



**Edison Electric Institute**

*Power by Association<sup>SM</sup>*

# The Utility Challenge: Transitioning the U.S. Generation Fleet

Institute for Regulatory Policy Studies  
Jurisdictional Forum Shopping: Ripples in the Stream  
April 21, 2011  
Springfield, IL

# Scope of Remarks

- I. Industry “Prism”
- II. Today’s Landscape for Strategic Decisions
- III. Additional Challenges
- IV. Concluding Remarks

# I. Industry Prism

# Objectives

- Minimize economic impacts to consumers
- Continue environmental improvements
- Maintain system reliability
- Maintain fuel diversity options
- Develop and deploy new technologies
- Obtain access to capital and cost recovery
- Negotiate myriad political landscapes

# Minimizing Consumer Impacts

- Long investment horizons (20-30 years) require some 'educated predictions' of expected future legislative, regulatory and policy actions
  - Proper planning means that utilities cannot – and do not – plan one rule at a time; utilities need to take a comprehensive view
- Avoid the cost, uncertainty and delay of litigation

# Continue Environmental Improvements

- Emissions
  - From 1980 to 2010, the power sector has reduced annual emission of SO<sub>2</sub> by 70 percent and NO<sub>x</sub> by 70 percent.
- Demand/generation
  - Electricity demand has increased 79.0% between 1980 and 2010 and 38.2% between 1990 and 2010.

## Sources

1. Emissions: EPA, 2011
2. Demand/generation: EIA Annual Energy Review 2009 and the EIA Electric Power Monthly--March 2011 Edition.

# Maintaining System Reliability

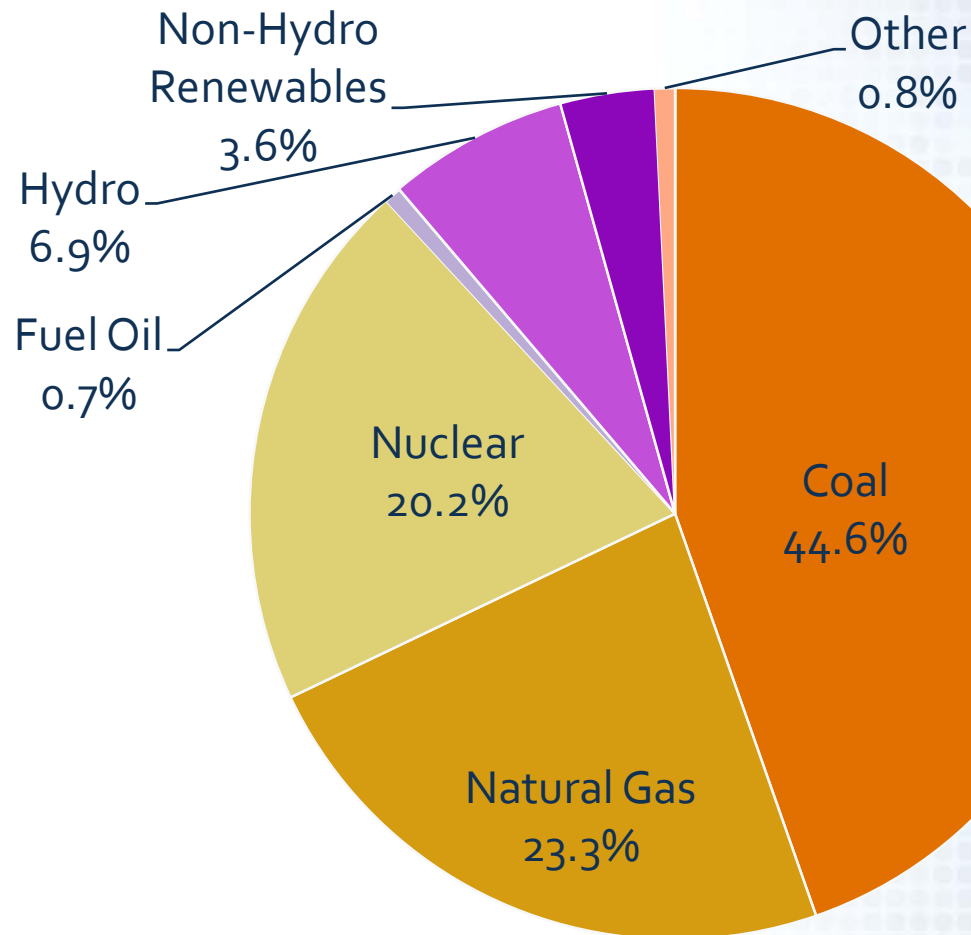
- Preserve system integrity through transmission and by maintaining adequate reserve margins
  - Transmission issues (voltage support, load pockets, etc.) can dictate what units must run
  - Timing and integration of new construction (i.e., before retirement of “old” units)
  - Adequate base load, peaking capacity and renewable capacity
  - Coordinated maintenance programs to accommodate retrofit outages

# Fuel Diversity and Innovative Generation Technologies are Critical

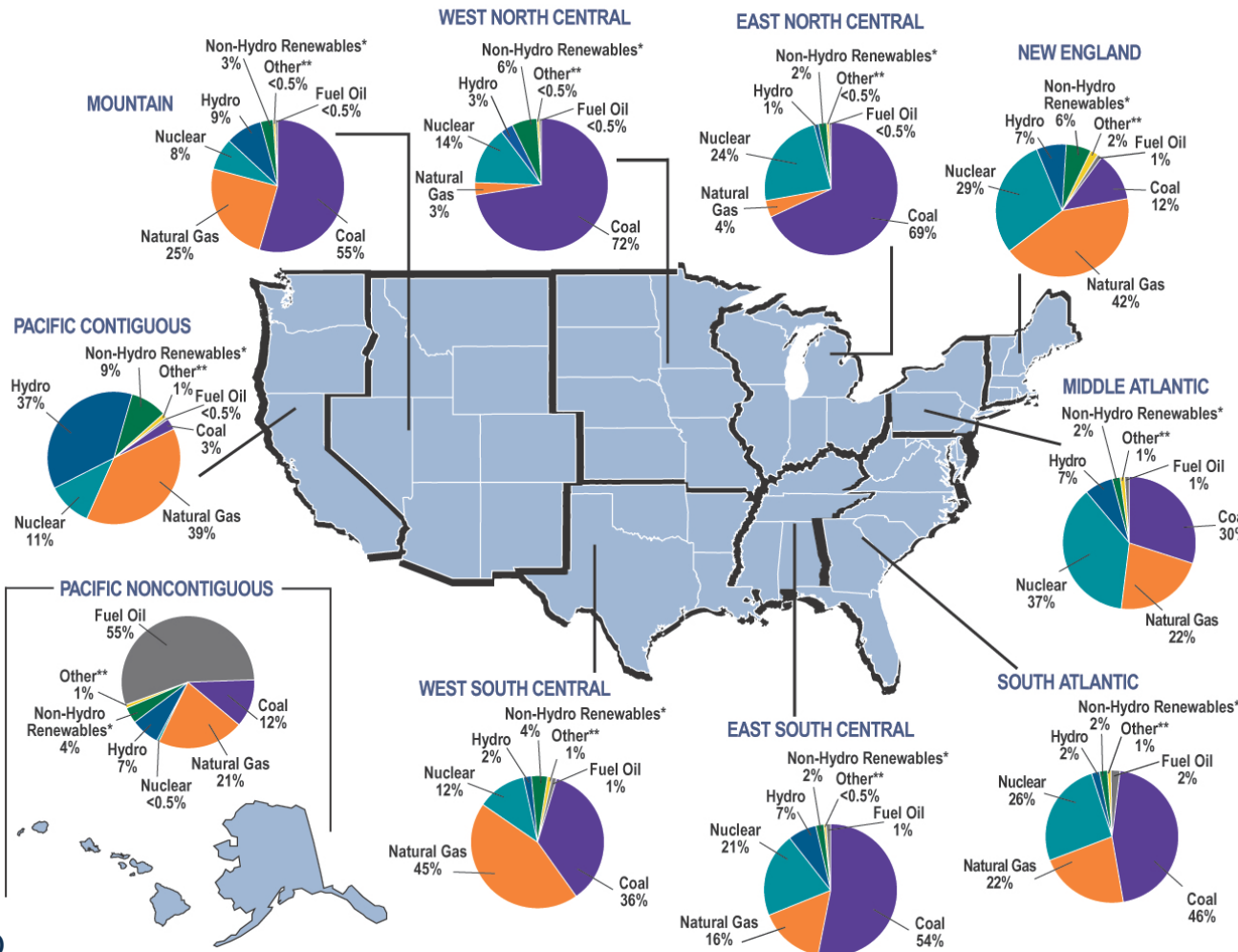
- Meet future energy demand
- Provide affordable, reliable energy
- Establish energy security
- Generate energy efficiently with minimal environmental impact



