FALL 2011 UPDATE

Ensuring a Clean, Modern Electric Generating Fleet while Maintaining Electric System Reliability

November 2011

M.J. BRADLEY & ASSOCIATES LLC

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ECONOMIC, FINANCIAL and STRATEGY CONSULTANTS

Acknowledgements

The following report was prepared on behalf of the following electric companies dedicated to responsible energy and environmental stewardship. The participating companies (listed below) are some of the nation's largest generators of electricity, with over 146,000 megawatts of electric generating capacity (including 93,000 megawatts of fossil generating capacity) throughout the U.S.

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Constellation Energy
Exelon Corporation
NextEra Energy
National Grid
Public Service Enterprise Group

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Executive Summary

This marks the third installment in a series of reports focusing on the reliability implications of two U.S. Environmental Protection Agency ("EPA") clean air rules affecting the electric power sector: (1) the Cross-State Air Pollution Rule ("Transport Rule")[1] and (2) the national emission standards for hazardous air pollutants from coal- and oil-fired electric utility steam generating units ("Utility Toxics Rule").[2]

The first report, published in August 2010, concluded that the electric industry is well-positioned to comply with EPA's proposed air regulations without threatening electric system reliability. The summer 2011 update, published in August, supplemented the original analysis in light of new information and reaffirmed the prior report's major conclusion that the electric industry can comply with EPA's air pollution rules without threatening electric system reliability. The August report noted that proper planning and implementation can secure important public health benefits, reliable electric service, and efficient market outcomes.

This "Fall 2011 Update" focuses on the many tools that are available for ensuring electric reliability as companies comply with the EPA rules by installing modern pollution control systems, utilizing allowances or retiring portions of the fleet that are uneconomic to retrofit.

Federal and state regulators agree that the industry has the tools to maintain electric system reliability even in the face of coal plant retirements. In testimony to Congress, FERC Commissioner John Norris stated "[i]n short, based on the information I have reviewed to date on EPA's regulations, I am sufficiently satisfied that the reliability of the electric grid can be adequately maintained as compliance with EPA's regulations is achieved."[3]

1. **The electric power sector relies on a wide range of planning and operational tools and market mechanisms to ensure the reliability of the Nation's bulk electric power system.**

    - Long-term reliability planning is an ongoing process involving industry participants, system operators and regulators that ensure adequate resources are available to satisfy future electricity demand—with an added margin of safety in the event of unplanned contingencies, such as an unexpected generation plant shutdown or extreme weather event.

    - A full reliability assessment considers not only the generating assets available to supply the grid, but also the transmission facilities, the interconnections with neighboring power systems and the demand side resources grid operators can dispatch or otherwise call upon to balance the system's supply and demand.

    - In recent years, actual reserve margins around the country have been well above the minimum target levels, because of new power plant additions, as well as reduced demand attributable to the economic recession and increasingly robust load management programs.

    - According to reports published by the North American Reliability Corporation ("NERC"), the group responsible for overseeing compliance with national reliability rules, the projected reserve margins

[1] The Transport Rule is sometimes referred to as CASPR rule.
[2] The Utility Toxics Rule is sometimes referred to as MATS (mercury and air toxics) rule.
[3] Testimony of Commissioner John R. Norris Federal Energy Regulatory Commission Before the House Subcommittee on Energy and Power Of the Committee on Energy and Commerce United States House of Representatives. September 14, 2011.

in 2014 range from *28% to over 40%*, with a large amount of excess generating capacity (150 GW nationwide) above the target reserve margins.

NERC Electric Reliability Region	Projected Reserve Margin [1] in 2014	NERC Target Reserve Margin	Cushion Above NERC Target Reserve Margin [2] In 2014
TRE	31.0%	12.5%	12.5 GW
FRCC	31.7%	15.0%	7.4 GW
MRO	28.3%	15.0%	5.5 GW
NPCC	30.1%	15.0%	9.5 GW
RFC	34.0%	15.0%	34.8 GW
SERC	29.4%	15.0%	30.4 GW
SPP	40.3%	13.6%	12.3 GW
WECC	40.2%	14.7%	33.2 GW
Total			**145.7 GW**

[1]Includes capacity defined by NERC as Adjusted Potential Reserve Margin, which is the sum of deliverable capacity resources, existing resources, confidence factor adjusted future resources and conceptual resources, and net provisional transactions minus all derates and net internal demand expressed as a percent of net internal demand. Source: NERC, *2010 Long-Term Reliability Assessment*, October 2010, p. 32 (Summer Demand).
[2]Capacity in excess of what is required to maintain NERC Reference Margin or the regional target reserve levels.

