

The Energy Industry Update

Highlights of Recent Significant Events and Emerging Trends

Winter 2012–2013

Vol. 13, Issue 2

View from the Executive Suite

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Decision Time

The November 2012 elections did little to change the dynamics in Washington, and fiscal issues continue to dominate the national debate, as energy policy is overshadowed by—and caught in the crossfire of—dueling views on spending and taxation. The averted “fiscal cliff” promises to yield more policy debate in 2013 and beyond. Climate change and renewables, called out in the inaugural address as priorities, are sure to spark debate. Nonetheless, energy and utility companies face infrastructure investment needs and impending deadlines for plant retirements and retrofits and must push forward in developing and executing strategies, some of which were deferred pending November’s electoral outcomes.

Efficiency and Growth

- ❑ Energy efficiency continues to drive year-over-year growth in energy demand lower; utilities are seeking alternative recovery mechanisms in this slow demand growth environment—sometimes also entailing lower allowable ROEs
- ❑ Some optimism remains that economic growth will pick up in 2013 and beyond, providing some tailwinds for energy companies, but more fiscal fireworks could cause a slowdown

Coal’s Slow Burn

- ❑ Anticipated coal-fired plant retirements continue to increase, spurred by EPA regulations and persistent low natural gas prices, while some owners will hold on (at least for a while) for various reasons: retrofit technology successes, performance of other plants, rate impacts, and reliability, and others are still deciding whether to retire or retrofit
- ❑ For coal plant owners contemplating retrofits, the supply chain is increasingly cause for concern in regions such as the Midwest as EPA deadlines and large volumes of plants stress capability to complete refurbishment in a timely manner

Consequences of a Natural Gas-Based Energy Industry

- ❑ Shale gas continues to be the major story in the U.S. energy picture, but there are risks to low gas prices (significantly increased demand, greater and multiple levels of regulation, pricing uncertainty/miscalculations)
- ❑ As power generation becomes increasingly dependent upon natural gas as a baseload or swing fuel source, federal and reliability officials are turning their attention to infrastructure adequacy and coordination of the gas and electric industries, increasingly important issues

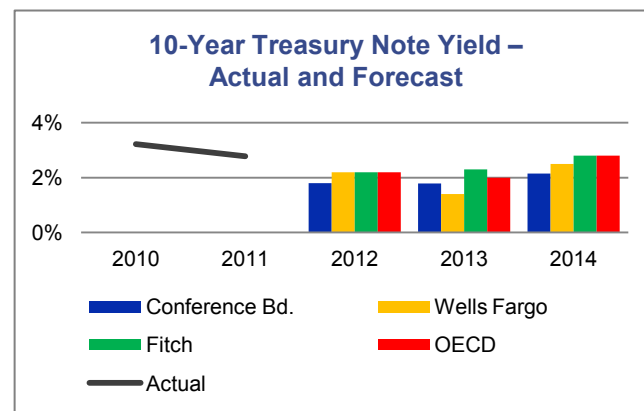
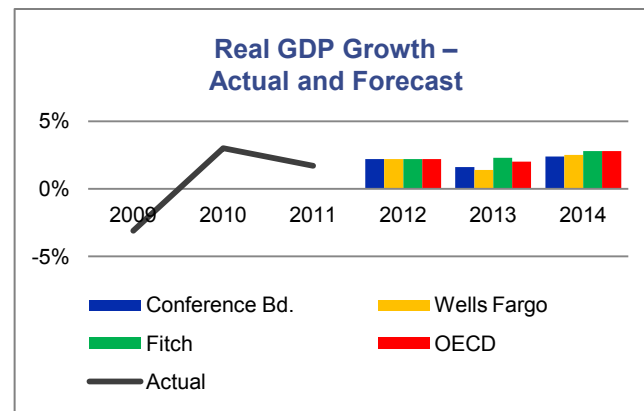
Policy Shift...or Not

- ❑ Changing personnel at the Department of Energy and the Environmental Protection Agency could alter policy; most, however, expect the trajectory and priorities of clean energy and increasing environmental regulation to remain substantially the same
- ❑ Federal renewables incentives (e.g., production tax credit) received a temporary extension and the dividend tax exemption was extended permanently, but it remains unclear how a contentious federal budget process might affect those policies in the longer term
- ❑ Meanwhile, FERC has offered clarification on criteria for granting transmission incentive rates. This provides some assurance for continued incentives in the near to medium term. Despite FERC’s clarification, questions about incentive criteria remain

Economic Outlook: Cliffs Avoided, Growth, and What It Portends for Energy and Utility Companies

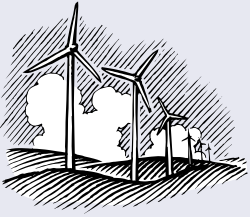
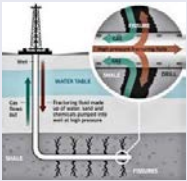
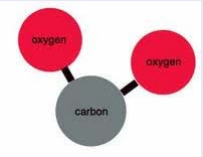
Possible Impact of Selected Fiscal and Economic Factors on Energy Utilities

Factor	Outcomes & Uncertainties	Implications
Economic Growth	<ul style="list-style-type: none"> Expected slow growth in early 2013 Modest acceleration in late 2013 or 2014 	<ul style="list-style-type: none"> Continued growth in energy demand, but at a relatively low rate
Dividend Taxation	<ul style="list-style-type: none"> Dividend tax exemption extended Obama Administration contemplating further unknown tax increases 	<ul style="list-style-type: none"> Potential for dividend and other investment tax incentives to get caught up in tax reform discussion
Individual Income Taxes; Transfer Payments	<ul style="list-style-type: none"> Rates increasing; tax burdens certainly increasing, but ultimate allocation of burden unclear Possibly reduced transfer payments (e.g., extended unemployment benefits) 	<ul style="list-style-type: none"> Household budget pressures on ratepayers Increased demand for LIHEAP and other assistance programs Commission, ratepayer resistance to rate increases More frequent rate filings, smaller increments
Production Tax Credit	<ul style="list-style-type: none"> Extension for one year; elimination or possible phase-out beginning in 2014 	<ul style="list-style-type: none"> Final dash to renewables construction in 2013? Potential grants of relief in some states to near-term RPS deadlines
Carbon Tax	<ul style="list-style-type: none"> Recently discussed as possible proposal; unlikely to be implemented in current Congress 	<ul style="list-style-type: none"> Longer-term consideration Negatively affect coal-heavy utilities, but positive for renewables, nuclear Ratepayer resistance to pass-through
Capex Incentives	<ul style="list-style-type: none"> Accelerated depreciation extended Potential withdrawal of "stimulus" 	<ul style="list-style-type: none"> Limited impact on utility investment, given maintenance, replacement, and upgrade needs Demand a greater factor
Monetary Policy	<ul style="list-style-type: none"> Continued low Treasury rates, but Fed exit strategy unclear 	<ul style="list-style-type: none"> Continued favorable financing costs, assuming spreads do not widen








While the immediate “fiscal cliff” talks yielded an interim deferral of some impending tax increases and spending reductions, key uncertainties remain as pending further rounds of contentious budget discussions play out in the next months and years.

The 2012 Election: How Might the Results Impact the Energy Industry?

Area	Current Views
<p>Renewables & Clean Energy</p> 	<ul style="list-style-type: none"> ↑ Election outcome positive for renewable energy ↓ President Obama may push for a clean energy standard, but it is unlikely to get enough House votes or a filibuster-proof majority in the Senate ↔ Likely that push for wind PTC renewal will be part of budget negotiations – most expect one-year extension over next several months (a two-year extension currently proposed); further discussion in 2013 ↑ Solar investment credit not likely to be rescinded before sunset in 2016 ↑ Continuation of policy encouraging utility-scale solar development on large areas of federal land ↑ Continued promotion of aggressive renewable and efficiency targets at Department of Defense installations
<p>Shale Gas & Hydraulic Fracturing</p> 	<ul style="list-style-type: none"> ↔ Outright ban unlikely, but continuation of EPA drinking water study and guidance on fracturing process and possible restrictions on activities on federal lands could increase production costs ↔ Near term, likely to remain primarily a state issue, but some risk of federal rules and/or exceptions including EPA's "green completion" regulation (expected in 2015) and the Interior Department's proposed chemical-disclosure policy on federal lands
<p>Climate Change & Carbon Regulation</p> 	<ul style="list-style-type: none"> ↓ Split Congress likely limits comprehensive GHG legislation ↔ Obama and Reid comments on new focus on climate creates some possibility of a carbon tax in any budget "grand bargain" – a "sleeping" issue ↑ New source GHG regulations for fossil-fired power plants and refineries will be released, but may be constrained (slightly) by Congressional oversight ↔ Possible expansion of GHG controls via regulation of <u>existing</u> facilities

Sources: Bracewell & Giuliani Legal Blog, "Top Energy and Environment Issues in the Wake of the 2012 Election" (Nov. 13, 2012); Foley & Lardner webinar, "The Future of Energy Policy Post-Obama Election" (Nov. 16, 2012); Chadbourne & Parke LLP webinar, "Post-Election 2012" (Nov. 16, 2012); "What Obama's Victory Means for Business," *Wall Street Journal* (Nov. 8, 2013); "Who Will Succeed Energy Secretary Steve Chu at DOE?," *greentechmedia.com* (Nov. 19, 2013); Bloomberg Government, "Post Election Assessment: What's at Stake for U.S. Energy Policy" (Nov. 7, 2012); SNL Financial; industry news; ScottMadden analysis

The 2012 Election (Cont'd): How Might the Results Impact the Energy Industry?

Area	Current Views
Nuclear Power 	<ul style="list-style-type: none"> ⇔ Proposed Clean Energy Standard, possible carbon fee/tax could buoy nuclear, <u>but</u> lack of permanent waste repository, low natural gas prices continue to dampen nuclear's fortunes and significant federal support of new build is unlikely ⇔ Four of five NRC commissioners' terms expire in 2013–2016
Power Plant Emissions Regulation 	<ul style="list-style-type: none"> ⇔ For CSAPR, MATS, and other rules, cycle of new proposed and final rules under statutory deadlines forced by "citizens suits" <u>plus</u> cycle of revisions driven by court challenges; pundits split on whether rule making will be more or less aggressive ⇔ Emissions markets likely "dead" for a while with legal wrangling over regulations
Transmission, Distribution & Smart Grid 	<ul style="list-style-type: none"> ↑ No Congressional action on transmission policy, e.g., siting; FERC will continue to implement Order 1000 ↑ Continued Obama Administration support of transmission; continuation of Administration's Interagency Rapid Response Team
Distributed Resources 	<ul style="list-style-type: none"> ↑ Continued promotion of combined heat and power pursuant to executive order issued in August
Energy Technologies 	<ul style="list-style-type: none"> ↓ Limited likelihood of electric vehicle funding in wake of the "Solyndra effect" ⇔ In light of Secretary Chu's possible departure as head of DOE, some say DOE "needs to transition from a focus on technological innovation...to a focus on commercialization and consensus-building"

Sources: Bracewell & Giuliani Legal Blog, "Top Energy and Environment Issues in the Wake of the 2012 Election" (Nov. 13, 2012); Foley & Lardner webinar, "The Future of Energy Policy Post-Obama Election" (Nov. 16, 2012); Chadbourne & Parke LLP webinar, "Post-Election 2012" (Nov. 16, 2012); "What Obama's Victory Means for Business," *Wall Street Journal* (Nov. 8, 2013); "Who Will Succeed Energy Secretary Steve Chu at DOE?," greentechmedia.com (Nov. 19, 2013); Bloomberg Government, "Post Election Assessment: What's at Stake for U.S. Energy Policy" (Nov. 7, 2012); SNL Financial; industry news; ScottMadden analysis

