

# Decision-Making In A Time Of Uncertainty: Is There Ever A 'Right' Answer?

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# Basic Truths About Electricity

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**“You Know What I Want More Than Cheap Electricity? I Want Electricity.” – Paul Patton, Former Governor Of Kentucky**

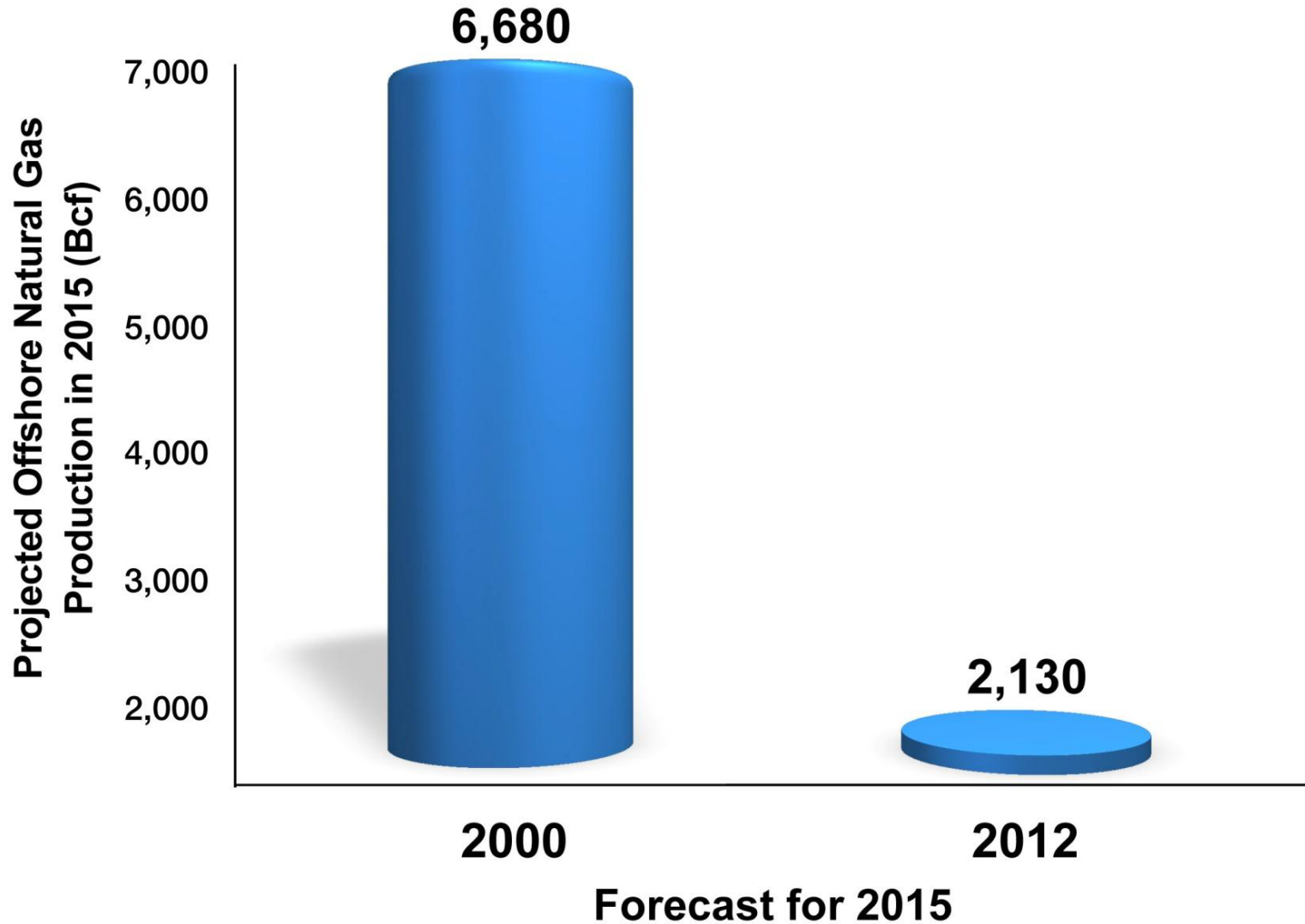
**“Juice From The Grid Now Penetrates Every Corner Of Our Lives, And We Pay No More Attention To It Than We Do To The Oxygen In The Air.” – National Geographic**