Source: NERC, *2010 Long-Term Reliability Assessment*, October 2010.

- System operators routinely perform power flow and power system studies to evaluate the implications of generating unit retirements. If they identify reliability concerns, system operators will establish mitigation measures to implement before the unit retires, including, for example, upgrades to existing power lines, upgrades to substations, adding additional transformers, building new transmission lines, and/or entering into reliability-must-run ("RMR") agreements with the retiring unit.

- Many power projects are in development. Expanded domestic natural gas production is facilitating a transition to a cleaner generation fleet. For example, at present, there are 38 gigawatts ("GWs") of generating capacity under construction, 18 GWs of which is natural gas-fired; and there are another 12 GWs of natural gas-fired generation capacity in advanced stages of development. In normal market conditions, it may typically take 2-3 years to fully develop, permit and construct a peaking facility, and 3-4 years to fully develop, permit and construct a gas-fired power plant. Demand-side resources, however, can be brought on line with much-shorter lead times (e.g., less than one year).

- Lisa Jackson, Administrator of the U.S. EPA, recently stated: "[i]n 40 years, the Clean Air Act has never caused a reliability problem."[4] A review of recent outages on the bulk power system confirms her statement. Recent outages have been caused by trees touching power lines, operator errors, substation fires, substation malfunctions, and weather-related system failures, not by implementing EPA clean air rules.

[4] Lisa Jackson, verbal testimony, U.S. House of Representatives, Committee on Energy and Commerce Hearing. September 22, 2011.

2. Options are available under existing law to manage electric system reliability as the industry makes the investments necessary to comply with EPA's clean air rules.

- A survey of recent corporate earnings statements shows that many of the Nation's generating companies impacted by the EPA clean air rules are well positioned to comply because of earlier investments in their fleets. See Appendix A.

- Companies representing half of the nation's coal-fired generating capacity—eleven out of the top 15 largest coal fleet owners in the U.S.—have indicated that they are well positioned to comply with EPA's clean air rules because of early investments in their generating fleets.

- Some electric generating units (or whole generating facilities) may choose to retire in lieu of installing air pollution controls. The Bipartisan Policy Center, for example, projects about 20 GW of coal plant retirements as a result of EPA's air, water, and coal ash rules.

- EPA and state regulatory authorities have the discretion to grant, on a unit-by-unit basis, an additional 12 months for the installation of pollution control systems where appropriate, beyond the three years allowed under the Clean Air Act ("CAA"). Existing regulations detail the process for requesting additional time for the installation of pollution control systems.

- Permitting authorities have used the one-year extension provision in the past under previous air toxics rules. For example, the following industrial facilities were granted 10-12 month extensions to comply with prior MACT (Maximum Achievable Control Technology) standards: (1) Lincoln Paper and Tissue in Lincoln Maine, (2) Biscoe Iron Foundry in Biscoe North Carolina, (3) Boral Bricks Salisbury Plant in Rowan County North Carolina, (4) Iowa Army Ammunition Plant in Middletown Iowa, and (5) Kaiser's aluminum works in Tacoma Washington.

- If four years is still not enough time to install the necessary pollution control systems, EPA has the statutory authority to enter into administrative orders of consent under §113(a)(4) of the CAA or consent decrees with power plant operators, allowing additional time for the installation of controls.

- EPA and the states also have existing legal authority to address potential reliability concerns associated with the retirement of electric generating units. Five of the nation's RTO's have submitted public comments to EPA proposing a "targeted backstop reliability safeguard" to address situations where additional time is required for a unit retirement. The joint RTO commenters anticipate that the reliability safeguard "would not need to be invoked often, if at all".[5]

- If additional time is provided for the installation of pollution control systems or to accommodate the retirement of a unit that is needed for reliability purposes, units should operate only for reliability purposes to limit the plant's air pollution emissions during the extension period. The CAA directs EPA specify "any additional conditions" for the protection of public health during the extension period. This approach ensures that reliability standards are maintained, while minimizing air pollution emissions, without an across-the-board delay in the implementation of the clean air rules.