Utility Investment Outlook: Analysts' Views

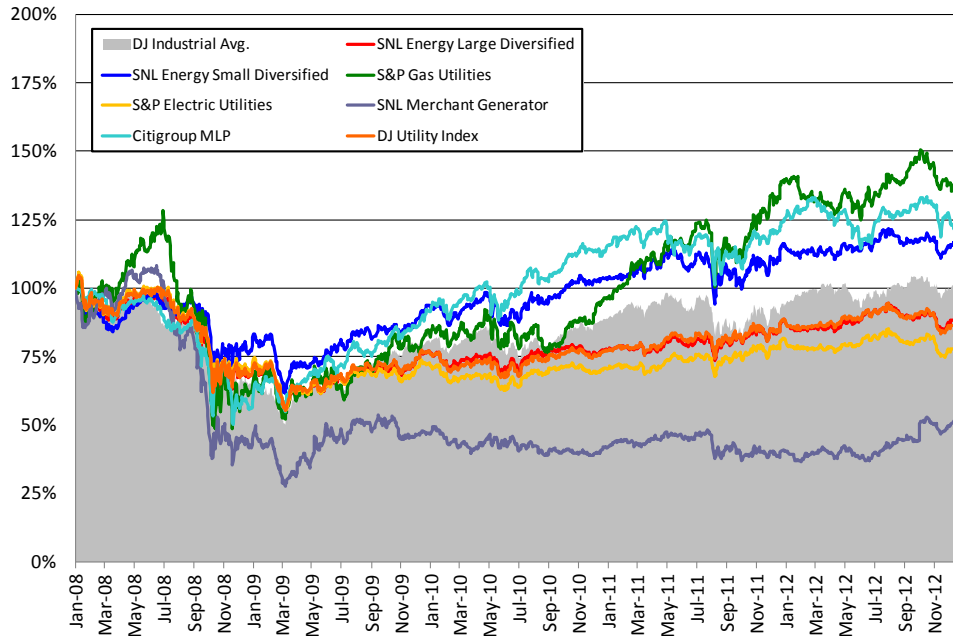
Views of Selected Utility Industry Subsectors by Various Investment Research Houses and Rating Agencies

Sector & Outlook	Headwinds ↓	Tailwinds ↑	Uncertainties ?
Investor-Owned Electric Utilities <ul style="list-style-type: none"> ▪ Stable credit ratings ▪ Market perform 	<ul style="list-style-type: none"> ❑ Continued softness in earnings ❑ No “game-changing catalyst on the horizon” ❑ Valuations expensive on absolute basis and relative to broader market ❑ Cyclical and structural slowing of energy sales growth ❑ Pension issues with changes in actuarial assumptions and low investment returns 	<ul style="list-style-type: none"> ❑ Investor appetite for stable, high dividend yields <u>and</u> conservative equity option ❑ Extension of dividend tax rates ❑ Unexpectedly hot summer in some U.S. regions boosted demand ❑ Solid liquidity—strong capital market access and low rates ❑ Low wholesale power prices ❑ Stable regulation (but downward trend in ROEs) 	<ul style="list-style-type: none"> ❑ Higher interest rates may make yields less attractive, but “that doesn’t appear to be in the cards” ❑ Long lead-time projects, regulatory delays in rate recovery, and pressures on allowable ROEs
Public Power, Municipals, and Cooperatives <ul style="list-style-type: none"> ▪ Stable credit ratings 	<ul style="list-style-type: none"> ❑ Continued environmental uncertainty ❑ Depressed wholesale prices (for publics/coops that augment revenues with market sales) ❑ Continued fiscal stress for municipalities; risk of need for higher financial support from munis to local governments 	<ul style="list-style-type: none"> ❑ Rate-setting authority ❑ Reliable cash flow ❑ Low natural gas (fuel) costs ❑ Continued relative capital cost advantage ❑ Conservative business model ❑ Proactive increases in rates to meet increased costs 	<ul style="list-style-type: none"> ❑ Willingness to raise rates to support increased costs, given continued economic weakness, political risk of doing so
Natural Gas Distributors <ul style="list-style-type: none"> ▪ Stable credit ratings ▪ Market perform to outperform 	<ul style="list-style-type: none"> ❑ Increased focus, cost of pipeline, and system safety 	<ul style="list-style-type: none"> ❑ Stable, high dividend yields ❑ Extension of dividend tax rates ❑ Low natural gas prices (minimize customer conservation) ❑ Reduced liquidity needs: lower cost of gas in storage, customer receivables ❑ Customer growth from housing builds, conversions 	<ul style="list-style-type: none"> ❑ Weather variability
Competitive (Merchant) Generators <ul style="list-style-type: none"> ▪ Negative ratings outlook ▪ Market perform 	<ul style="list-style-type: none"> ❑ Extended trough for wholesale power prices (but some analysts say gas-dependent merchants well positioned for near to medium term) ❑ Expiration of above-market legacy hedges ❑ Capital markets for high-yield issuers volatile; capital market access issues 	<ul style="list-style-type: none"> ❑ Vertical integration into retail provides some counter-cyclicality 	<ul style="list-style-type: none"> ❑ Potential natural gas price rebound ❑ Potential consolidation among gencos ❑ Fuel type and diversity, regional differences

Energy and Utility Company Stock Prices: Some Buoyancy Despite “Cliff-Diving”

Over Five-Year Horizon, Electrics and Merchants Trail the Dow, But Small Diversifieds Still Outperforming

Selected Stock Index Values (Jan. 2008–Dec. 2012)
(Index: Jan. 1, 2008 = 100%)

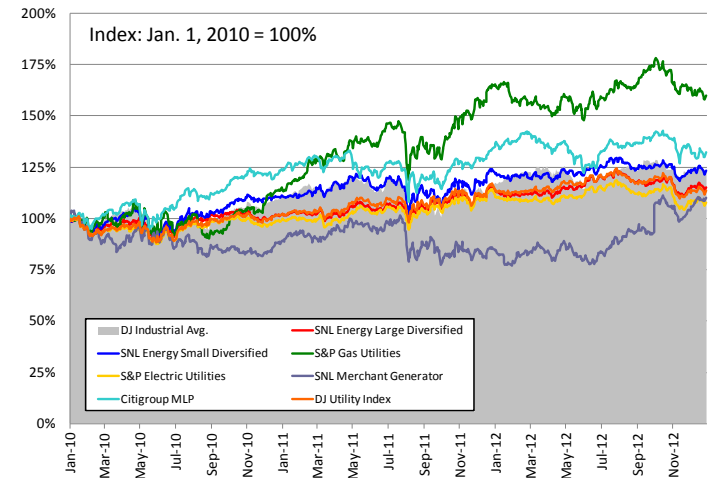


- ❑ The fiscal cliff did not yield a huge sell-off in utility stocks, and utilities remain a key—but not the only—option for investors seeking income, thus preserving its investment attractiveness
- ❑ However, one investment bank believes 2013 will see “continued poor stock performance for many diversified utilities, driven by credit concerns, retail margin weakness, and regulatory issues”*

Sources: SNL Financial; *Morgan Stanley; ScottMadden analysis

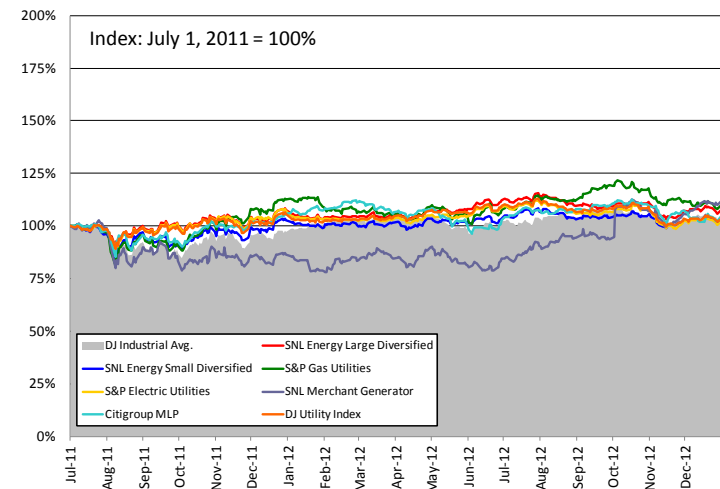
Gas MLPs Moving Toward Industrials

Selected Stock Index Values (Jan. 2010–Dec. 2012)



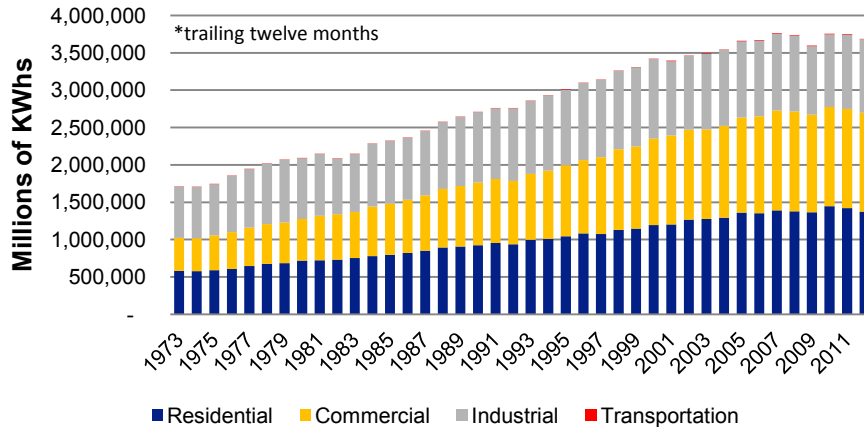
More Recently, Gas Sector Is Coming “Back to Earth”

Selected Stock Index Values (July 2011–Dec. 2012)



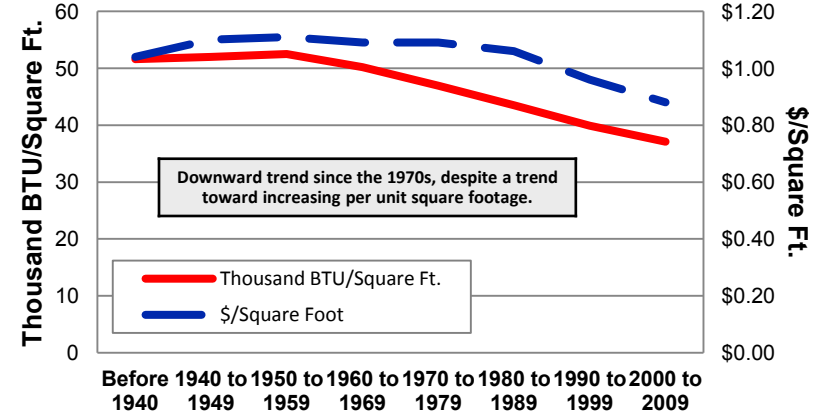
Growth in Retail Sales Appears to Be Flattening

Annual U.S. Electricity Sales by Customer Class (1973–Oct. 2012*)



Residential Energy Usage and Cost per Square Foot Declining

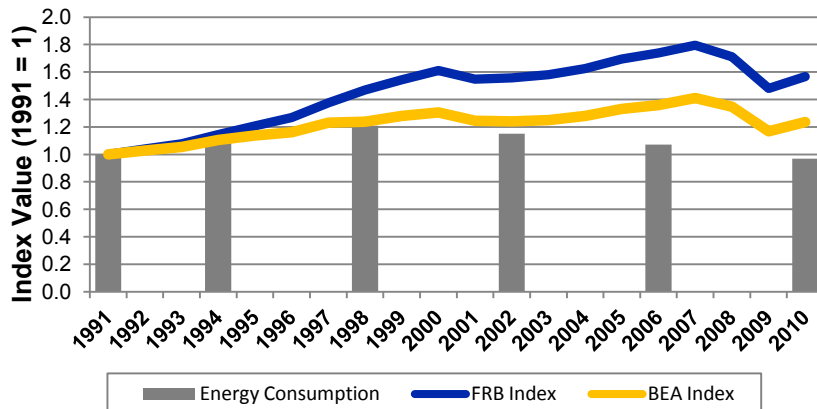
Average Energy Consumption per Household Site (2009) by Decade Added (BTUs/Square Foot | 2009\$/Square Foot)



- ❑ Despite increasingly larger residences, energy consumption per square foot has been declining
 - Key factors include building codes, improved technology, and efficiency programs
 - Conservation behavior, due to slow economic growth and high unemployment, may also be playing a part
 - While electricity consumption as a proportion of energy type has increased (air conditioning, electronic devices, etc.), power consumption per household has increased by 22% since the 1970s while average home square footage has increased 46%
- ❑ Electricity sales growth remains stuck at sub-1% levels with risk of declines if price/rate levels or volatility increase
- ❑ Manufacturing energy trending similarly due to technology improvements, although it is unclear what the impact of cheap natural gas will be on levels of consumption
- ❑ Aging and replacement of housing stock and equipment will continue to drive much of this trend

Manufacturing Energy Use Has Declined, But Mix of Causes?