**“In Our Business We Build Plants For 40 To 60 Years, So We Have To See (Deep) Into The Future.”**

**-- Jim Rogers, CEO Of Duke Energy**

# How Go The Prognostications?

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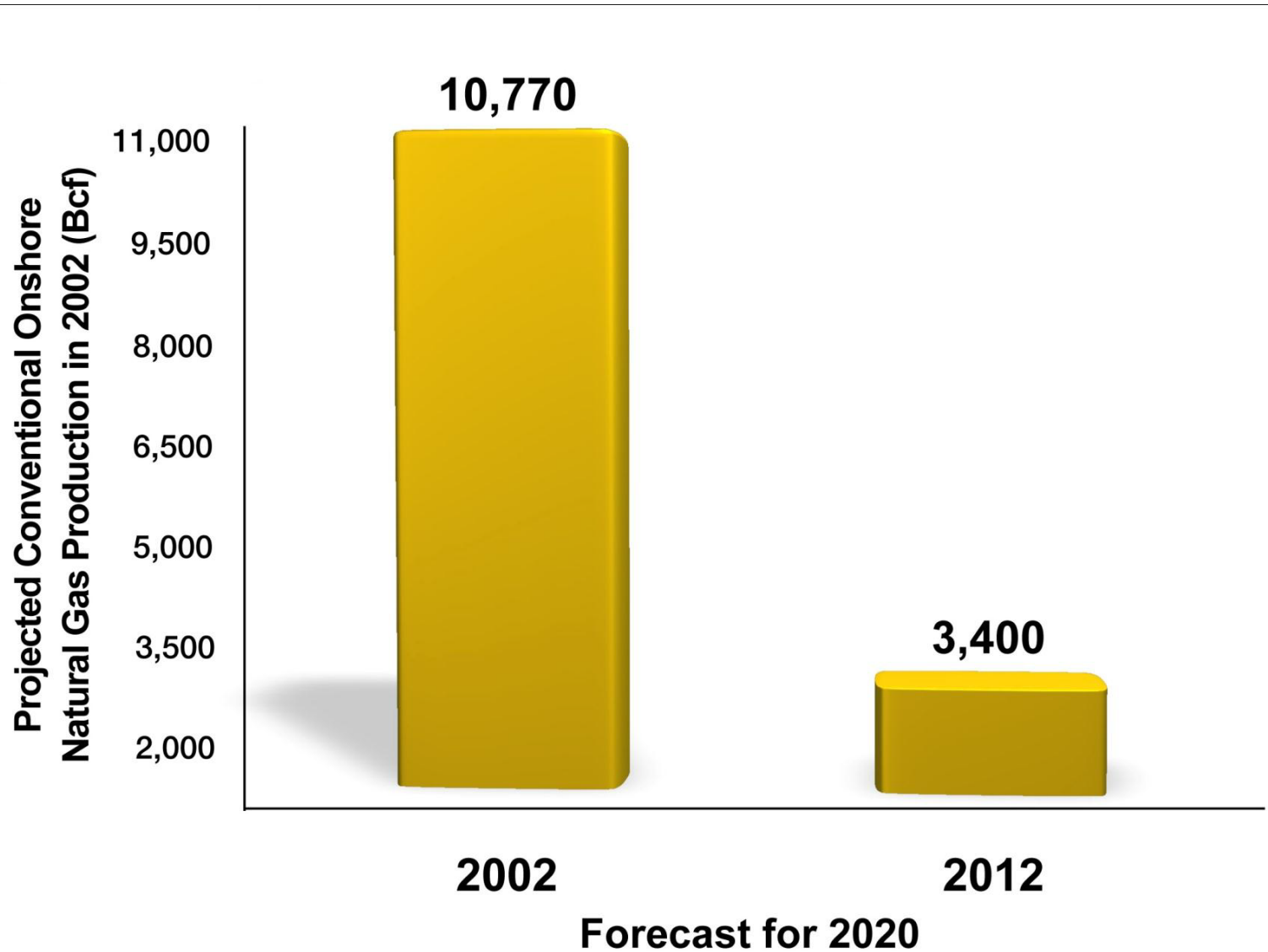


Source: U.S. Energy  
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# How Go The Prognostications?