# Electric Companies Use A Diverse Mix of Fuels to Generate Electricity



# Different Regions of the Country Use Different Fuel Mixes to Generate Electricity



\*Includes generation by agricultural waste, landfill gas recovery, municipal solid waste, wood, geothermal, non-wood waste, wind, and solar.

\*\* Includes generation by tires, batteries, chemicals, hydrogen, pitch, purchased steam, sulfur, and miscellaneous technologies.

Sum of components may not add to 100% due to independent rounding.

Source: U.S. Department of Energy, Energy Information Administration, Power Plant Operations Report (EIA-923); 2009 preliminary generation data.

May 2010

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# Maintain Access to Capital and Cost Recovery

- Wall Street restructuring: access to capital markets and increasing cost of capital for needed utility investments
  - As a capital-intensive industry, reduced access to capital markets at higher costs places a premium on enhanced liquidity and financial flexibility
- PUC approvals processes
  - Approval of Integrated Resources Plans (IRPs)
  - Prudency review of expenditures
  - Least-cost compliance demonstration
  - Avoiding stranded assets (aka premature or improper shutdowns and retirements)
  - Coordination within a state or region – integrated resource planning requirements, reliability organizations

# Negotiate Myriad Political Landscapes

- State
  - Regulatory and legislative initiatives
  - State/regional GHG programs (AB 32, RGGI, WCI, etc.)
- Federal
  - EPA – air, ash, water and greenhouse gas regulation
  - FERC – transmission siting, energy efficiency, market design
- Administration and Congress
  - President's push for a Clean Energy Standard
  - EPA (de)funding?
  - Proposals for regulatory delays?
  - Additional economic analysis

## II. Today's Landscape for Strategic Decisions

# Coal Units by Age, Capacity and Emissions

## U.S. Generating Units, 10 Year Increments

Age of Units*	Generating Units		Total Nameplate Capacity		Total Net Generation Year 2008		Total CO <sub>2</sub> Emissions Year 2008		Total SO <sub>2</sub> Emissions Year 2008		Total NO <sub>x</sub> Emissions Year 2008	
	#	Percent of Total	GW	Percent of Total	GWH	Percent of Total	MTons	Percent of Total	Tons	Percent of Total	Tons	Percent of Total
0-10 Years	16	1.4%	5.3	1.6%	19,788	1.1%	28.7	1.4%	18,083	0.2%	13,779	0.5%
11-20 Years	64	5.8%	14.9	4.5%	78,261	4.2%	78.1	3.8%	137,803	1.9%	108,115	3.8%
21-30 Years	186	16.7%	86.1	26.1%	541,408	29.0%	615.0	29.6%	1,336,033	18.0%	763,207	26.9%
31-40 Years	238	21.4%	122.5	37.1%	724,206	38.8%	780.7	37.6%	2,750,025	37.1%	1,053,259	37.1%
41-50 Years	270	24.3%	60.8	18.4%	316,029	16.9%	352.2	16.9%	1,879,152	25.4%	533,038	18.8%
51-60 Years	304	27.3%	39.3	11.9%	187,473	10.0%	220.7	10.6%	1,265,388	17.1%	356,902	12.6%
61-70 Years	30	2.7%	0.9	0.3%	1,166	0.1%	2.5	0.1%	19,223	0.3%	6,554	0.2%
> 70 Years	4	0.4%	0.0	0.01%	5	0.0003%	0.1	0.004%	87	0.001%	484	0.02%
<b>Coal Unit Totals</b>	<b>1,112</b>	<b>100.0%</b>	<b>329.95</b>	<b>100.0%</b>	<b>1,868,336</b>	<b>100.0%</b>	<b>2077.9</b>	<b>100.0%</b>	<b>7,405,794</b>	<b>100.0%</b>	<b>2,835,339</b>	<b>100.0%</b>