Energy Consumption vs. Selected Measures of Manufacturing Output (Index 1991 = 1)

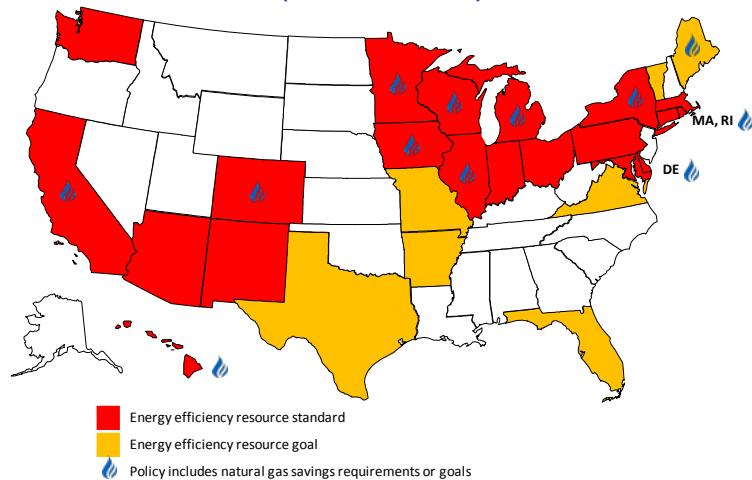


Sources: EIA, 2009 Residential Energy Consumption Survey, 2010 Early Release Estimates, Manufacturing Energy Consumption Survey, and Annual Energy Outlook; ScottMadden analysis

Energy Efficiency: Slowly Forcing Changes to the Utility Model?

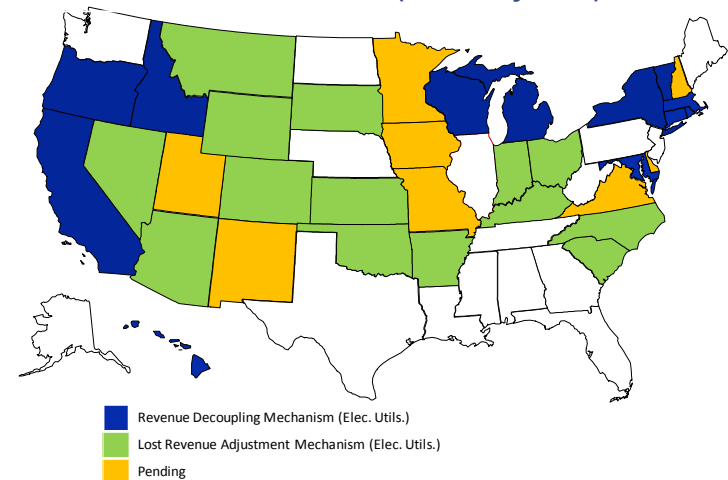
19 States Have Efficiency Standards; Goals in Seven Others

Energy Efficiency Resource Standards
(as of Oct. 2012)



...While Revenue Recovery Mechanisms May Not Align

Lost Revenue Adjustment and Revenue Decoupling Mechanisms
for Electric Utilities (as of July 2012)



- ❑ Energy efficiency resource standards (EERS) and goals are moving forward in many states, although new EERS are not pending
- ❑ Even without direct mandates like EERS, indirect effects from federal efficiency mandates such as lighting efficiency and Energy STAR, building codes, and improved materials and technologies (e.g., LEDs), continue to reduce energy intensity
- ❑ Fitch considers energy efficiency “a significant threat to the credit profile of the electric utility sector and the first major challenge to the otherwise monopolistic utility franchise”
- ❑ Increasingly, utilities will have to develop business and regulatory models that provide a return on investment in demand-side energy infrastructure

Timing of Selected DOE Appliance Efficiency Standards

Appliance/Equipment	Issued	Effective
Boilers	2007	2012
Central Air Conditioners	2011	2015
Ranges and Ovens	2009	2012
Refrigerators	2011	2014
Water Heaters	2010	2015
Commercial Boilers	2009	2012
Commercial Air Conditioners, Heat Pumps*	2012	2013
Commercial Refrigeration Equipment	2009	2012
General Service Lamps (incl. Fluorescent, Incandescent, and CFLs)	2007, 2009	2012

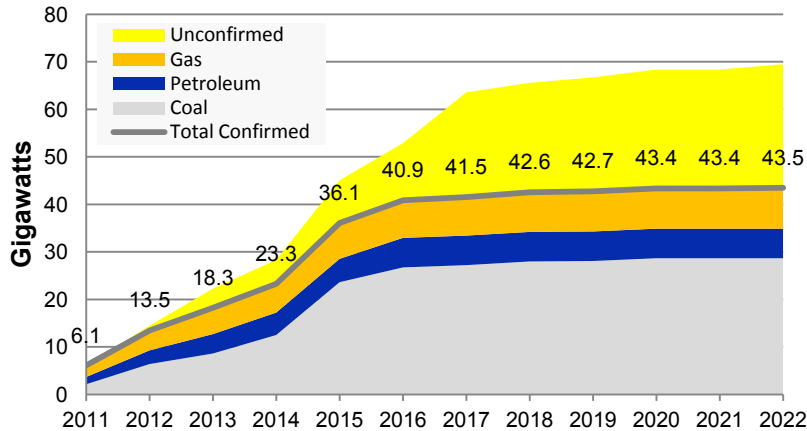
Note: *Water- and evaporatively-cooled

Sources: DSIREUSA; Institute for Electric Efficiency; DOE Appliance Standards Awareness Project; FitchRatings

NERC's Latest Long-Term Reliability Assessment: Some Good News and Some Cautionary Notes

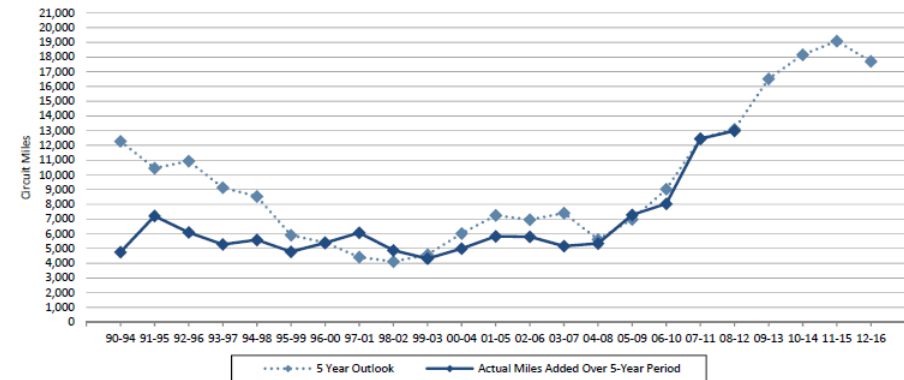
About 44 GWs of Planned Fossil Retirements with 26 GWs More Projected by NERC by 2022

NERC-Wide Cumulative Summer Fossil-Fired Capacity Resource Retirements



Planned Transmission Additions Over Next Five Years Far Exceed Any Prior Five Years' Miles of Additions

Historical Actual Miles Added for Rolling Five-Year Periods and Projected Five-Year Plans (200 kV and Above)



2012 Key Reliability Findings

Finding and Impact

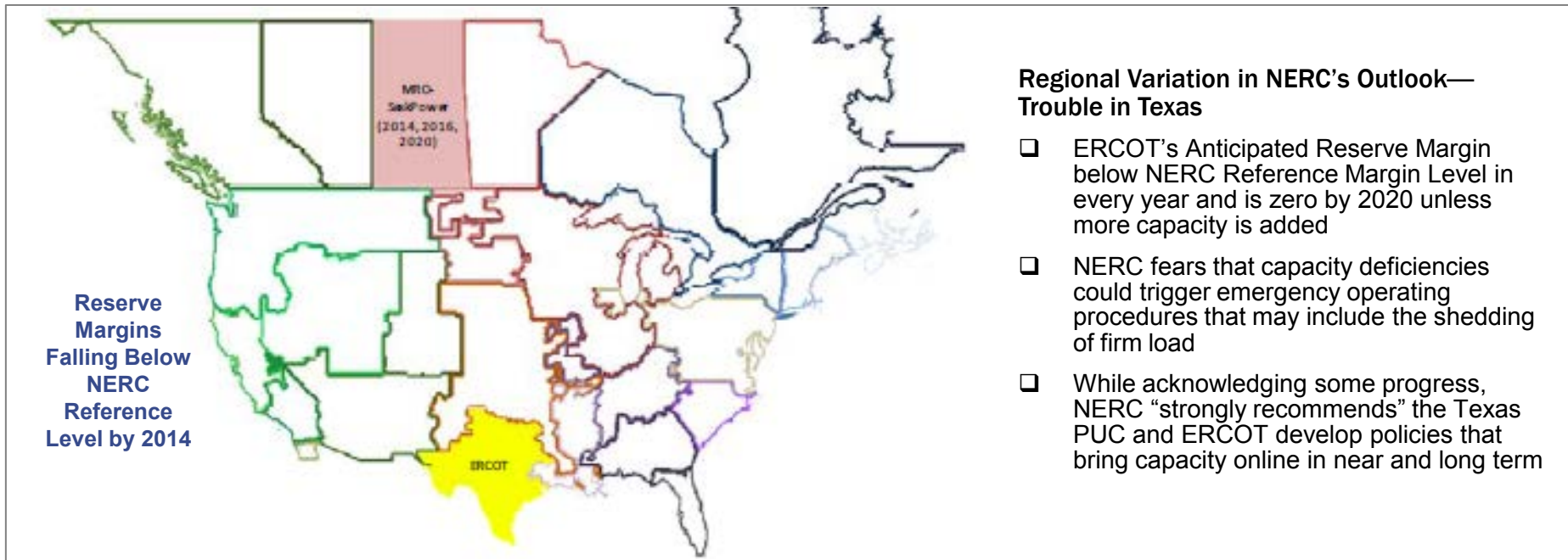
- ↔ Transmission growth to accommodate new and distant resources
- ↔ Renewable resources additions introduce new planning and operational challenges
- ↓ Significant fossil-fired generator retirements over the next five years

Commentary and Considerations

- ❑ 18,700 miles (>200 kV) are planned over the next five years—triple the circuit miles constructed during any five-year period
- ❑ Delays could impede plans; reassessment of load growth accounts for more than 40% of delays/defers
- ❑ Integration issues plus concern about peak availability, with 20 GWs of on-peak planned renewable capacity, 21.5 GWs of on-peak “conceptual” capacity
- ❑ NERC estimates nearly 71 GWs of retirements by 2022, with 90% of that retiring by 2017
- ❑ Estimates are highly uncertain, as generation owners are still evaluating options and many have not announced retirement decisions. Per NERC, about 44 GWs of retirements are confirmed based upon announcements and resource plans
- ❑ Next three or four years may see system stability issues in some areas, need transmission enhancements

NERC's Latest Long-Term Reliability Assessment: Some Good News and Some Cautionary Notes (Cont'd)

2012 Key Reliability Findings	
Finding and Impact	Commentary and Considerations
<p>↓ Long-term generator maintenance outages for environmental retrofits</p>	<ul style="list-style-type: none"> ❑ Most controls are required by 2016 (MATS compliance), and NERC estimates that about 339 unit-level retrofits covering 160 GWs will be required ❑ NERC's "unconfirmed" maintenance outages schedules still unknown, leaving less than 50 GWs (or the 160 GWs) confirmed, may result in generation capacity not being available during shoulder months and off-peak times during the operating day in the near term (2013–2016)
<p>↑ Resources sufficient to meet reliability targets in most areas</p>	<ul style="list-style-type: none"> ❑ Generally, long-term outlook for reserve margins, and thus reliability, looks good ❑ The outlook varies, however, by region: Near term, ERCOT reserve margins are expected to decline significantly over the next 10 years
<p>↑ Increases in demand-side management help to offset future resource needs</p>	<ul style="list-style-type: none"> ❑ Demand-side management is projected to total 80 GWs by 2022, offsetting about six years of peak demand growth and equivalent to 7% of total on-peak generation 2022 capacity ❑ Observers are monitoring frequency of economic demand response and response fatigue