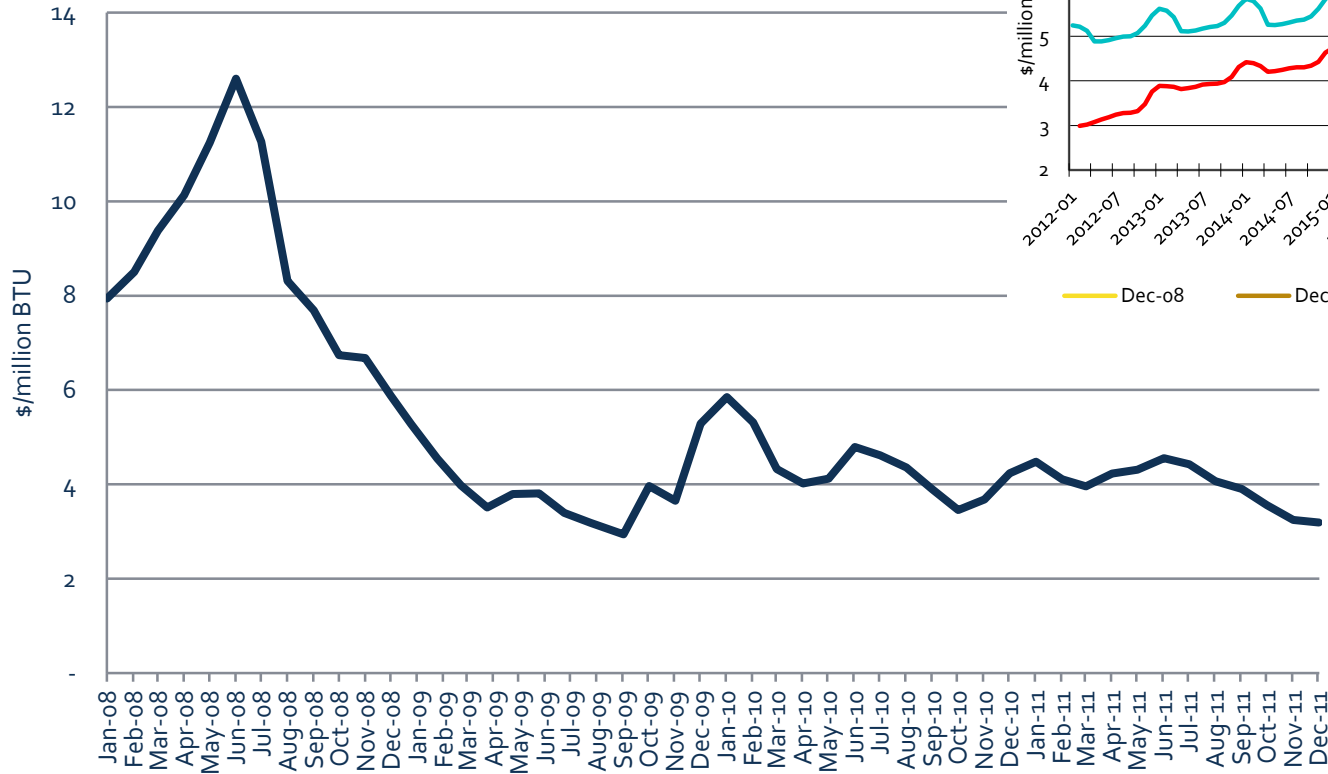
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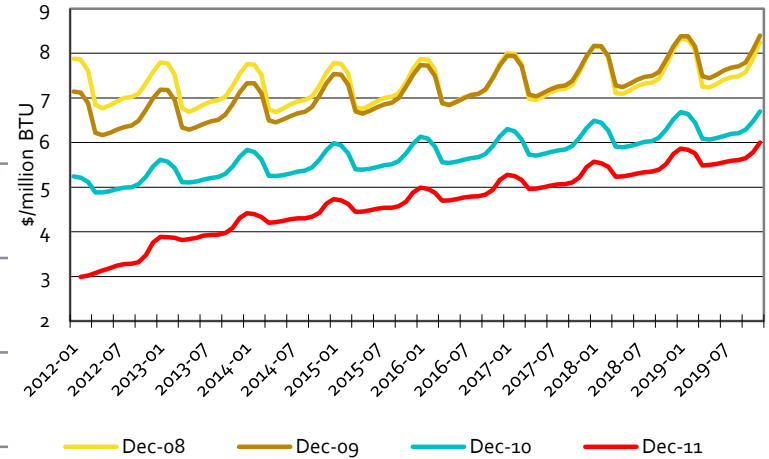
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# The Fly In The Ointment

## Henry Hub Spot Price



## Henry Hub Futures Price



Source: EEI

# Snapshot Of Today's Significant Utility Challenges

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- Aging utility infrastructure
- Federal/state environmental/renewable requirements
- New technology deployment
  - Smart grid, alternative generation
- ***Flat to marginal growth in power sales***

# Aging Infrastructure

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- **Substantial Infrastructure Spending Requirements...**

- \$1.8 trillion over 20 years for electric\* --- 2.4 times net book value of current asset base
- \$335 billion over 20 years for water; \$1 trillion, including waste water\*\*