Source: Ventyx, Inc.—EV Suite

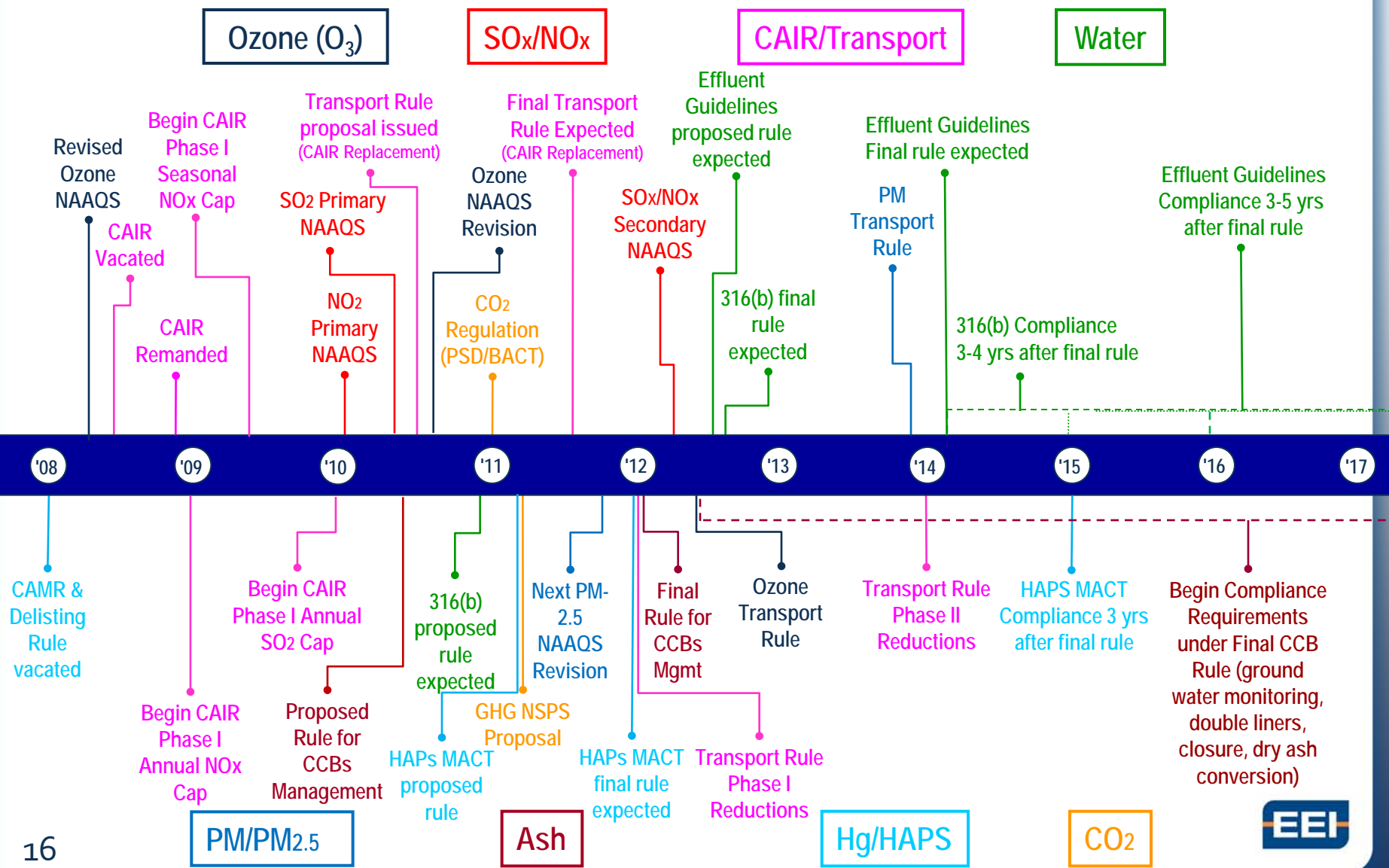
Mton = million tons

\* Does not include units that came online in 2009

# Announced Coal Plant Retirements

- IOUs have announced plans to retire ~20 GW of coal-fired generation between 2010 and 2022
  - ~6% of the coal fleet in 2010
  - Most will be 50-60 years old upon retirement
  - Variety of reasons – fuel and/or compliance costs, consent decrees, age, etc.
  - Some will be replaced with natural gas, which will significantly reduce SO<sub>2</sub>, mercury and CO<sub>2</sub> emissions at those plants
- TVA and other non-IOU power entities have announced plans to retire more than 1,000 MW of coal-fired generation
  - TVA may add another 3,700 MW of retirements by 2017

# Possible Timeline for Environmental Regulatory Requirements for the Utility Industry





# What is the Potential Impacts of these EPA Rules on Existing Generation Fleet?

- Numerous analyses on potential impacts of EPA rulemaking
- Every analysis uses different assumptions making comparison difficult
- Estimates of cumulative coal plant retirement range from ~30 to 70 GW
- Very few of the analyses consider future regulation of CO<sub>2</sub>
- Addressing GHG emissions and EPA regulations will be costly
  - Could cost up to \$200 billion in additional CAPEX by 2015
  - Industry already has capital expenditures of \$80 billion annually

# Climate Legislation

- Progress during 111<sup>th</sup> Congress, but Senate unable to close the deal
- Some House members taking hits for “yes” votes on Waxman-Markey
- Prospects in 112<sup>th</sup> Congress?
  - Cap-and-trade is on life support
  - All proposals have same problem: need 60 votes
- EPA regulatory activity remains a catalyst

# State Climate Activities

- Regional programs continuing, albeit at different levels
  - RGGI (12 states)
  - MGGA (6 states)
  - WCI (6 states)
- CA law to take effect in 2012; some uncertainty due to recent court decision
- Overall state activity could increase in absence of federal legislation...
- ... *but* level of state opposition to increased costs in this economic landscape also is growing

# Climate Litigation

- Some courts have allowed states/individuals to sue GHG emitters under common law tort principles
  - AEP v. Connecticut (U.S. Dec. 6, 2010): federal common law action that seeks CO<sub>2</sub> emissions reductions from five electric utilities; Supreme Court review granted and oral arguments scheduled for April 19, 2011
  - Comer v. Murphy Oil (U.S., Jan. 10, 2011): federal and state tort law suit that seeks monetary damages from CO<sub>2</sub> emitters for Hurricane Katrina impacts; Supreme Court denied review of 5<sup>th</sup> Circuit decision, effectively reinstating district court decision barring suit
  - Kivalina v. ExxonMobil: native community seeking damages for moving village because of rising sea levels; district court disallowed suit, but appeal pending in 9<sup>th</sup> Circuit
- In absence of legislation, tort suits against GHG emitters are expected to increase, following tobacco and asbestos precedents

# Summary of Industry's Predicament

- Industry will need to comply with pending EPA regulations on air, water, and coal ash on or around 2015
  - Will require retrofit, retirement or replacement of substantial portion of existing coal fleet in short period of time
  - Could impact reliability; need to assess feasibility; regional differences
- Yet, without a long-term carbon policy, industry faces the possibility of stranded investments
- Need both a satisfactory resolution of the current regulatory challenges and a long-term legislative solution on carbon to allow for the most efficient transition to a cleaner generation fleet

## III. Additional Considerations

# A Paradigm Shift

Illustrative

**THEN...** large periodic projects to support strong load growth required infrequent, but major, rate cases



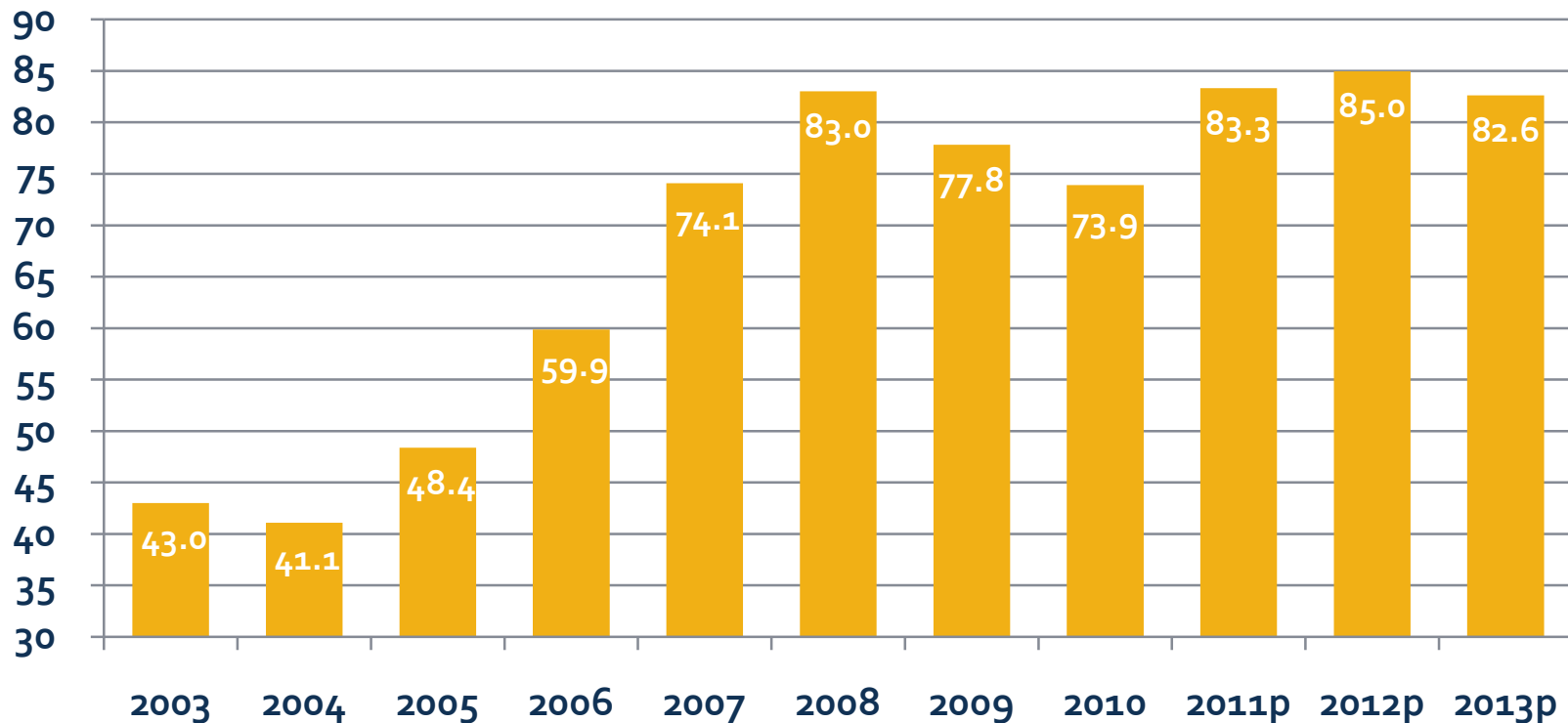
**NOW...** Ongoing investment well above depreciation and slower sales growth requires ongoing rate increases