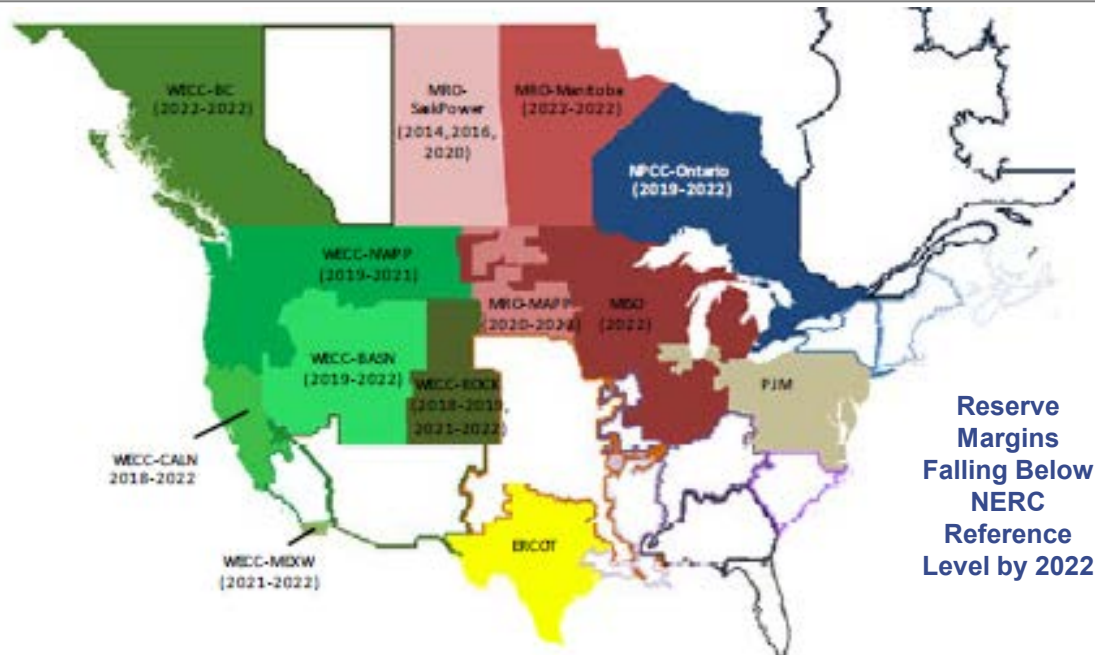


NERC's Latest Long-Term Reliability Assessment: Some Good News and Some Cautionary Notes (Cont'd)

2012 Key Reliability Findings	
Finding and Impact	Commentary and Considerations
<p>↔ Increased dependence on natural gas for electricity generation</p>	<ul style="list-style-type: none"> ❑ NERC estimates almost 100 GWs of planned and “conceptual” new capacity over the next 10 years will be gas fired ❑ NERC continues to study impacts on operations and planning of this interdependence between gas and power generation, especially: <ul style="list-style-type: none"> — Availability of gas-fired generation with neither firm transportation nor dual-fuel capabilities, especially during extreme cold weather — Impact of significant gas supply or pipeline disruption
<p>↓ Increased risk of capacity deficiencies in ERCOT as planning reserve margins projected to fall below targets</p>	<ul style="list-style-type: none"> ❑ ERCOT reserve margins projected at 13.4% as early as next year; below its 13.75% target

Regional Variation in NERC's Outlook— Expanding Concerns But Less Urgent

- ❑ Longer term, reserve margins begin to fall below reference levels in some other regions
- ❑ These regions (except ERCOT) have at least five years to enhance capacity
- ❑ “Conceptual resources”—generation in early stages of assessment—not considered for the reserve margin forecast, could be sufficient to aid regions including WECC, PJM, and Ontario, but their eventual construction is uncertain

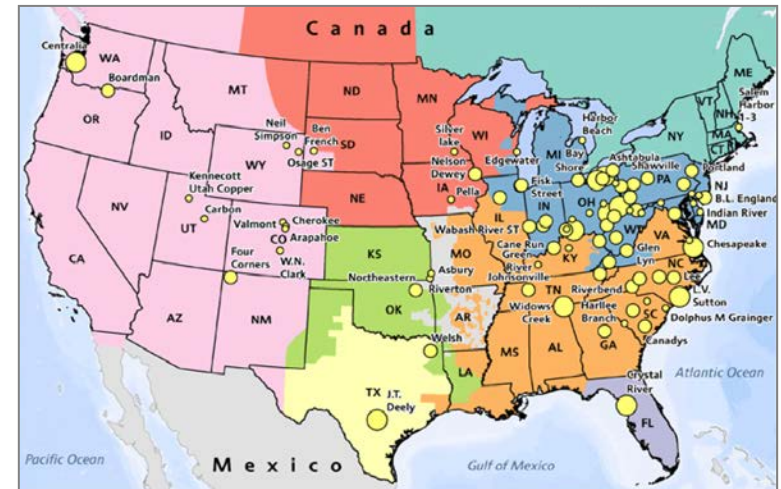


Potential Coal Plant Retirements: The Latest Tally

Selected U.S. Coal Plant Retirement Forecasts: 30 GWs to 100 GWs between 2015 and 2020

Analyst	Projected Retirements
Union of Concerned Scientists	59 GWs “ripe for retirement” in add’n to est’d. 41 GWs announced (100 GWs total)
Brattle	59–77 GWs
Sanford Bernstein	58 GWs by 2015
Bipartisan Policy Center	56 GWs by 2016
Friedman Billings Ramsay	50–55 GWs by 2018
Guggenheim Partners	50 GWs by 2015
ICF	50 GWs by 2015
EIA	49 GWs by 2020
Reuters/Factbox	35 GWs by 2015
Wood Mackenzie	30 GWs by 2015, add’l 45 GWs by 2025

Announced Coal-Fired Plant Retirements as of Aug. 2012 (30 GWs through 2021)

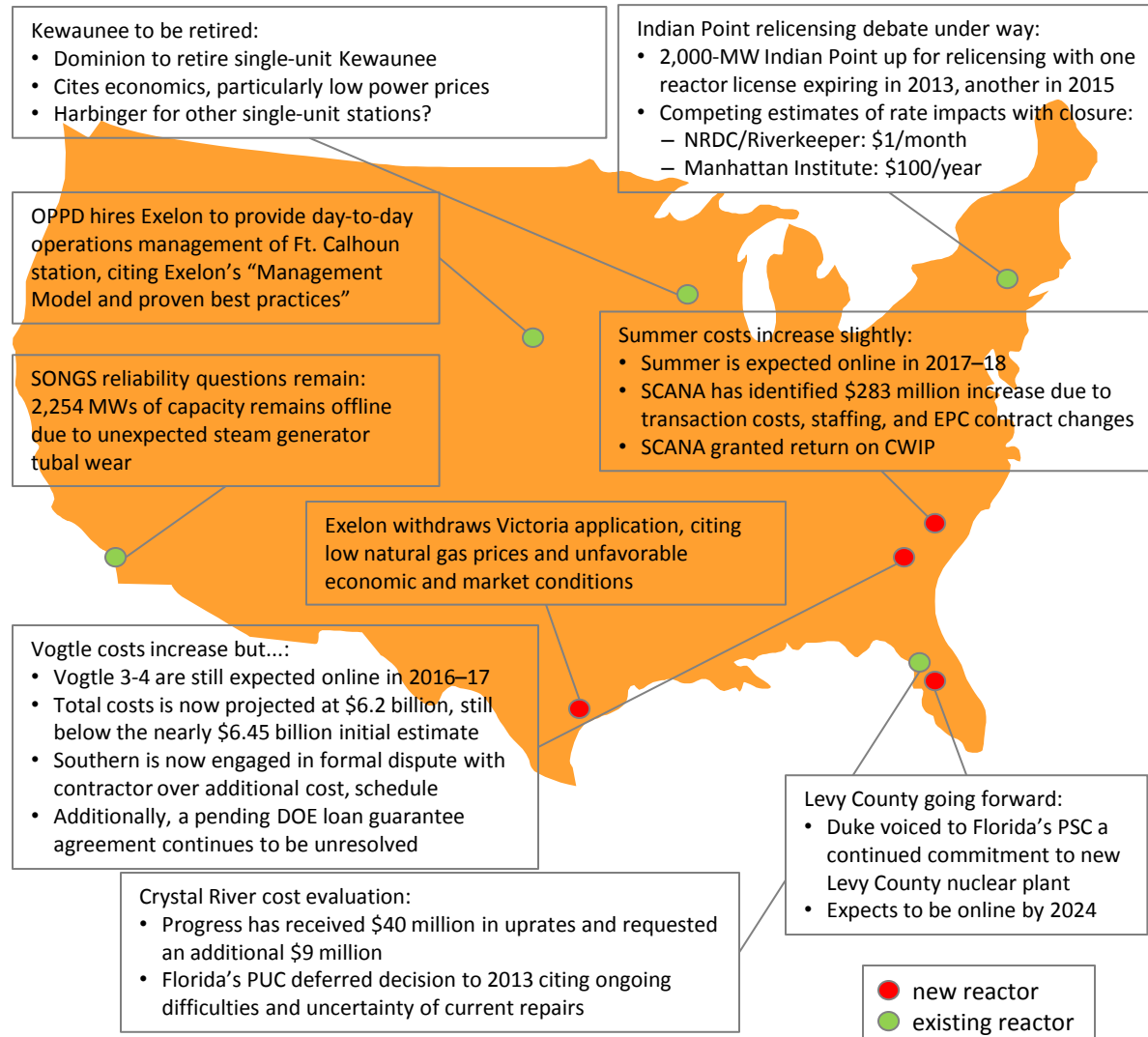


- ❑ **Regulatory “tsunami”:** With re-election of President Obama, the “tsunami” (no longer “train wreck”) of EPA regulations affecting power generation is now expected to be promulgated and implemented
- ❑ **Gas vs. coal:** The story remains centered on the natural gas vs. coal price differential, as natural gas prices continue to remain low by historical standards. Meanwhile, coal mines have ramped back production in response to lower demand, and production costs are rising in response to increased mining regulation
- ❑ **Regional impacts:** EIA projects that most retirements will be older, inefficient units concentrated in the Mid-Atlantic, Ohio River Valley, and Southeast, which have excess capacity. The Midwest ISO could be particularly affected by a large number of unit retirements
- ❑ **East vs. West:** Generation using lower sulfur Powder River Basin (PRB) and Illinois coal is expected to fare better than Appalachian coal-fired plants. Coal producer Peabody Energy estimates that PRB is competitive with \$2.50 to \$2.75/MMBTU natural gas, while for Illinois it is \$3.25 to \$3.50 and \$4.50 for Appalachian coal
- ❑ **“Unretirements” and temporary deferrals:** Some utilities may reconsider retirement of selected coal plants for varied reasons
 - Detroit Edison, e.g., told regulators that it planned to keep some (albeit large) units open that it had originally slated for closure as new controls technology works better than projected
 - Otter Tail Power is delaying retirement of its Hoot Lake plant from 2015 to 2020 to reduce ratepayer impacts
 - TVA has had to delay idling of five coal units because of unanticipated operating challenges at a large pumped storage plant
 - At PJM’s request, First Energy delayed some unit retirements to 2015, pending upgrades, in order to provide voltage support