[5] Joint Comments of the Electric Reliability Council of Texas, the Midwest Independent Transmission System Operator, the New York Independent System Operator, PJM Interconnection, L.L.C., and the Southwest Power Pool.

I. ELECTRIC SYSTEM RELIABILITY PLANNING AND IMPLEMENTATION

The electric power system in the United States, despite its scope and complexity, has proven to be a very robust and reliable system. The power system operates pursuant to a detailed set of operating standards, as designed and implemented by the North American Electric Reliability Corporation (NERC) and approved by the Federal Energy Regulatory Commission (FERC). This comprehensive system of standards and regulatory oversight guides the efforts of electric utilities and grid operators to ensure reliable energy supplies. Numerous stakeholders help maintain the reliability of the electric system, including regional reliability organizations, regulators, utilities, grid operators, and other market participants. Together, the policy infrastructure, industry participants, and planning tools provide a critical backdrop for assessing the changes underway as the electric industry responds to EPA's upcoming clean air rules.

A. Reliability Planning: Systems are in place to ensure the reliability of the Nation's bulk electric power system

Reliability planning and coordination is an ongoing process to ensure that adequate resources are available to satisfy peak electricity demand—with an added margin of safety in the event of unplanned contingencies, such as an unexpected generation plant shutdown or extreme weather event. Industry planners engage in long-term planning for peak-day "resource adequacy", while also conducting special assessments of the localized implications of generating unit retirements or new plant interconnections.

1. Resource Adequacy: Planning for peak demand days

System planners conduct long-term resource adequacy studies, to ensure that there are sufficient resources available to satisfy the demand for electricity on peak days. The resources evaluated include: generating facilities; transmission facilities; interconnections with neighboring power systems; and demand side resources (e.g., emergency generators) which the grid operator can dispatch or otherwise call upon to balance the system's supply and demand.

Most regions observe the "one day in 10 year" loss-of-load expectation (LOLE) standard, where the objective is to experience no more than one involuntary service interruption (e.g., blackout) every ten years.[6] To meet the resource adequacy standard, planners for each electrical region use probability models to determine the amount of resources needed to meet end-use demand for electric power. To assess whether additional resources are needed to meet the LOLE standard, these studies review: scheduled and unplanned/forced outage rates; availability of capacity on transmission connections to neighboring systems; on-call demand-reduction resources; and higher-than-expected peak-load use.

2. System Assessments: Planning to accommodate reliable operations when a plant retires or is added to the system

Additionally, system planners conduct periodic reliability assessments when infrastructure changes are anticipated to occur on the system. For example, system impact studies are performed when: (1) a company plans to interconnect a new generating facility to the grid; (2) an existing generating unit plans to retire from service; or (3) a company plans to construct a new transmission facility. The goal is to ensure that, even with the changes in the physical components of the system, the system will continue to operate reliably at all times and under a variety of operating conditions and contingencies. These system impact

[6] The standard focuses on outages caused by insufficient deliverable generation and other resources installed on the system, rather than weather-related and other events that take out transmission and distribution facilities, and thus interrupt service to customers.

studies may also identify associated changes (e.g., transmission system upgrades) required to maintain voltage support, reliable power system flows, or other critical grid operating capabilities.

Planners also perform special assessments of emerging issues—such as how fuel supply and delivery issues might affect the ability of power plants to operate at certain times of the year; how limitations on the operations of a power plant (e.g., due to constraints on air emissions) might limit the grid operator's ability to dispatch generating units; or how penetration of non-dispatchable generating resources (such as wind, or solar) might impact system operations and reliability. These studies identify issues that operators may need to consider as they dispatch plants and operate the system.