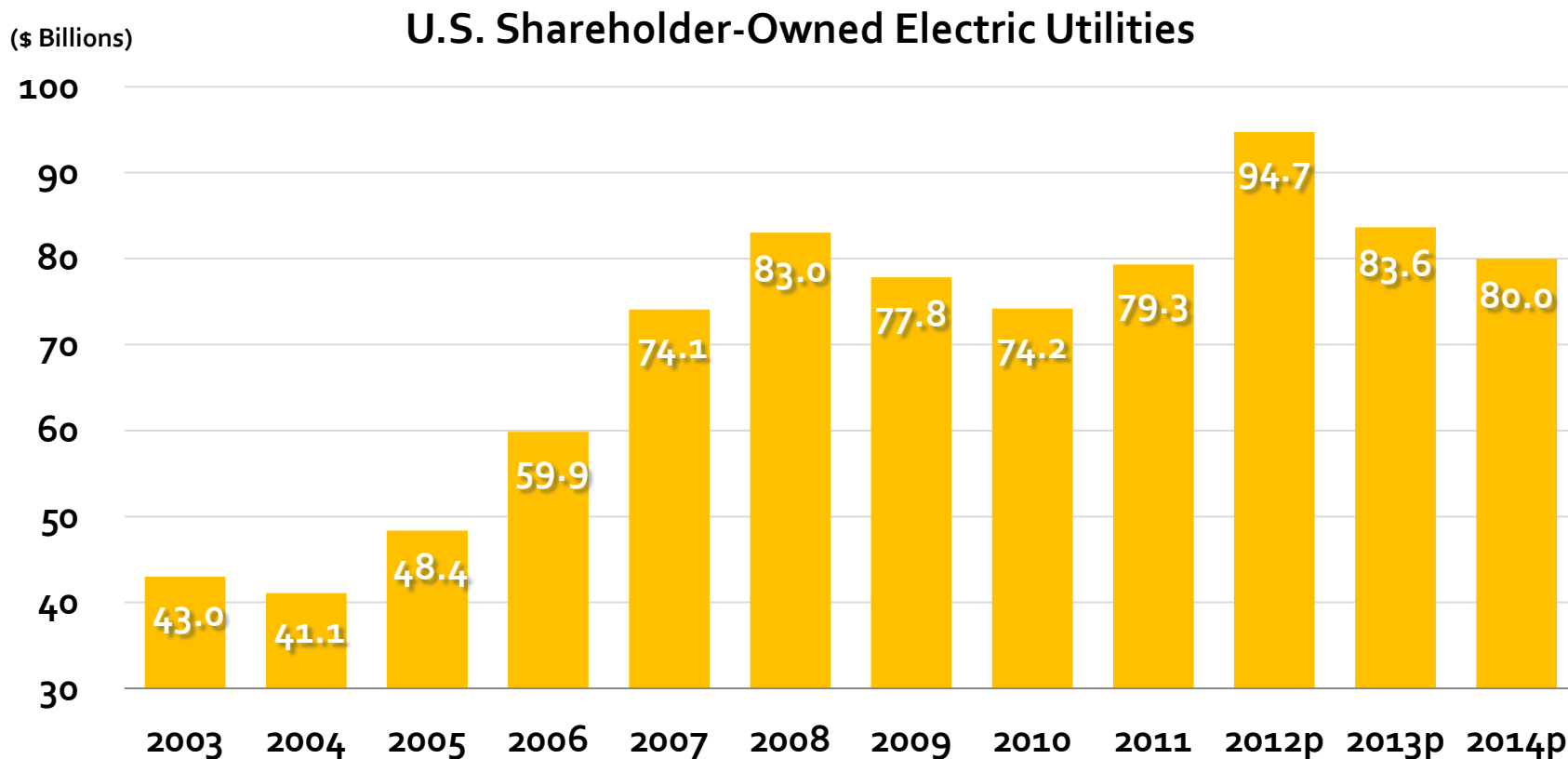
- **... As Utility Physical Plant Ages:**

- About 45% of total electricity generating capacity is greater than 30 years old; about 20% is greater than 40 years old
- About two-thirds of coal capacity is at least 30 years old; about one-third is greater than 40 years old
- About 70% of transmission lines are at least 25 years old

\*Brattle Group estimates

\*\*EPA estimates

# EEI's Capital Expenditure Forecast



Source: Edison Electric Institute Finance Department, company reports, SNL Financial (June 2012)



# An Environmental Compliance Juggernaut

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- **Environmental Mandates**