U.S. Nuclear Power: Latest Developments

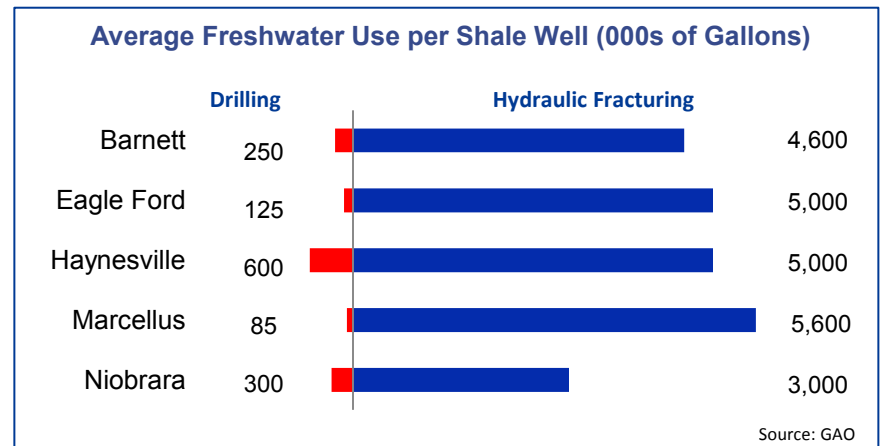
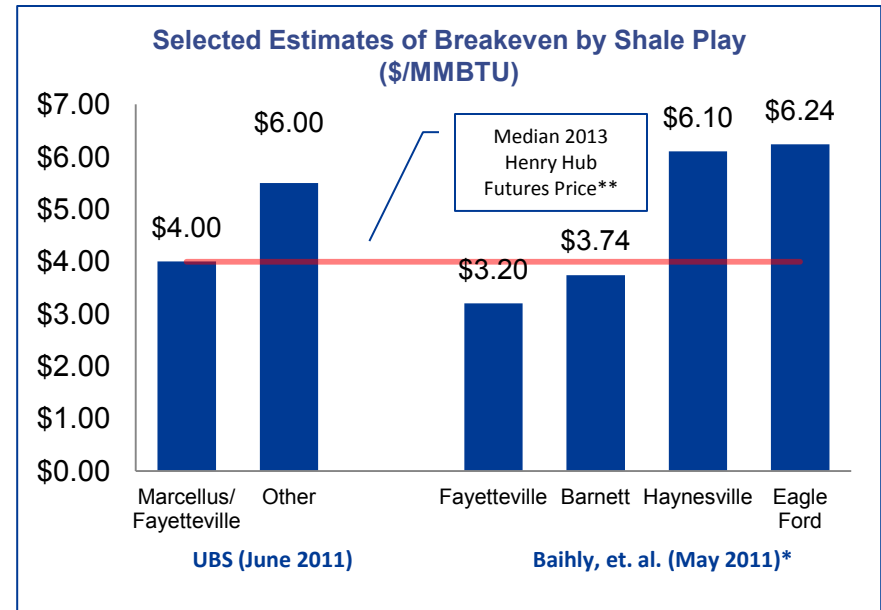
- ❑ **Yucca flux:** Used fuel strategies remain in limbo with the cessation of work on Yucca Mountain
 - An appeals court decision caused NRC to suspend, at least for a while, new reactor license decisions, pending resolution of waste issues
 - As a result, NRC has initiated a two-year “waste confidence” environmental impact assessment of used fuel storage at shutdown sites
 - In January 2012, a Blue Ribbon Commission made recommendations for future waste disposal siting; congressional follow-up is still pending
- ❑ **Small modular reactor (SMR) interest:** DOE has indicated interest in SMRs with a modest but meaningful grant of \$67 million for SMR R&D and TVA has partnered with DOE to assist with SMR technology development
- ❑ **Decommissioning funding:** NRC issued new guidelines for decommissioning—specifically regarding low-level waste—which the industry believes will increase those costs by \$120 million per reactor
- ❑ **Post-Fukushima regulatory framework:** NRC is considering a more integrated regulatory framework (decision in 2013), including:
 - Role of voluntary industry initiatives
 - Decision process for determining appropriate safety margins
 - Addressing beyond-design-basis matters
- ❑ **FLEX:** Some plants are participating in an NEI FLEX program in which each facility receives additional back-up generators and emergency batteries averaging \$1 million per plant

Noteworthy Developments for Selected New and Existing Nuclear Plants



Shale Gas: Risks to Bullish View

- ❑ Production curves (output yield from fields and wells) vary within and across various shale plays
 - Some skeptics point to rapid decline rates
 - No “one-size-fits-all” assessment of shale play productivity; assessments still evolving
- ❑ Reserves and ultimate supply are smaller than technically recoverable resources—a key question is how much at what price
- ❑ Externalities—and responses thereto—could play a role in slowing development
 - Stringent EPA regulation or local opposition, such as New York’s ban on fracking, could make availability of the shale resource moot
- ❑ Economics are brutal in the current environment
 - Series of write-downs on North American shale stakes by BHP Billiton (\$2.84B), BP (\$2.1B), BG (\$1.3B), and others as “land rush” meets \$3 natural gas prices
 - While current gas prices offer breakeven for some wet plays, most dry gas is not in the money at \$3
- ❑ Water consumption remains a concern in some areas
 - Water usage rates in recently drought-prone areas like Texas are emerging as a point of concern
 - Industry proponents, however, point to the large percentage of water consumed by municipalities and irrigation



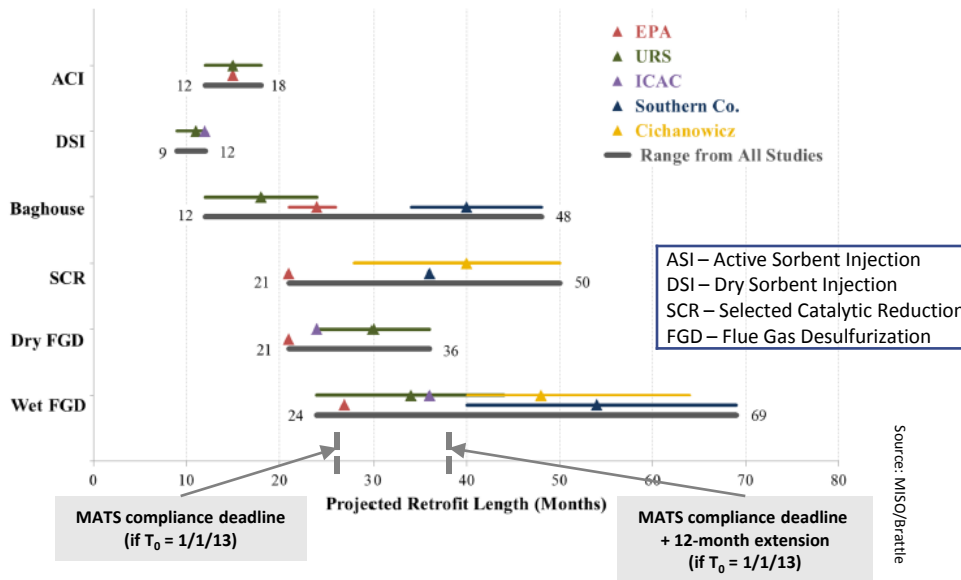
Notes: *Based upon paper for Society of Petroleum Engineers and assuming EURs as of 2009
**Monthly futures prices as of Oct. 23, 2012

Sources: *The American Oil & Gas Reporter* (May 2011); *World Oil* (July 2012); UBS Investment Research, “NYT Shale Gas Allegations Seem Exaggerated” (June 27, 2011); industry publications

Power Plant Replacement and Retrofit Supply Chain: Timing Is Everything

If Retrofit Decision on Coal Unit Has Not Been Made, Technology Options May Be Limited Given Compliance Timeframes

Selected Estimates of Retrofit Timing by Technology



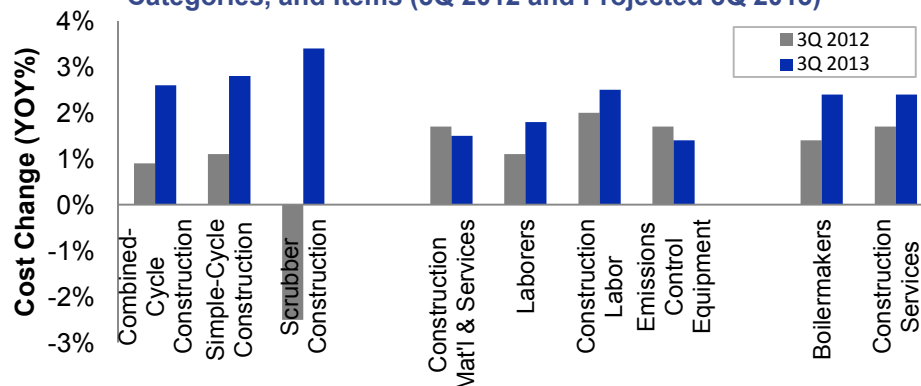
With EPA compliance deadlines (esp. MATS*) approaching, the power plant construction and maintenance supply chain will be stretched

- Both significant new construction (replacement of retiring units) and retrofits will be occurring contemporaneously
- Retrofit windows will be limited—shoulder months and perhaps some winter outages
- Compliance is required by Q1 2015, with possible extensions into early 2016, leaving only about 24 to 36 months to complete
- Per a MISO-commissioned study, the most single-year retrofits and new build of 89 GWs**, which it deems a “soft cap”

Available skilled labor supply may be stretched thin

- A shortage of skilled labor persists, despite relatively high construction unemployment (11+% as of 3Q 2012)
- This is manifesting itself in increased cost: craft labor is seeing a gradual, nationwide increase in wages and fringe benefits
- Boilermakers in particular could be in short supply: MISO found that 10% of boilermakers are in utility construction, while retrofit/build workload will require about 30% of all boilermakers over the next several years

12-Month Trailing Index Cost Changes for Selected Facilities, Categories, and Items (3Q 2012 and Projected 3Q 2013)



Contractor performance and liquidity should be monitored

- Increased competition and aggressive bidding on projects has increased risk of liquidity and performance issues with general and sub-contractors
- Rising materials costs exacerbate this risk

Notes: *Mercury and Air Toxics Standard; **normalized as wet FGD-equivalent MWs

Sources: Midwest ISO-The Brattle Group, “Supply Chain and Outage Analysis of MISO Coal Retrofits for MATS” (May 2012); Power Advocate, *Cost Intelligence Report for the Energy Industry* (Nov. 2012); EEI; EPA; Engineering News-Record; ScottMadden analysis

Rate Case and Regulatory Activity: Grid Costs and Reliability in Focus

Infrastructure Investment Continues

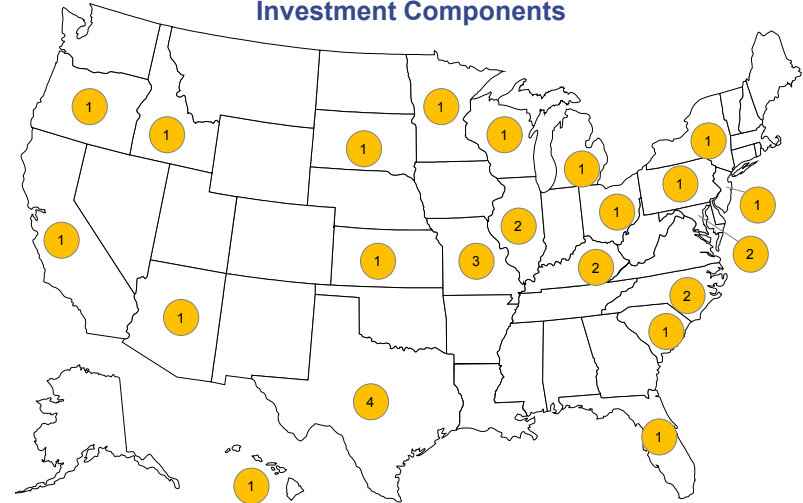
- Investor-owned electric utilities continue to invest in transmission and distribution (T&D) systems, for upgrades, reliability, and new build—at least 22 electric rate cases pending as of mid-December identified T&D system enhancements as a driver

Grid Resiliency in the Spotlight, But at What Cost

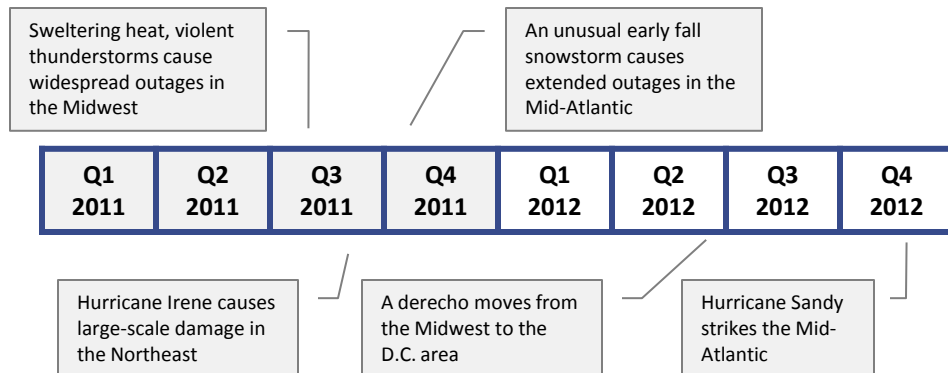
- Meanwhile, a spate of major weather events in 2011 and 2012—most recently Hurricane Sandy—has renewed calls to harden T&D system infrastructure
- Recovery of storm restoration costs has become contentious, as perceived slow response to extraordinary events causes some commissions to resist recovery requests and sparks debate over privatizing the Long Island Power Authority
- Discussion of undergrounding of lines has re-emerged (last “wave” of discussion was in the mid-2000s after major hurricanes)
 - Sandy’s impacts on the ConEd system demonstrated that undergrounding is not a panacea
 - Maryland and D.C. have each commissioned studies of undergrounding
 - However, at 5 to 10 times more costly per mile vs. overhead lines, undergrounding may be prohibitive and consumers may be unwilling to accept increased rates, especially as load growth continues to be flat

