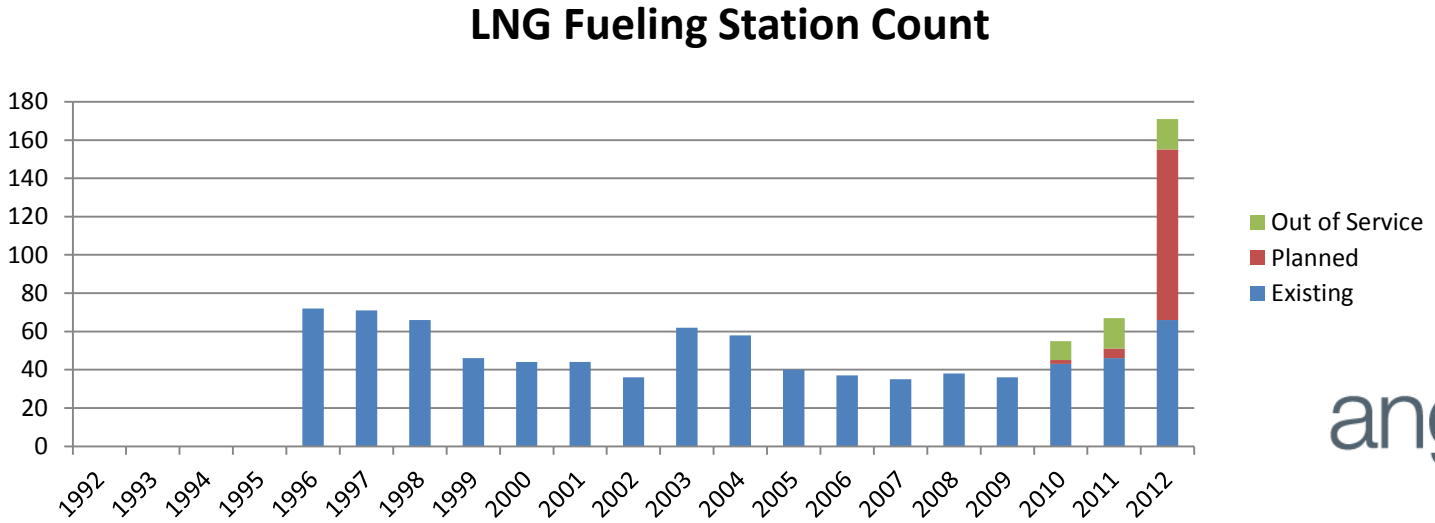
Natural Gas Fueling Station Trends





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Retail Stations Growing NG Fueling

Loves Travel Stops

stripes

TA TravelCenters of America

Pilot TRAVEL CENTERS LLC

FLYING J

GetGo from GIANT EAGLE

Clean Energy

integrys

OnCue Express

ANGA's Member Companies
Leading the Way

CNG NOW!

Emerging Markets – Marine and Rail

- Advantages of LNG as marine transportation fuel:
  - Lowers fuel costs—a key factor
  - Greatly reduces criteria pollutants (SOx, NOx and particulate matter)
  - Utilizes stable domestic fuel supply

- BNSF is testing new natural gas locomotives to combat high diesel prices
- Diesel is 4x more expensive than natural gas
- New EPA air standards will require RR industry to add expensive emissions equipment by 2015

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NATURAL GAS EXPORTS

LNG Export Concerns

- Fear:
  - All proposed LNG export projects will be built and all built capacity will be fully utilized.
  - This will lead to high domestic gas prices and volatility.
  - The result will be diversion of investment and job losses.
- Truth:
  - Abundant supplies and continued development will mitigate price and volatility impacts.
  - Global energy markets and capital markets will limit LNG export volumes.
  - Government intervention is counterproductive.

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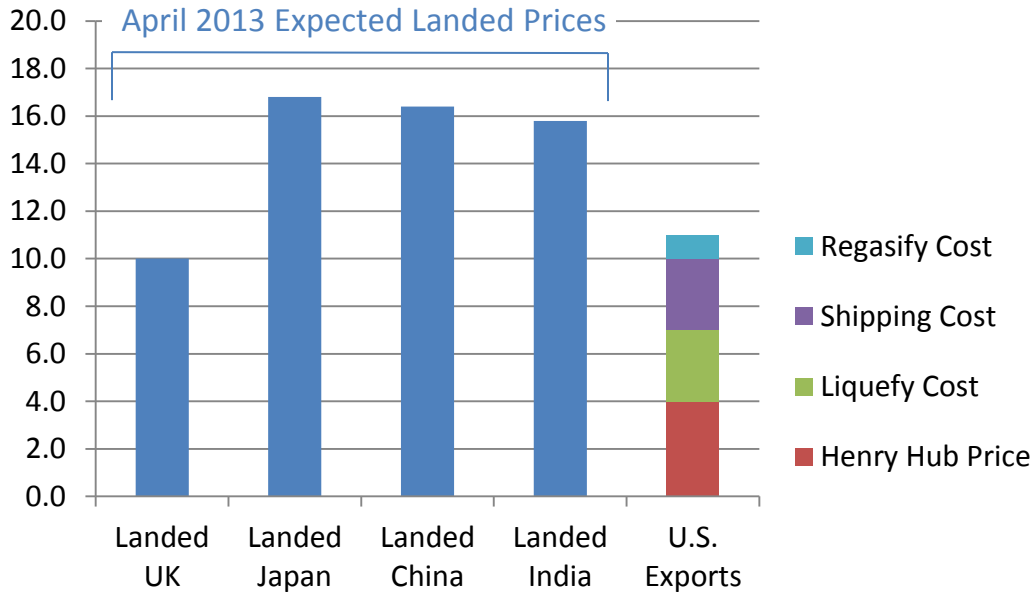
U.S. LNG Export Price Components

LNG Landed Prices and Cost of Delivered U.S. Exports ($/Dth)



- The U.S. domestic price is only one component of the total cost to export LNG from the U.S. Additional costs include liquefaction costs, shipping , and regasification costs.

- Depending on destination, these additional costs can be 2 to 3 times the current U.S. domestic price.

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The Economic Impacts of Shale Gas

- $930 billion in tax revenues
  - Cumulative to 2035
- Nearly $1.9 trillion in capital expenditures
  - Between 2010 and 2035
- 238,000 direct jobs associated with unconventional production
  - Expected to increase to 334,000 by 2015 and to 403,000 by 2020
  - 4 times higher each year with indirect jobs and induced jobs
- Lower energy prices for consumers
  - Electricity prices average 10% lower
  - Households will save an average of $926 per year between 2012 and 2015
  - This savings will exceed $2,000 by 2035

Source: IHS, “Economic and Employment Contributions of Shale Gas in the United States.” 2012

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