- EPA Regulations

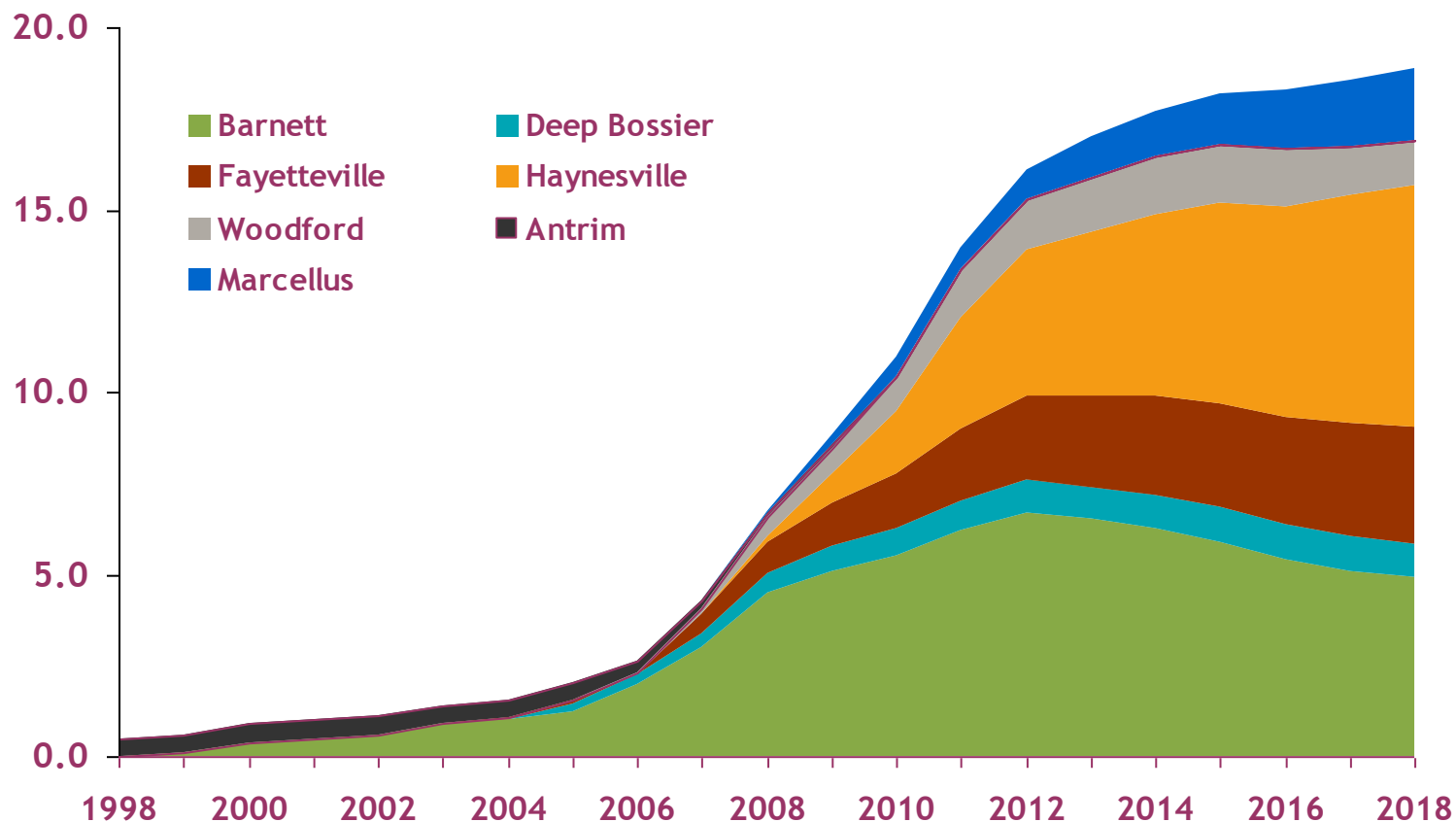
- Cross-State Air Pollution Rule (currently under legal challenge)
    - MACT
    - Cooling Water Intake (316(b))
    - Ash Disposal
    - Greenhouse Gas Restrictions

- **Industry Response**

- Retrofit, repower, or retire virtually entire coal fleet (~53GW announced through 2022, ~34MW of which will be retired)