Widespread T&D-Influenced Rate Case Activity

Number of Rate Cases by State with Transmission or Distribution Investment Components

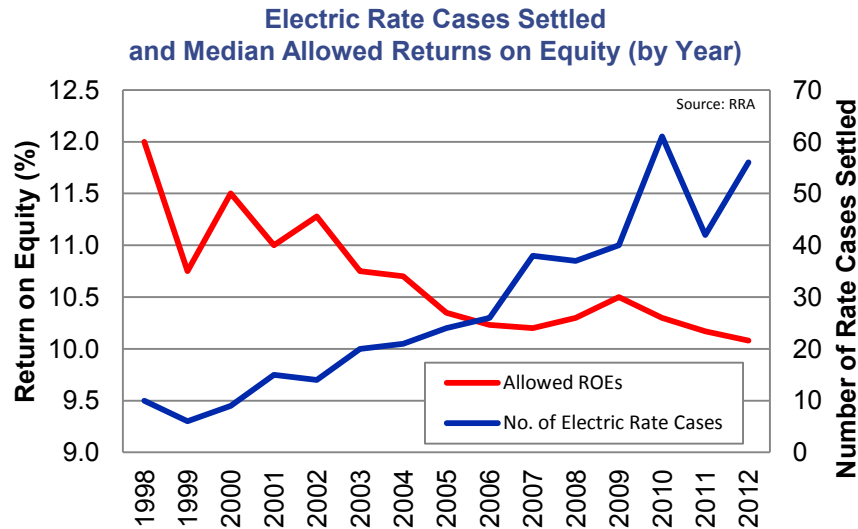


A Bad Stretch: Weather Events Stress the U.S. Grid



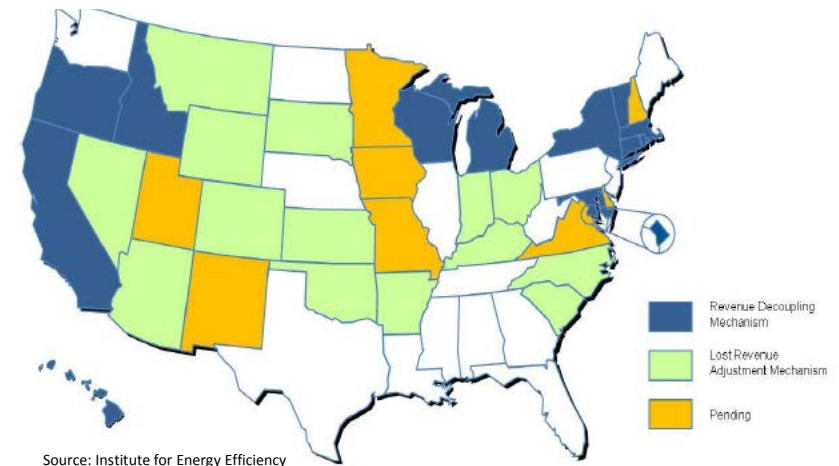
Rate Case and Regulatory Activity: Grid Costs and Reliability in Focus (Cont'd)

More of the Same: More Rate Cases, Lower ROEs



Lower Growth, More Efficiency Encourages Decoupling

Lost Revenue Adjustment and Revenue Decoupling Mechanisms for Electric Utilities by State (as of July 2012)

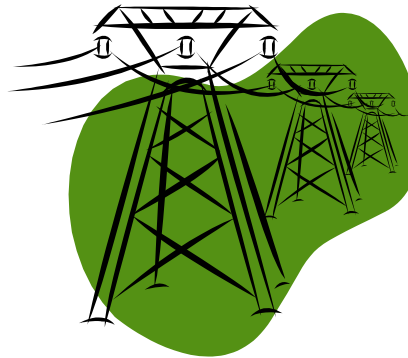


- ❑ Amid the ongoing low interest rate environment, allowed returns on equity (ROE) continue to fall
- ❑ In an effort to rein in rate awards, some commissions are requiring more frequent rate cases, while utilities continue to seek automatic adjustment mechanisms to combat regulatory lag
- ❑ There is continuing divergence of transmission and other utility businesses with regard to regulatory construct and returns. Transmission ROEs remain above 12% in many regions, formula rates remain commonplace, and FERC recently reaffirmed its transmission incentive ROE policy
- ❑ With slow or declining load growth, some utilities contemplate partial decoupling mechanisms or similar strategies; many jurisdictions have these in place
- ❑ However, these alternative rate structures can impact allowed ROEs because of the perceived reduced revenue risk for the utility. Peer comparisons for making those “adjustments” are becoming more complicated as peers may also have decoupling or similar mechanisms
- ❑ On the horizon, further activity to recover increasing costs of system hardening, infrastructure upgrades, and pension and benefits

Electric Transmission: Some Driving and Restraining Forces

Driving Forces

- ❑ FERC recently reaffirmed and clarified its incentive rate policy
- ❑ Continues to provide solid returns (>12% ROE) when compared to distribution (~10%)
- ❑ Aging infrastructure presents ongoing opportunities
- ❑ Coal retirements are driving the need for new projects
- ❑ Renewables driven both by economics (read production tax credit) and renewable portfolio standards will require interconnection



Complicating Factors

- ❑ Compliance filings suggest that elimination of the right of first refusal will require significantly more work; no clear path to new development by non-incumbents in many regions
- ❑ Timing of implementation of EPA standards limiting coal will challenge transmission development; lack of clarity has cascading effects
- ❑ Electric and gas convergence presents new contingencies in the planning process and reliability concerns in certain regions
- ❑ Timelines for deployment of supply side alternatives are significantly shorter than for transmission (distributed energy resources, demand response, energy efficiency, gas-fired generation), further complicating planning

Restraining Forces

- ❑ Load growth has slowed due to the recession and weak recovery
- ❑ Energy efficiency and demand response continue to impact load growth and peak loads
- ❑ Energy intensity is increasing
- ❑ Distributed energy resources are proliferating in certain regions
- ❑ Siting and lack of federal backstop authority slow development
- ❑ Retail rate pressure continues, exacerbated by the weak economy

Elements of Electric Transmission Rates and FERC's New Incentive Rate Policy

Elements of Incentive Rates and Some Recent Developments

Base ROE	<ul style="list-style-type: none">❑ Was challenged in New England; FERC staff recommended reduction from 11.14% to 9.66% in a “new normal” economy; Commission decision pending
Incentive ROE	<ul style="list-style-type: none">❑ Have been granted sparingly though some projects have received them for joining an RTO, project specific risk, independence❑ Base ROEs plus incentive adders have generally been in the 11% to 12% range (for projects)
Recovery of Abandoned Investment	<ul style="list-style-type: none">❑ PATH example: Opponents have already begun challenging what if any portion of the \$225 million in development costs come from ratepayers; some have sought disallowances of some expenditures as “imprudent”❑ Other cases may be on the horizon
CWIP in Rate Base	<ul style="list-style-type: none">❑ Consistently granted❑ Removal or limitation of CWIP in rate base could stress profitability and liquidity of developers of major, long lead time projects
Formula Rates	<ul style="list-style-type: none">❑ These have grown commonplace and as a result are changing the way even integrated utilities manage O&M and capital expenditure❑ Many states have retail riders

FERC Policy Statement on Transmission Incentives

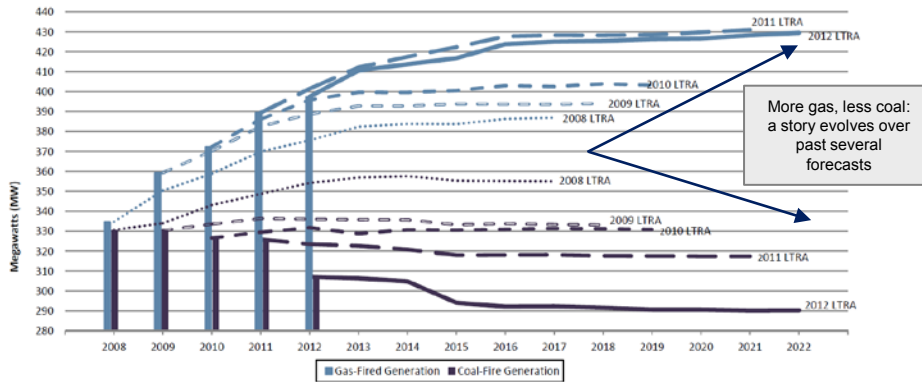
- ❑ On November 15, 2012, FERC issued a policy statement for transmission incentive rates which:
 - Is no longer limited to “routine/non-routine” analysis
 - Applies an enhanced “nexus” test
 - Encourages joint ownership
- ❑ The policy now requires four showings:
 - The proposed project faces risks and challenges that are not either already accounted for in the applicant’s base ROE or through risk-reducing incentives
 - Applicant is taking appropriate steps to minimize its risks during project development
 - Alternatives to the project have been, or will be, considered in a transmission planning process or other appropriate forum
 - An applicant commits to cost containment by limiting the application of the incentive rate of return to a cost estimate (with a provision for revisiting estimates to address cost increases that are outside the control of the applicant)

Formula transmission rates with transmission incentives (including adders for RTO participation) have generally reflected returns on equity from the mid-10% to upper-13% range

Gas-Power Interdependence: Implications of the “Dash to Gas”

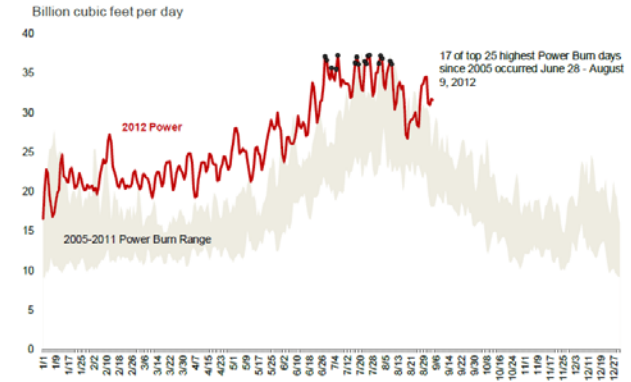
Divergence of Fates of Coal- and Gas-Fired Generation

NERC-Wide Coal- and Gas-Fired Generation Outlook: 2008–2012 LTRA Reference Case Comparison

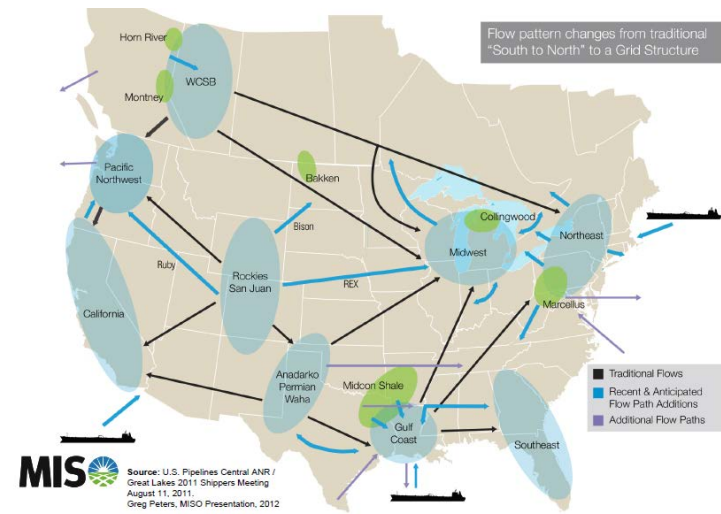
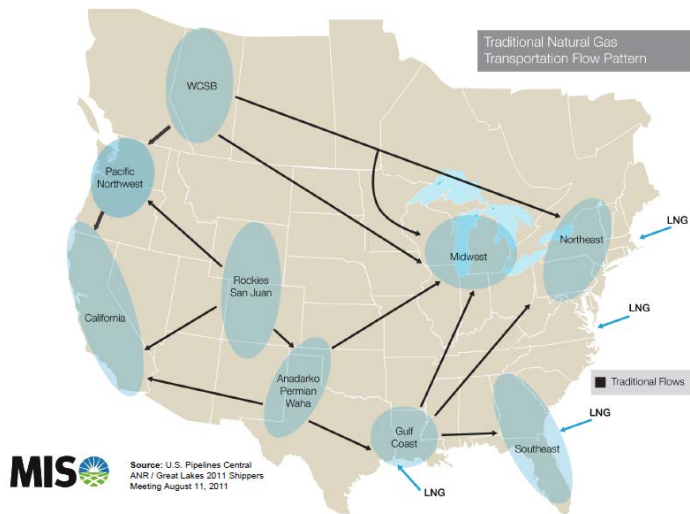


For Power, Natural Gas Is Increasingly in Demand

Daily U.S. Natural Gas Burn for Power Generation: 2005–2011 vs. 2012 (through Sept.)