# Industry Capital Expenditures

(\$ Billions)

## U.S. Shareholder-Owned Electric Utilities



Source: SNL Financial, company reports and EEI Finance Dept.

p = projected

Note: Starting in 2008, the universe of companies drops from 69 to 63, removing six companies that did not file Form 10-K with the SEC.

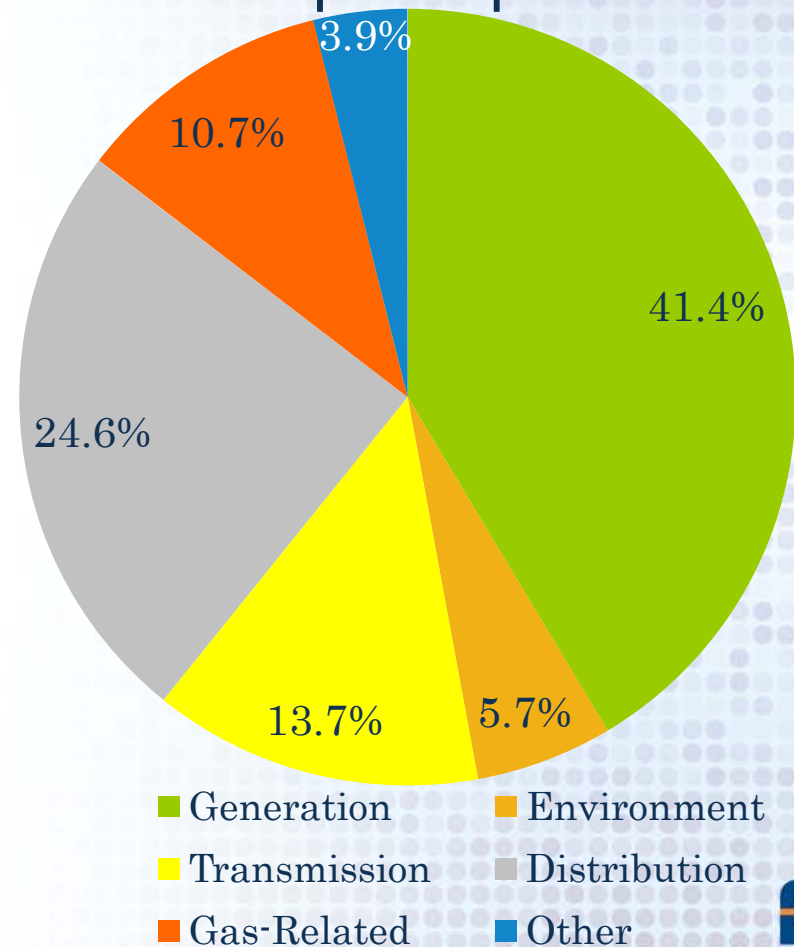




# Capex by Business Unit

- Industry committed to reliability, making needed investments in generation, transmission, smart grid/distribution & the environment
- About 1/2 of current capital expenditures are generation-related
- Prospective EPA rules could increase total capex by 30% annually