3. Real-Time System Operations: Systems to assure operational reliability at all times

System operators also plan for secure system operations in real time by equipping operators with a variety of tools. Some of the tools provide power plant dispatch signals that reflect inherent technical operating constraints related to particular plants (e.g., how long it takes them to start up, or to ramp up from low operating levels to full output). Other tools reflect regulatory agreements controlling plant output. These agreements include, for example, RMR agreements which keep an otherwise uneconomic plant operating under certain system conditions to provide voltage support or other reliability functions, or ones limiting plant dispatch to maintain required emissions levels. Other critical tools provide real-time communications and control devices advising grid operators of facility operations' status, to avoid operational disturbances which would shut down parts of the system, and to enable operators to manage any unexpected reliability problems by responding immediately to changing system conditions, including through automatic control devices.

B. Reliability Entities: Multiple parties play a role in ensuring the reliability of the Nation's bulk electric power system

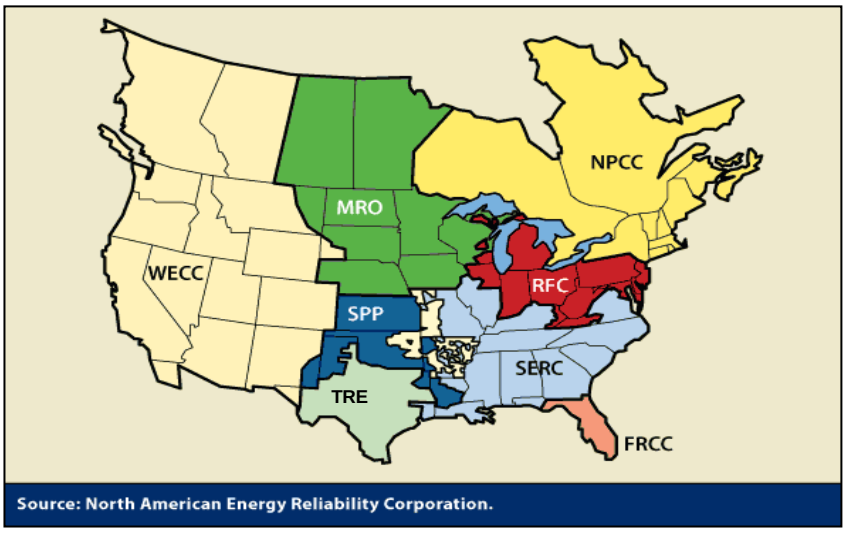
1. Roles of NERC, the regional reliability councils, electric utilities, and others

NERC establishes and maintains standards to ensure the reliability of the North American bulk electric system.[7] These standards define the reliability requirements for planning and operating the system, which includes three major regions of interconnected electrical systems: the Eastern Interconnection (covering most of eastern North America); the Western Interconnection (a large area spanning from the Great Plains to the Pacific Coast); and the ERCOT Interconnection, comprising most of Texas.

NERC works with eight regional reliability entities, whose participants include grid operators, utilities, generating companies and other key stakeholders in the electric industry. As shown in the map below, the regional entities include: the Western Electric Coordinating Council (WECC) covering the Western Interconnection; the Texas Reliability Entity (TRE), covering most of Texas; and the Nation's Eastern Interconnection served by the Midwest Reliability Organization (MRO); the Southwest Power Pool (SPP); the Northeast Power Coordinating Council (NPCC); the Reliability First Corporation (RFC); the SERC Reliability Council (SERC); and the Florida Reliability Council (FRCC).

[7] Under the authorities established in the Energy Policy Act of 2005, FERC certified NERC as the Nation's independent electric reliability organization (ERO), with the responsibility to establish and enforce the reliability standards for the bulk power electric system. All reliability standards and enforcement actions proposed by NERC must be approved by FERC. Also, FERC's authority is limited to the bulk-power system—not the distribution system. Bulk-power system outages, as opposed to outages on the distribution system, can affect large areas with significant regional and national implications.

NERC Regional Entities



Most of the Nation's regional reliability entities cover multiple states. Each monitors and enforces compliance with NERC's reliability standards, and assesses the maintenance of minimum target reserve margins, a key indicator of resource adequacy. All regions plan to have capacity above expected demand to accommodate unplanned power plant outages, transmission failures, unexpectedly high demand, or other contingencies. Most regions maintain minimum target reserve margins of about 15 percent.