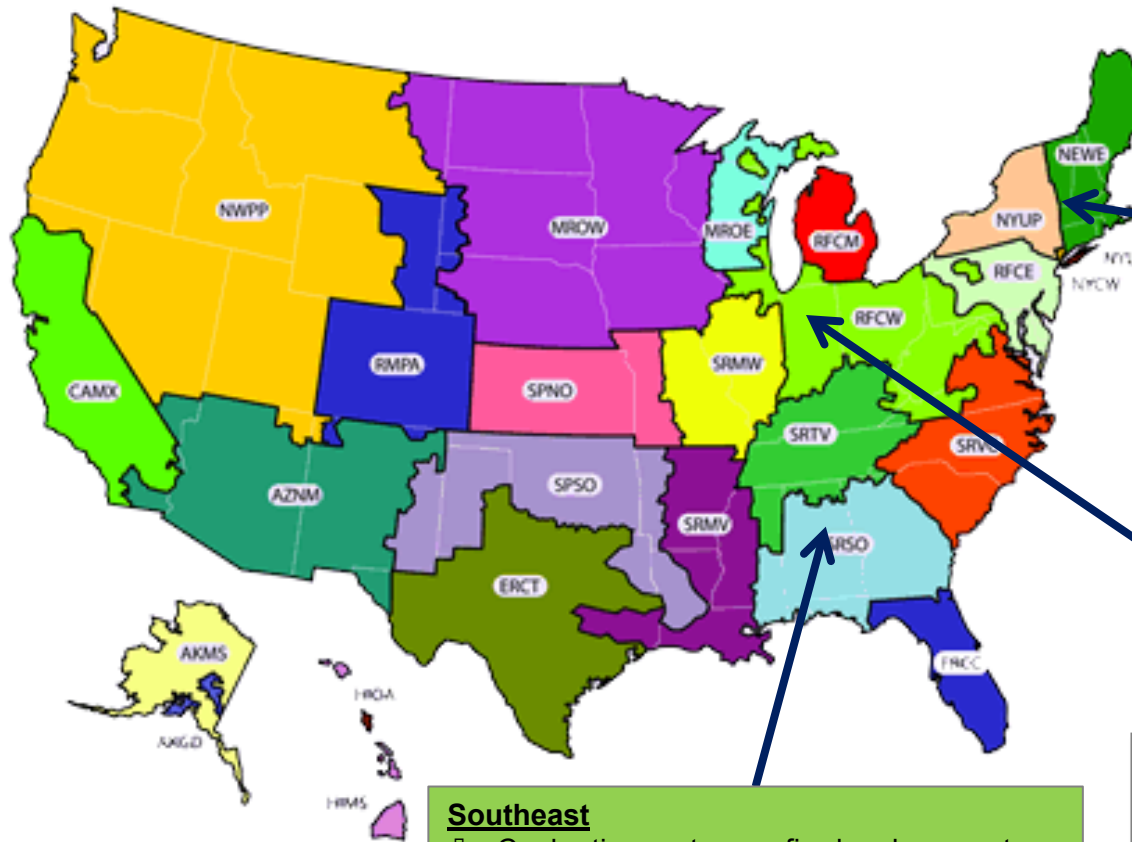


Historic “Longitudinal” Flow Pattern Shifting to Today’s Developing “Grid” Flow Patterns



Sources: EIA, “Natural Gas Markets: Recent Changes and Key Drivers,” at LDC Gas Forum (Sept. 2012); Midwest ISO gas-power workshop (May 2012) www.midwestiso.org/Events/Pages/GE20120510.aspx; NERC gas-power interdependence report (released Dec. 2011) www.nerc.com/files/Gas_Electric_Interdependencies_Phase_1.pdf

Gas-Power Interdependence: Regional Differences Mean Different Concerns



New England

- ⇓ End-of-the-(gas) line; history of gas issues
- ⇓ High winter gas demand; large gas demand centers
- ⇓ Nearby sources declining
- ⇓ Constrained interfaces—gas and power
- ⇓ Bid-based market
- ⇑ LNG import capability
- ⇑ Problem identified and being worked

Midwest

- ⇓ Massive anticipated gas-fired replacements
- ⇓ High winter gas demand; large gas demand centers
- ⇓ Bid-based market
- ⇑ Shale supply in adjacent regions
- ⇑ Problem identified and being worked

Southeast

- ⇓ Coal retirements; gas-fired replacements
- ⇑ Modest winter gas demand
- ⇑ Bilateral market; traditional cost-based regulation of generation
- ⇑ Shale supply in adjacent regions

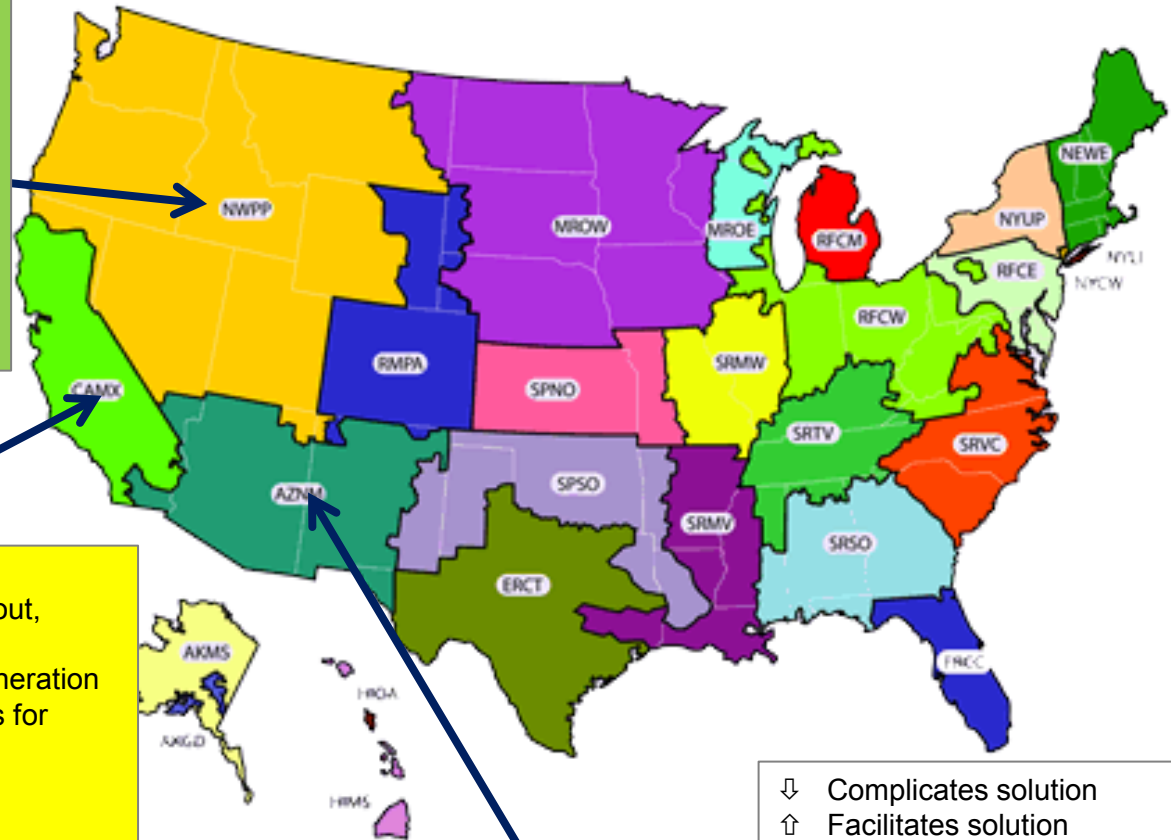
- ⇓ Complicates solution
- ⇑ Facilitates solution

Depending upon variables such as existing and anticipated gas resources and infrastructure, volume and timing of coal-fired power plant retirements and retrofits, market structure, and a history of collaboration among regional players, solutions to gas-power interdependence complexities can be facilitated or hampered.

Gas-Power Interdependence: Regional Differences Mean Different Concerns (Cont'd)

Northwest/Mountain West

- ⇩ Large intermittent resource build-out
- ⇧ Significant hydro resources, but need to distinguish capacity and energy needs
- ⇧ Significant coal-fired capacity; massive retirements not expected immediately
- ⇧ Available Rockies, Canadian supply
- ⇧ Largely traditional (non-bid-based) market
- ⇧ Recent pipeline expansions
- ⇧ Working group established for Northwest



California

- ⇩ Large intermittent resource build-out, aggressive targets
- ⇩ Heavy reliance upon gas-fired generation
- ⇩ “Peaky,” low cap-factor gas needs for renewable capacity backstop
- ⇧ Available gas supply in West
- ⇧ Generally more temperate
- ⇧ Large gas demand centers (SF, LA)
- ⇩ Bid-based market
- ⇧ Generator, gas transmission communication taking place

Desert Southwest

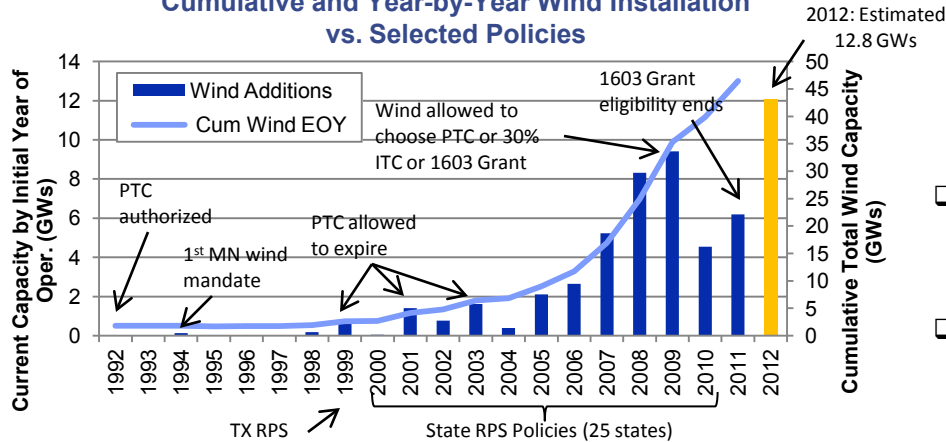
- ⇩ Heavy reliance upon gas-fired generation, with more on horizon

- ⇩ Complicates solution
- ⇧ Facilitates solution

Curtain Call for the Production Tax Credit and Shifting Paradigm for Wind Development?