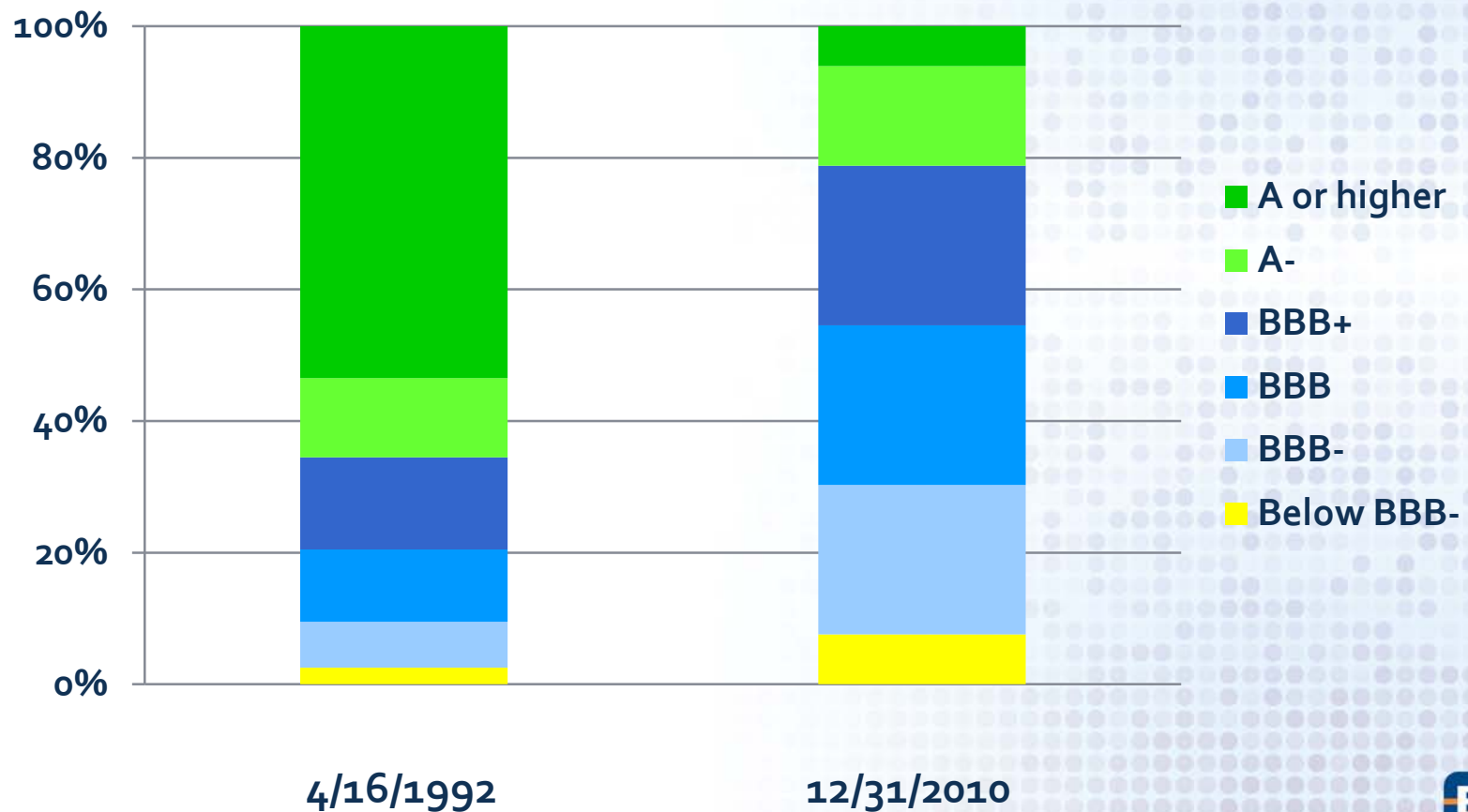
2010 Capital Expenditures



# Decline in Credit Quality

1992 vs. 2010

## S&P Credit Ratings Distribution, Electric Utilities

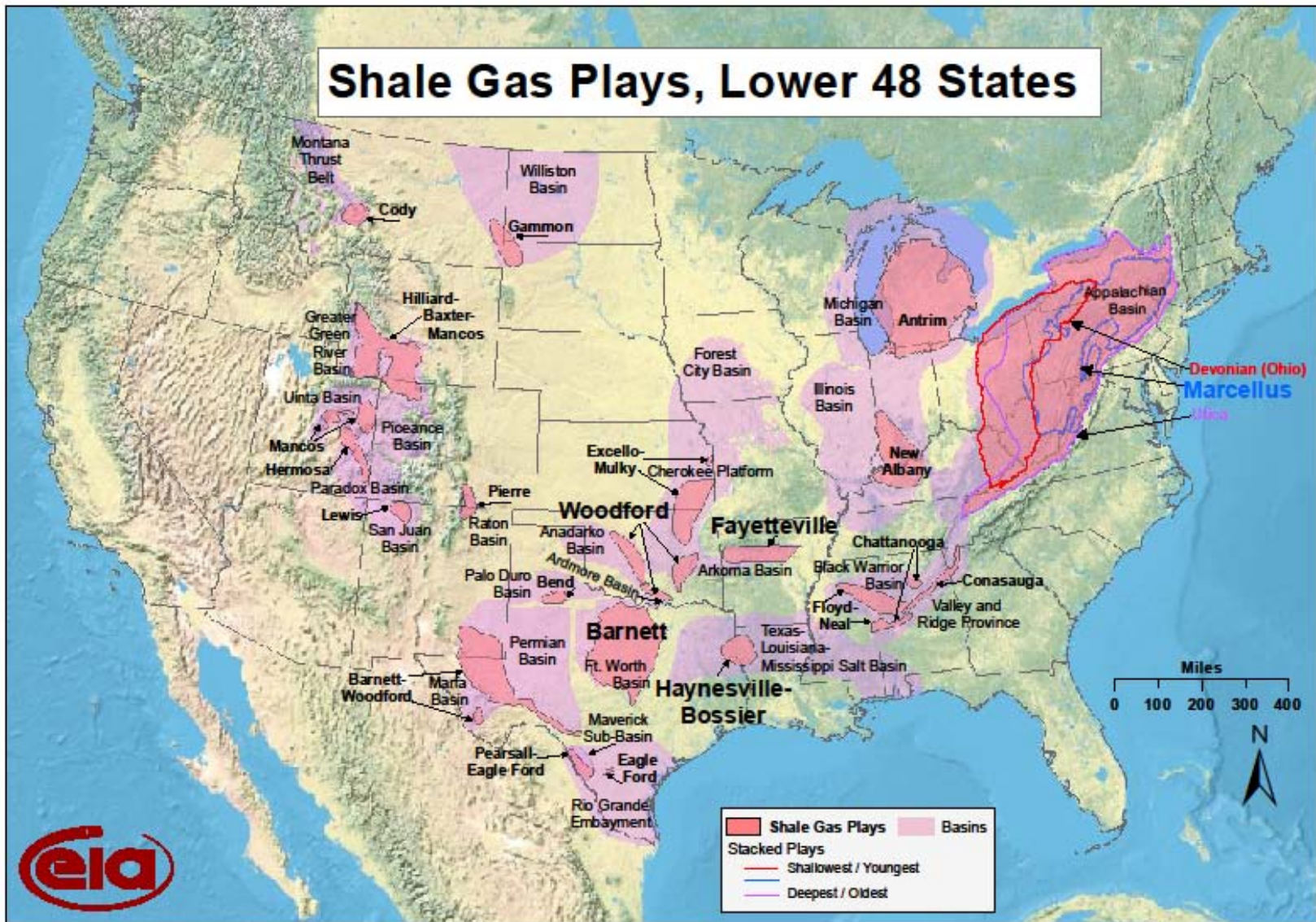


# Attributes of Natural Gas <sup>1</sup>

- “Natural gas is the cleanest fossil fuel. It emits:
  - Approximately 80% less sulfur dioxide and nitrogen dioxide per megawatt hour (MWh) than coal;
  - No mercury or particulates;
  - And, 55% less carbon dioxide per MWh than coal”
- “Forward natural gas prices are lower than coal on a dollars per MWh basis and are expected to stay lower until 2020”
- “Gas usage in the utility sector was up an average of 6% year over year for the first half of 2010 compared to 2009”