# The Bull In The China Shop

## Shale Gas Production



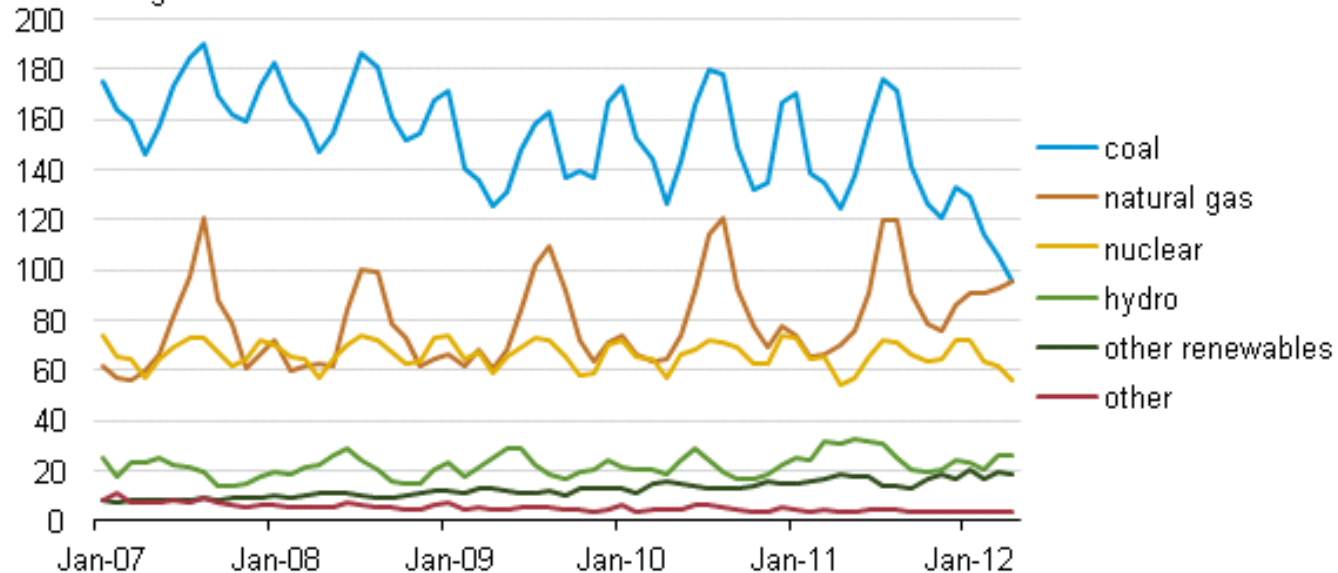
Source: Tristone Capital, Devon Energy

# Monthly Gas- And Coal-Fired Generation

Equal For The First Time (April 2012; 32%)\*

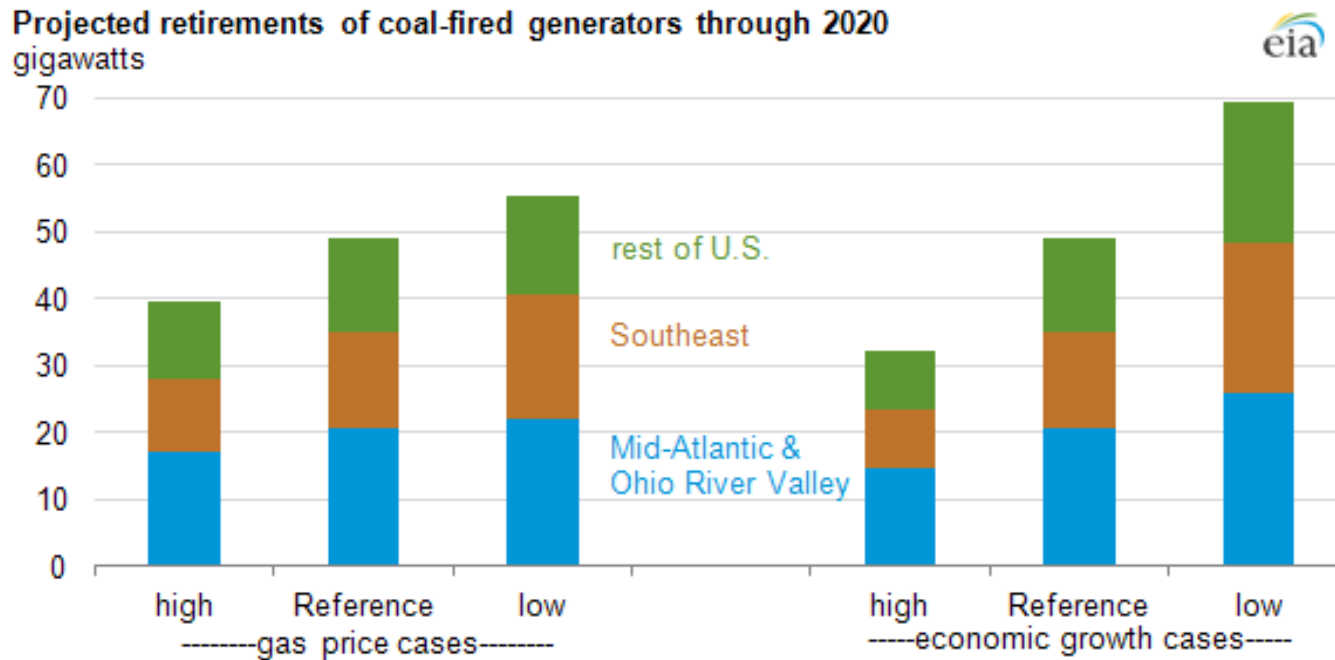
U.S. monthly net electric power generation, January 2007 – April 2012