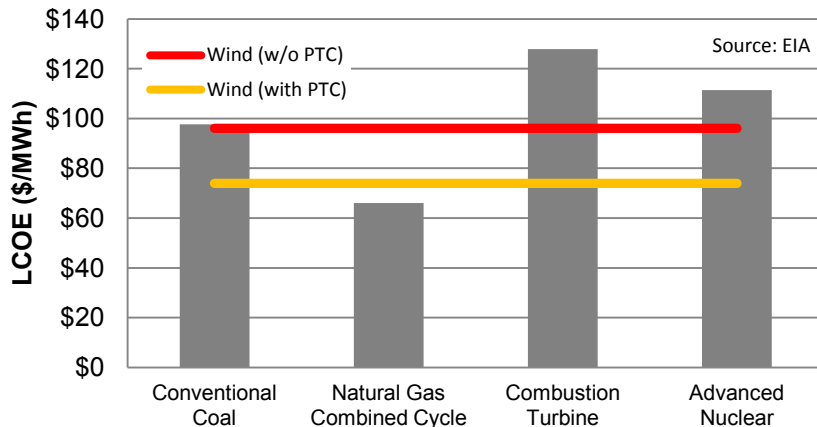
“Near Death” for PTC for Two Decades

Cumulative and Year-by-Year Wind Installation vs. Selected Policies



The PTC Remains Essential to the Wind Industry

Estimated Total System Levelized Cost of Energy (LCOE) for New Plants in Service in 2017 (2010\$/MWh)



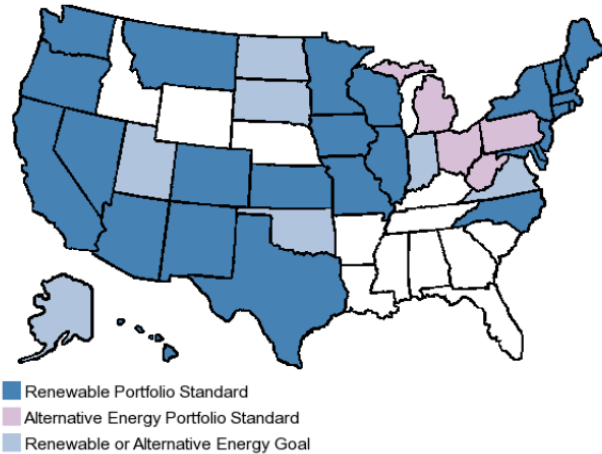
- ❑ As the clock ran out on 2012, “fiscal cliff” negotiations yielded an extension of the 2.2¢/kWh renewable energy production tax credit (PTC), among other subsidies*
 - Projects “under construction”—a term subject to some interpretation—in 2013 can qualify for the PTC
 - Effectively extends the credit for more than one year with the “commenced construction” deadline rather than a “placed in service” deadline
- ❑ Industry observers are not sure how many 2012 projects will be “construction-ready” by 2013, given continued economic uncertainty, good reserves in many areas, flat power demand, and low wholesale electric prices
- ❑ One analyst projects 1.2 GW in new wind installations for 2013 versus a record 12 GWs to 13 GWs in 2012, as developers moved to complete projects given uncertainty about PTC renewal for 2013. Projects completed or “planned for completion” for 2012 went from about 5 GWs projected at the end of 2011 to more than 12 GWs estimated as of late November 2012
- ❑ The extension provides temporary clarity, but doesn’t solve fundamental long-term uncertainty for the industry, which has experienced start-stop subsidy support, leading to boom-bust construction cycles
- ❑ AWEA, the wind industry lobby, has indicated a willingness to phase out the PTC over several years (ending after 2018), perhaps in response to D.C. talk of fiscal austerity and technology advances and related cost improvements
- ❑ Looking to a possible future post-PTC era, one observer forecasts meaningful changes for the wind industry
 - *Financing structures*: Fewer debt/tax-focused schemes and more traditional project financing
 - *Deeper pockets*: Developers will need to have larger balance sheets as activity slows
 - *Customer-oriented models*: Less develop-and-flip activity, more tailored services such as resource shaping and firming

Note: The investment tax credit and bonus depreciation for renewables were extended as well
Sources: REchargenews.com; Stoel Rives; Van Ness Feldman; American Wind Energy Association (AWEA); Dept. of Energy; Power magazine; Forbes; EIA; SNL Financial

Absent Delays, State Renewable Portfolio Standards Should Support Some Renewables Development

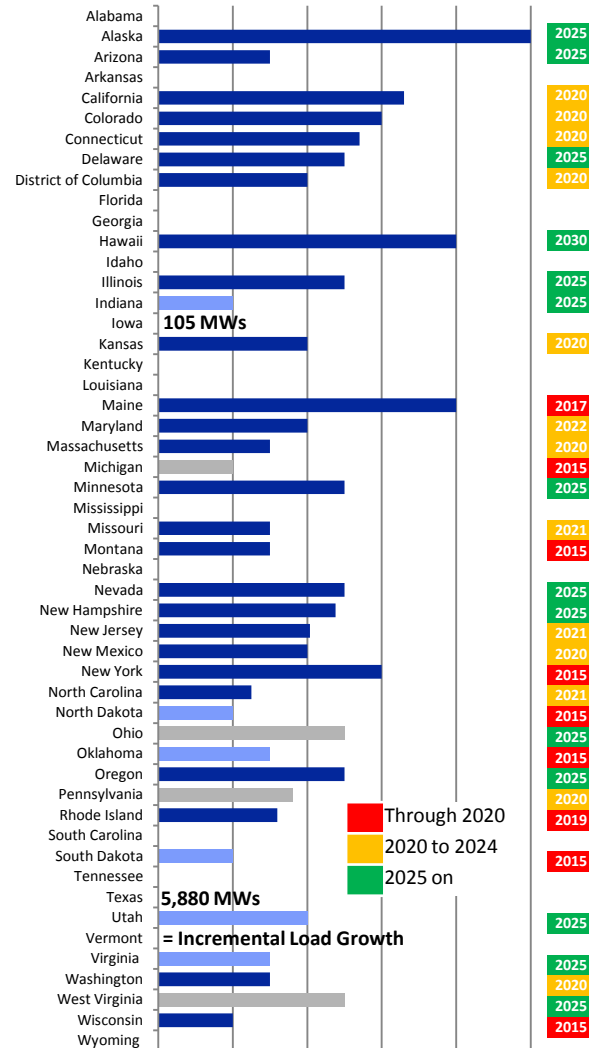
30 States Have Renewable Portfolio Standards or Goals

Renewable and Alternative Portfolio Standards and Goals (as of Oct. 2012)

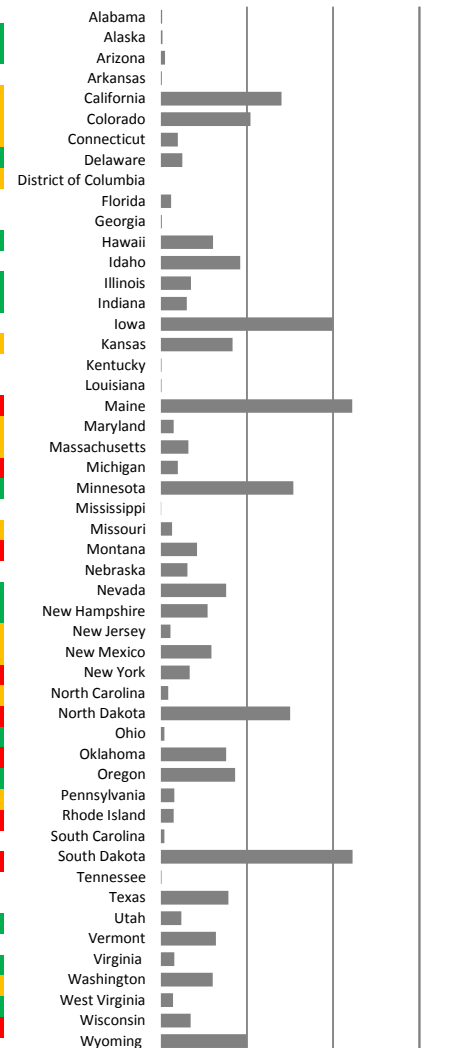


- Compliance deadlines for renewable and alternative portfolio standards in some states are rapidly approaching, while only 164 TWh (~4%) of net generation in the United States in 2011 was from non-hydro renewable resources
- About half of RPS states have solar carve-outs, but in most cases those volumes are modest
- California, PJM, several Western states, and the Midwest have significant RPS compliance requirements beginning in 2020
- In addition to development, one key to compliance will be the availability of renewable energy certificates, with some utilities likely banking certificates to meet near-term needs
- However, 2013 development may be slower as uncertainty about production tax credit extension either froze or pulled development into 2012

Renewable or Clean Energy Targets or Goals (as of Oct. 2012)



Utility/IPP Non-Hydro Renewable Net Generation* as % of Total (2011)



Notes: *Includes utility/IPP combined heat & power, excludes industrial, commercial generation
Sources: Center for Climate and Energy Solutions; DSIREUSA.org; EIA

Wind O&M Costs: Increasing Focus But Costs Remain Low

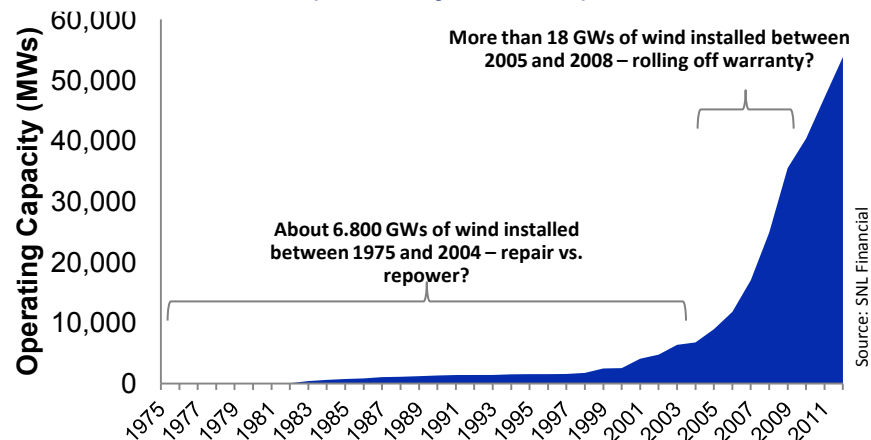
- ❑ As the installed base of wind power grows and ages, the industry is increasingly focused on operations and maintenance (O&M) costs, especially as OEM warranties (typically last five or six years) begin to expire
- ❑ One estimate put U.S. wind farm O&M at \$2.7 billion in 2011, with the expectation that it will double by 2025
- ❑ The worldwide wind fleet, however, is not homogeneous; it varies by ownership, technology, size, manufacturer, and geographic dispersion
- ❑ Early U.S. installations using smaller, kW scale technologies are more likely to be candidates for repowering or retirement than for continued O&M
- ❑ For newer turbines, technical advancements and better siting and management of farms has improved service performance
- ❑ Some analysts see performance upgrades as an area for innovation and business growth

Headwinds for New Wind Construction

- ❑ The wind construction market is expected to slow in 2013 given the stop-go production tax credit dynamic
- ❑ Low natural gas prices have driven the spot electricity prices lower, which are compared to PPA prices for breakeven/cost-effectiveness of new build
- ❑ The gap between state renewable portfolio standards and qualified generation capacity is narrowing in many states
- ❑ Mostly limited progress on expediting new transmission build to “unlock” new wind generation from high-resource availability areas

Wind Assets Aging by the Year

**U.S. Wind Cumulative Operating Capacity by Year Online
(as of early Nov. 2012)**



Selected Utility Estimates of Wind O&M Costs

Puget Sound Energy	\$40,000 to \$70,000/year for five-year-old, 1-MW turbine (about 1¢ to 1.5¢ per kWh)
Oklahoma Gas & Electric	<ul style="list-style-type: none"> • 20% failure rate on major components requiring tower repair or crane • Industry estimate: Failures in gearboxes, main bearings, and generators that involve a cost from \$30,000/turbine (up tower repair) to \$500,000/turbine (requiring a crane)
Basin Electric	\$500,000/year budget for gearbox replacement
LADWP	\$5 million budgeted per year for 90 wind turbine generators; now to be increased 20%

Notes: *Converted at \$1.339/€1, the two-year trailing average exchange rate at Nov. 27, 2012

Sources: IHS Emerging Energy Research; Bloomberg New Energy Finance: Vestas Q3 2012 Investor Presentation (Nov. 7, 2012); Wind Energy Update, “Wind O&M Market Overview 2012/2013” (Nov. 2012); DOE-EERE, “Establishing an In-House Wind Maintenance Program” (2d ed. 2011); SNL Financial (at center.snl.com/Resources/whitepaper.aspx?id=4294969809)

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Support for Department of Defense Energy Efficiency Task Force (EITF) Projects by J. Jacobi, Aug. 2012
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