1. Speech by Exelon CEO John Rowe, March 8, 2011, to the American Enterprise Institute

# Shale Gas Plays, Lower 48 States

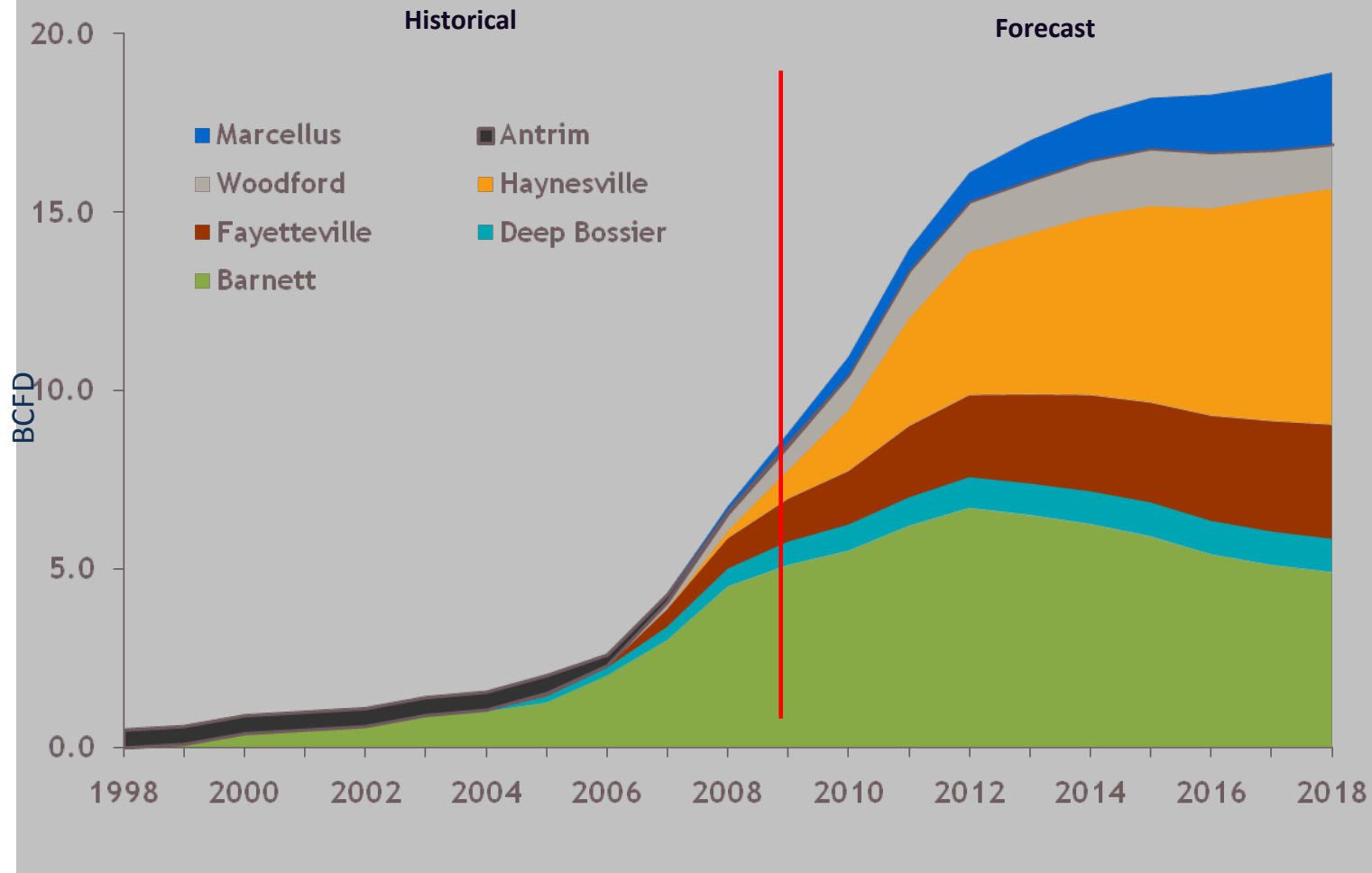


Source: Energy Information Administration based on data from various published studies.  
 Updated: March 10, 2010

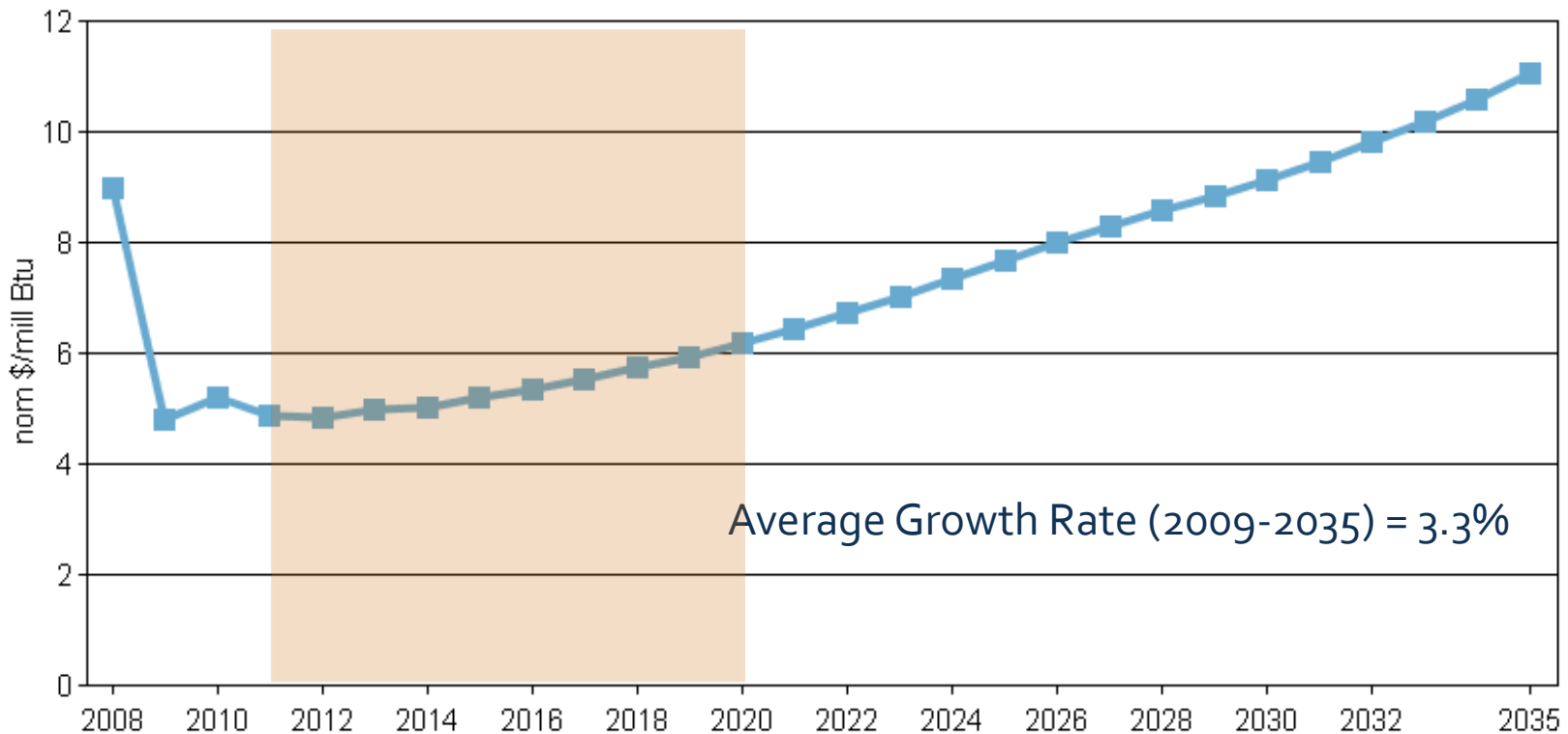


# U.S. Shale – A Game Changer?

## Gas Production Potential



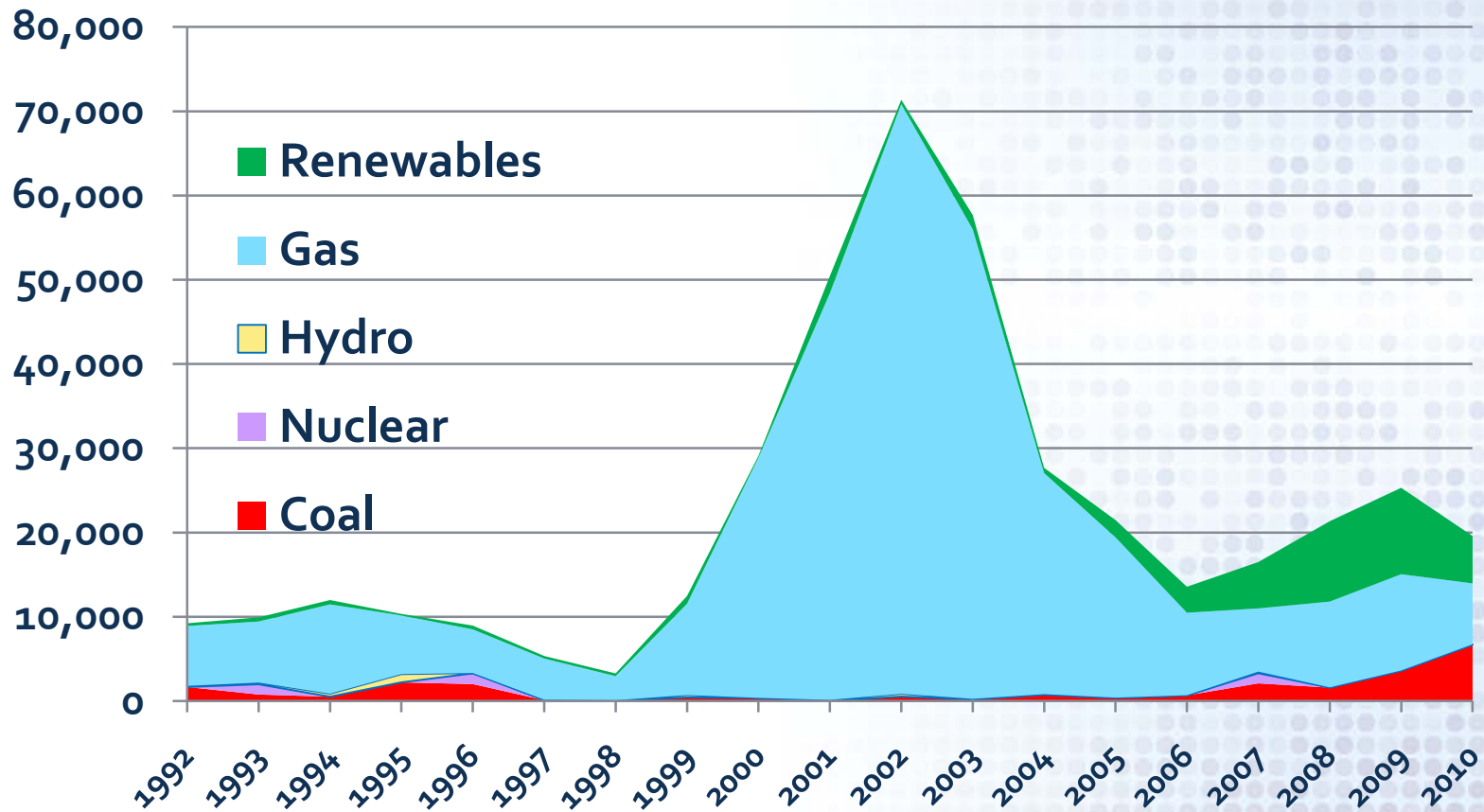
# Nominal Natural Gas Price for Electric Power (AEO 2011 Ref. Case)