Actual or expected reserve margins measure the extent to which generating capacity exceeds (or falls short of) peak electricity demand. In recent years, actual reserve margins around the country have far exceeded the minimum target levels, due not only to new power plant additions, but also to reduced demand attributable to the economic recession and increasingly robust load management programs.

NERC Electric Reliability Region	Projected Reserve Margin [(1)] in 2014	NERC Target Reserve Margin	Cushion Above NERC Target Reserve Margin [(2)] In 2014
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[2]Capacity in excess of what is required to maintain NERC Reference Margin or the regional target reserve levels.

Source: NERC, *2010 Long-Term Reliability Assessment*, October 2010.

Within the different regions, the reliability councils, transmission owners, electric utilities, power plant owners, and independent system operators are responsible for compliance with different aspects of NERC's reliability standards. They rely on various tools to ensure a reliable power supply:

- Regional entities carry out the fundamental resource adequacy assessments and identify surpluses and shortfalls.

- System operators and transmission companies conduct long-term transmission planning to assess future reliability conditions, in light of load growth, planned resource additions (or retirements), and other anticipated changes in the system infrastructure. Transmission plans are developed with considerable public input.

- Regulated utilities prepare integrated resource plans ("IRP"), which serve as comprehensive road maps for providing reliable electric service to customers while addressing economic trade-offs of different supply options (e.g., new power plants, new transmission facilities, energy efficiency) and associated risks and uncertainties. As with long-run transmission plans, IRPs are developed with considerable public input.

- Many independent system operators—like PJM Interconnection, L.L.C. ("PJM"), the New York ISO (NYISO), and ISO New England (ISO-NE)—rely on forward capacity market designs to encourage investment in new and existing resources and conduct periodic auctions to secure commitments to supply future capacity. In June 2011, ISO-NE announced that it had procured sufficient generation and demand-side resources to meet the region's reliability needs in 2014-2015.[8] In May 2011, PJM also announced that it had secured sufficient resources to meet its reliability needs in 2014-2015; PJM secured resources sufficient to maintain a 20 percent reserve margin for the region.[9]

- Transmission operators (e.g., Regional Transmission Organizations (RTO) like the Midwest ISO (MISO), the Southwest Power Pool (SPP), PJM, NYISO, and ISO-NE) as well as electric utilities in parts of the country without an RTO also conduct studies to identify transmission overloads, voltage limitations and other potential reliability standards violations. Also, they develop transmission plans to resolve violations that could otherwise lead to overloads and black-outs.

- Before commencing commercial operation, power plant developers request transmission operators perform system impact studies to determine, any reliability issues arising from the new plant's interconnection to the grid. Using power flow models to examine a variety of operating conditions with the new plant in place, these system impact studies and subsequent facility studies identify reliability concerns and proposed measures (such as transmission system upgrades) to mitigate any potential concerns.

- Before retiring or deactivating a generating unit, existing power plant owners must provide the RTOs notice so that system operators can evaluate the reliability implications of the retirement or deactivation using power flow and other power system modeling. Factors considered in such an assessment include, but are not limited to, "the operating characteristics of a unit, the number of

[8] ISO-NE. Fifth Forward Capacity Market Auction Secures Power System Resources for 2014-2015: More than 40,000 Megawatts of Resources Competed to Meet the Region's Capacity Needs. June 8, 2011.

[9] As discussed in the Summer Update, PJM recently announced the results of its forward capacity auction for the period when EPA's clean air rules will be in effect. The results of the auction confirm that the PJM region will have ample electricity supply after EPA's rules take effect. The market response represents a 20.6 percent reserve margin for the region. PJM. Demand Resources and Energy Efficiency Continue to Grow in PJM's RPM Auction. May 13, 2011.
PJM. 2014/2015 RPM Base Residual Auction Results. PJM DOCS #645284.

proposed retirements and the location of the units." The respective RTOs/ISOs require the following advance notice requirements:[10]

RTO/ISO	Advance Notice Requirements
ERCOT	90 days notice (for units to be taken out of service for periods that exceed 180 days)[11]
MISO	26 weeks[12]
NYISO	180 days (for generators larger than 80 MW) and 90 days (for generators smaller than 80 MW)[13]
PJM	90 days[14]
SPP	45 days[15]