million megawatthours



\*Preliminary; Source: U.S. Energy Information Administration

# EIA's Coal Plant Retirement Scenarios



Energy Information Agency,  
July 31, 2012

# The 'Shale Gale'

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- **93 gigawatts of gas-fired capacity additions over next ten years\***
  - YTD 2012 electric sector consumption of gas increased 21% over 2011
  - 24,000 miles of pipeline will be necessary to transport the fuel to new gas plants
  - Adjustments may be necessary to traditional scheduling protocol: firm versus interruptible transportation contracts
- **Incremental coal capacity is in doubt**
- **Renewable alternatives are substantially disadvantaged**

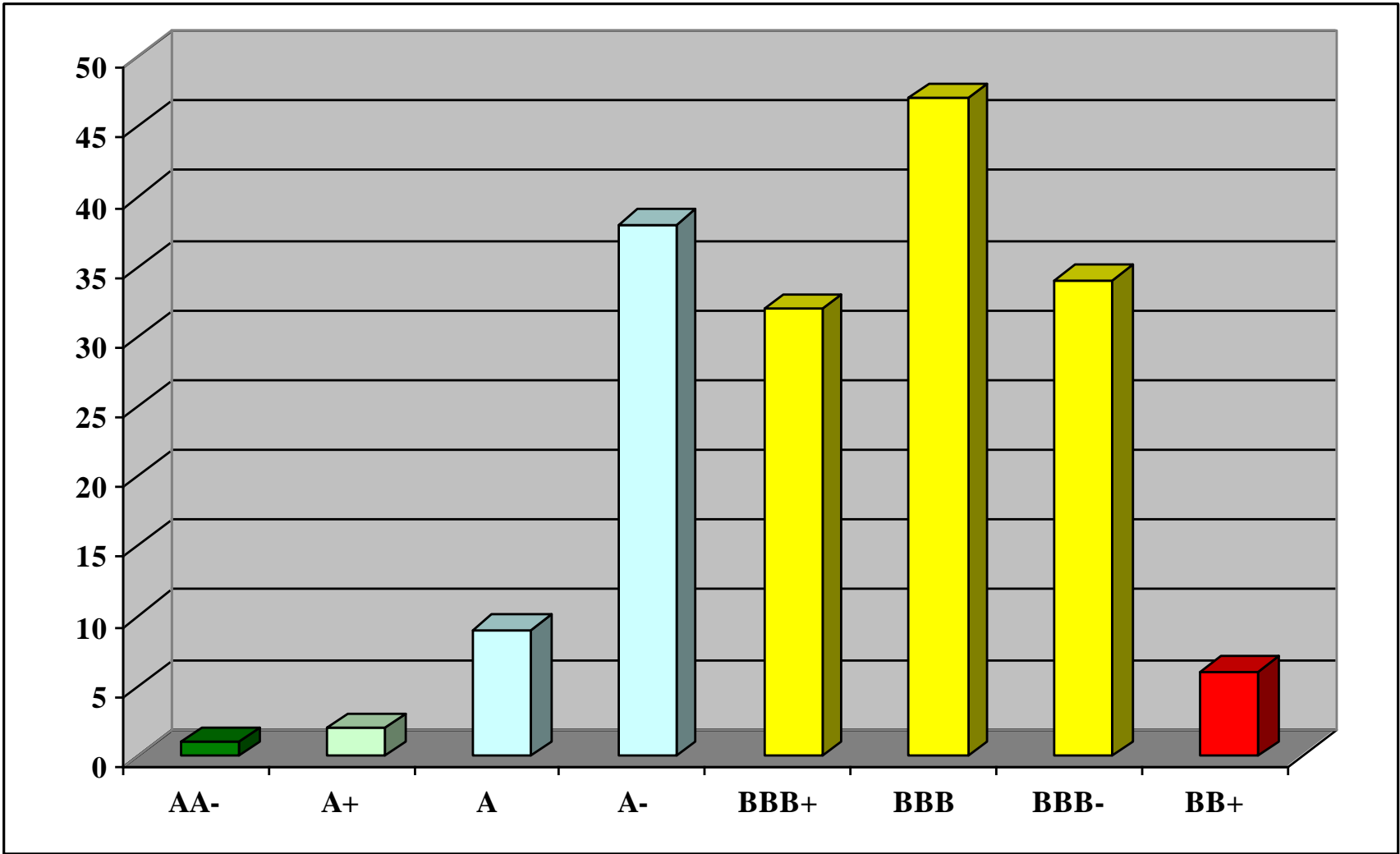
\*North American Electric Reliability Corp. estimate