U.S. Energy Information Administration  
Independent Statistics and Analysis

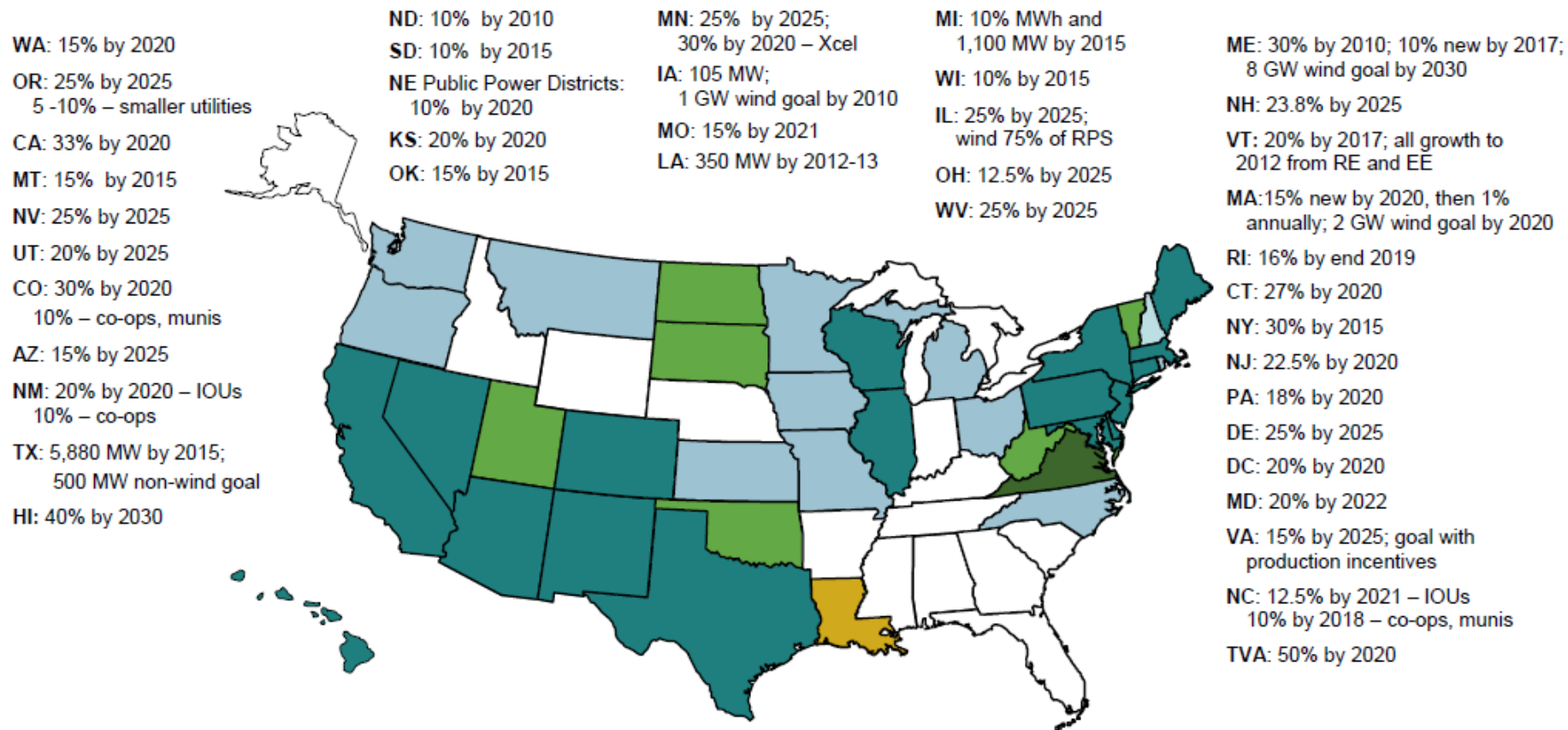


# Alternative Energy Markets: Historical Capacity Additions (MW)



## Renewable Portfolio Standards (RPS) and Goals

29 states and D.C. have an RPS; 7 States and 3 Power Authorities have Goals

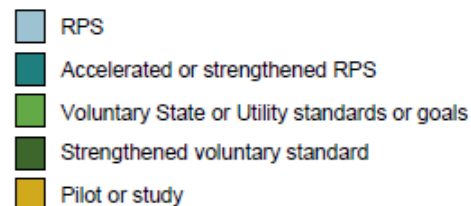


Updates at: <http://www.ferc.gov/market-oversight/othr-mkts/renew.asp>

**Notes:** A RPS requires a percent of an electric provider's energy sales (MWh) or installed capacity (MW) to come from renewable resources. Most specify sales (MWh). Map percents are final years' targets.

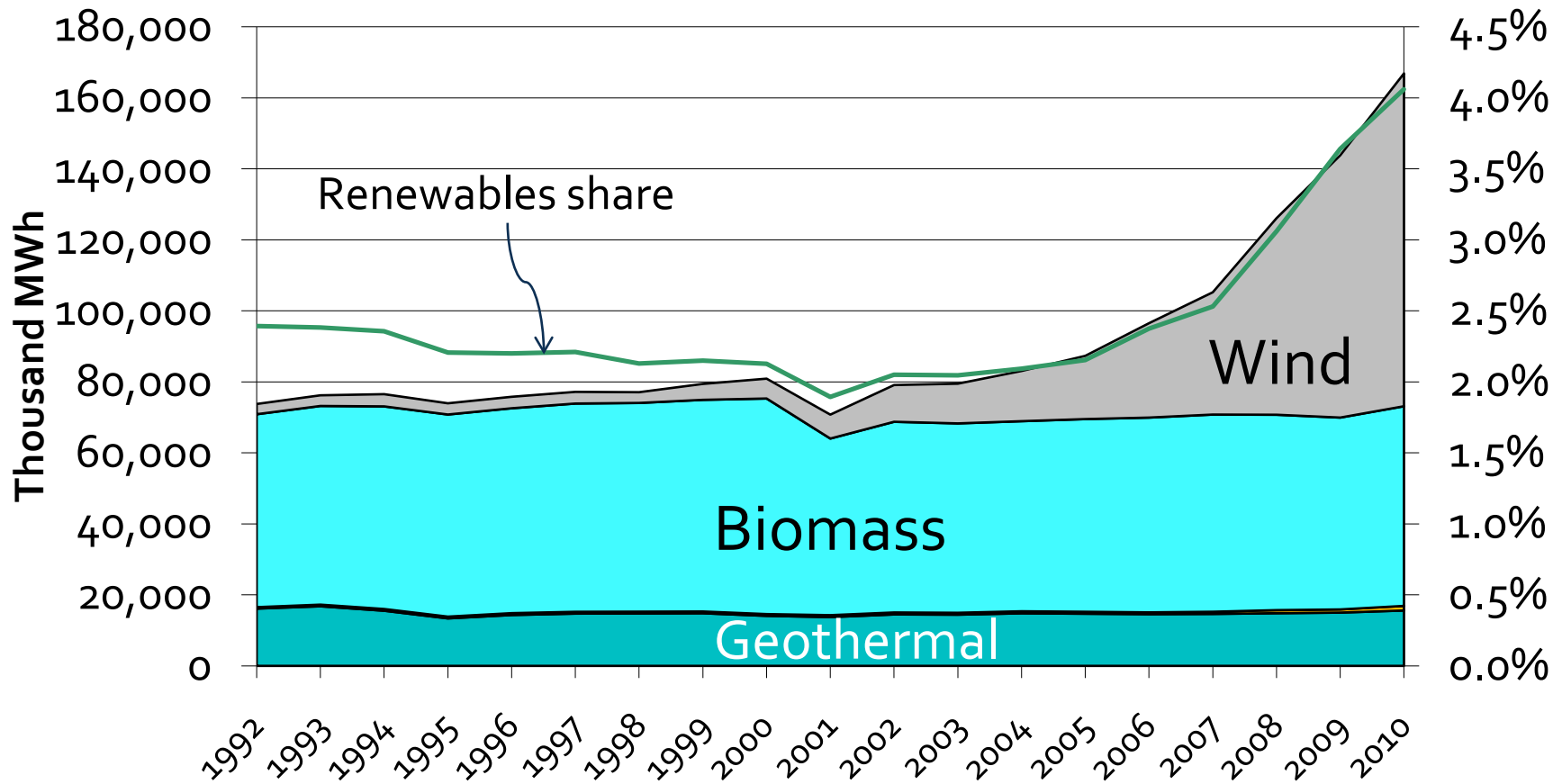
Nebraska's two largest public power districts, which serve close to two-thirds of Nebraska load, have renewable goals. The Tennessee Valley Authority's (TVA) goal across its 7-state territory is 50% zero- or low-carbon generation by 2020.

**Sources:** derived from data in: Lawrence Berkeley Labs, State Public Utility Commission (PUC) and legislative tracking services, Pew Center. Details, including timelines, are in the Database of State Incentives for Renewables and Energy Efficiency: <http://www.dsireusa.org>





# Alternative Energy Markets: Historical Generation Growth



## IV. Concluding Remarks

# Contact Information



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# Appendix

# National Ambient Air Quality Standards (NAAQS)

- New 1-hour NO<sub>2</sub> and SO<sub>2</sub> standard in 2010
- Will tighten ozone and PM standards in 2011 and 2012, respectively
  - New ozone and PM standards will drive additional new Transport Rules
- NAAQS continually ratcheted down over time
  - Ozone – 1994, 2008, 2011
  - PM 2.5 – 1997, 2006, 2012
- State Implementation Plans: EGUs in bulls-eye due to perceived cost-effectiveness

# Transport Rule

- Final Transport Rule expected by June 30, 2011
  - Proposal affects power companies in 31 eastern states
  - Emission budgets for NO<sub>x</sub> and/or SO<sub>2</sub> (both for most states)
- Some EEI member companies able to meet requirements due to combination of individual company approaches to addressing environmental issues, state requirements, fuel mix, and settlement agreements; other EEI members have concerns:
  - New reduction requirements must be met only 6 and 30 months after rule is finalized
  - Provides little long-term certainty – requirements will be superseded soon by subsequent Transport Rules addressing the 2010 ozone standards and the 2011 PM standards
  - Constraints on emissions trading

# Mercury / HAPs Regulation

- Proposed March 15, 2011 (publication in *Federal Register* pending); November 2011 final rule publication –required by consent decree
- 3-yr compliance timeline after final rule; State have authority to grant 1-yr extension under limited circumstances
- Mercury: numeric emission limit for lignite (coal less than 8,300 Btu/lb), other coal and IGCC– equivalent to a 91 percent reduction from uncontrolled mercury levels in the coal burned
- Acid gases: hydrogen chloride (HCl) numeric emission limit as a surrogate, with an alternate surrogate of SO<sub>2</sub> – equivalent to a 91 percent reduction.
- Non-mercury metals: numeric emission limit for total PM as a surrogate, with alternate surrogate of total metals or individual metals
- Organics (including dioxin): Work practice standards requiring the implementation of an annual performance test program

# Mercury / HAPs Regulation (2)

- Estimate of annualized compliance costs to the power industry in 2015 are \$10.9 billion (2007\$) and approximately \$10 billion in 2020 and 2030
- EPA projects approximately 9.9 GW of coal-based generation may be retired by 2015
- EPA projects the installation of:
  - 81 GW of dry scrubbing controls – 56 GW of dry sorbent injection and 25 GW of dry flue gas desulfurization
  - 93 GW of activated carbon injection
  - 166 GW of fabric filters (baghouses)
- EPA claims this proposed rule will yield annual monetized benefits (in 2007\$) of between \$59-140 billion (using a 3 percent discount rate)



# Cooling Water Intake Structures 316(b)

- Proposed rule signed March 28, 2011; EPA is required to finalize the rule by July 27, 2012
- The proposed rule leaves much to the discretion of the permit writer (and the EPA Region that reviews the permit)
- In general, the rule sets separate standards for impingement mortality and entrainment mortality for units with design intake rates above 2 million gallons per day (MGD)
- There will be a 90 comment period from the time the proposal appears in the *Federal Register*
- EPA estimates the total annualized cost of the rule at \$383.8 million

# Coal Combustion Residuals (CCR)

- Co-proposal of two options in June (75 *Fed. Reg.* 35128):
  - Subtitle C, “Special” hazardous waste listing; Subtitle D regulations
  - Beneficial use exempt from regulation
  - Soliciting input on other options, restrictions on beneficial use
- Subtitle C option would reverse 1993 & 2000 Regulatory Determinations
- Majority of states, ash recyclers, industry groups, large number in Congress oppose hazardous waste regulations
- Will significantly impact operations: closure of ash ponds, construction of additional disposal capacity, reductions in beneficial use
- Comments submitted Nov. 2010; Final Rule expected 2012

# GHG Regulation

- Motor vehicle GHG regulation forces stationary source GHG regulation
- EPA Tailoring Rule modified permitting rules to exclude small sources (at least for several years)
  - Legal basis uncertain – numerous lawsuits because CAA reinterpreted by EPA
- Affected sources must go through Best Available Control Technology (BACT) reviews – EPA guidance in late 2010
- GHG NSPS being developed for fossil power generators and refineries, including for existing sources