# Smart Grid

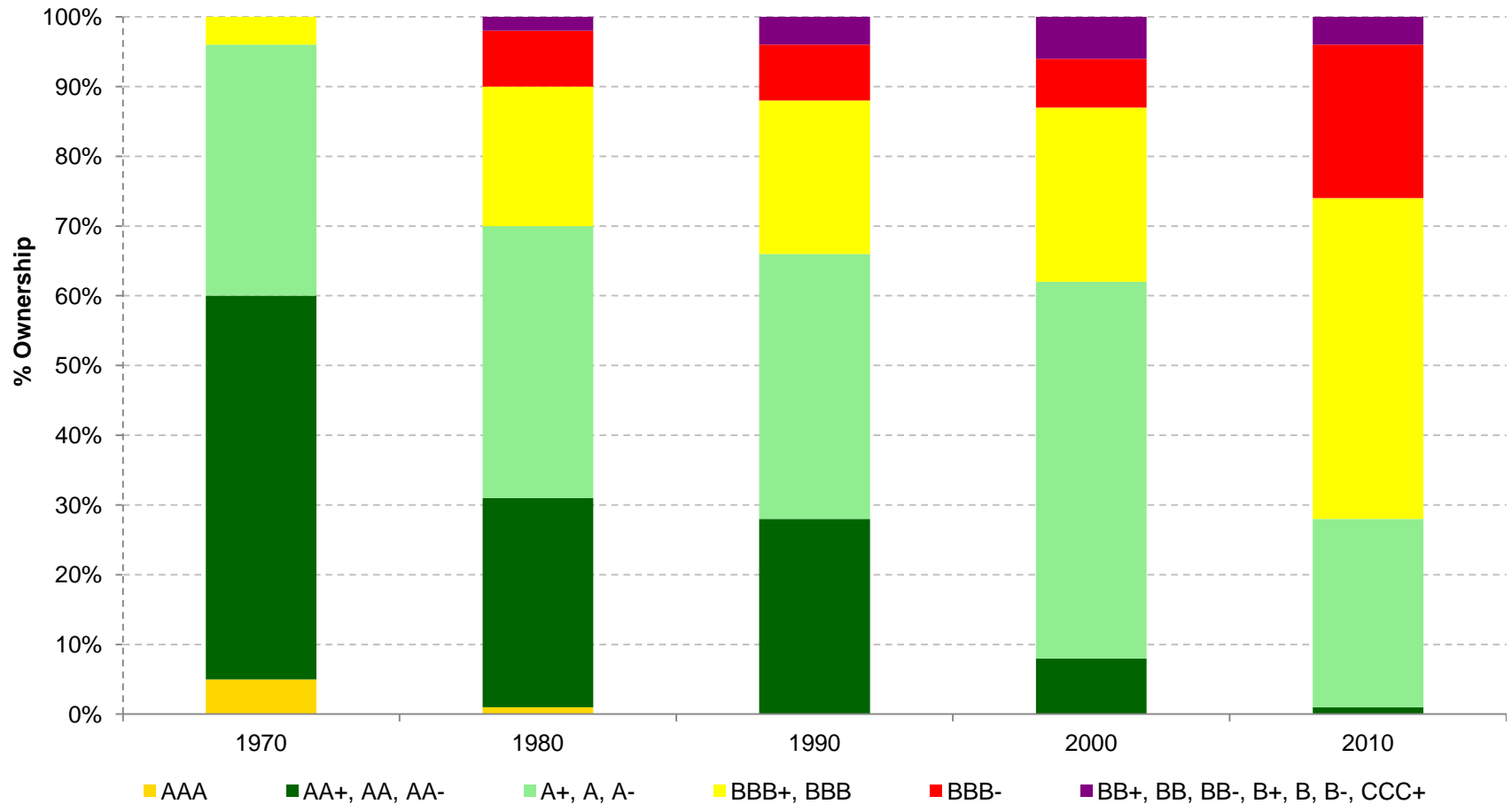
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- **Enables two-way flow of electricity and information, automates controls for a widely distributed energy delivery network**
  - Implications
    - An industry that is no longer primarily dependent on central station power and one-way power flow
    - An industry that is increasingly dependent on distributed and central station renewables/storage
    - Increased usage of demand response

# Electric Utilities Ratings --- Emphatically High Grade, But...



# Credit Quality Has Eroded Considerably In 40 Years



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