Despite these tariff requirements, however, power plant operators have historically given several years advance notice. Several RTOs have suggested that notification of retirements associated with EPA's rules should be made within 12 months of EPA issuing its final regulations.[16] From a timing perspective, PJM, for example, will typically complete a deactivation study within 30 days, testing for violations of NERC reliability criteria including stability, thermal line loadings and voltage limits. In 2011, PJM received eight unit deactivation requests; seven of the reliability studies identified no reliability impacts.[17]

- If a power flow and other power system analyses identify reliability concerns, system operators will specify mitigation measures that need to be implemented before the unit retires. This could include upgrades to existing power lines, upgrades to substations, adding additional transformers, or building new transmission lines. ISOs/RTOs can neither compel the construction of new generating facilities nor prevent an existing generating unit from retiring. "Rather, the ISO/RTO model is based on a market platform that provides financial incentives designed to facilitate resource adequacy consistent with applicable reliability standards". By contrast, transmission assets are regulated, and as a result, the ISO/RTOs plan for, and have the authority pursuant to their tariffs to direct the expansion of the transmission grid to address reliability issues."[18] Additionally, to help mitigate reliability impacts of retiring generation units, the ISO/RTOs use their transmission planning reports as well as these system impact studies, to signal to the market the need for market response solutions, such as the addition of generation, demand response or energy efficiency resources.[19]

- Where a retirement might lead to a local reliability concern, ISOs/RTOs may attempt to enter into RMR agreements with the owner of a power plant to prevent it from retiring the plant. An RMR agreement identifies the terms and conditions under which the plant may operate for grid reliability purposes, in exchange for the users of the system paying the plant owner its costs to keep the plant in operation. For example, when PJM determined that two proposed-to-be-retired power plants in

[10] Joint Comments of the Electric Reliability Council of Texas, the Midwest Independent Transmission System Operator, the New York Independent System Operator, PJM Interconnection, L.L.C., and the Southwest Power Pool, p. 3.
[11] ERCOT Protocol Section 3.14.1.1.
[12] MISO Tariff section 38.2.7 and Attachment Y.
[13] NYSPC Case No. 05-E-0889.
[14] PJM Tariff section 113.1 and 113.2.
[15] SPP EIS Protocols Section 12.
[16] Joint Comments of the Electric Reliability Council of Texas, the Midwest Independent Transmission System Operator, the New York Independent System Operator, PJM Interconnection, L.L.C., and the Southwest Power Pool.
[17] PJM. Generator Deactivations as of September 7, 2011.
[18] Joint Comments of the Electric Reliability Council of Texas, the Midwest Independent Transmission System Operator, the New York Independent System Operator, PJM Interconnection, L.L.C., and the Southwest Power Pool. p. 3.
[19] Joint Comments of the Electric Reliability Council of Texas, the Midwest Independent Transmission System Operator, the New York Independent System Operator, PJM Interconnection, L.L.C., and the Southwest Power Pool. p. 4.

Pennsylvania were needed to maintain local reliability, PJM entered into an agreement to keep the plants operating until completion of required transmission upgrades. The agreement included "explicit operating procedures that would prevent the dispatch of these units except for 'Reliability Purposes,' defined as the commitment of the units only 'after all [generation] resources have already been committed and additional units are required to help alleviate a 'Transmission Security Emergency…."[20]

2. The Role of the Federal Energy Regulatory Commission

Since 2005, FERC has been responsible for ensuring electric system reliability. As noted above, under the Energy Policy Act of 2005's amendments to the Federal Power Act ("FPA"), Section 215, FERC approves NERC's adoption and enforcement of electric reliability standards. "By law, Reliability Standards cannot include any requirement to enlarge Bulk-Power System facilities or to construct new transmission capacity or generation capacity."[21]

The District of Columbia Circuit Court of Appeals has upheld FERC's authority under the FPA to approve, even over state commission or local utility objections, reserve capacity requirements assigned by RTOs to those entities (e.g., electric distribution companies, other providers of retail electricity supply to end-users), and to require they pay for such capacity obligations.[22] FERC can also authorize ISO determinations approving or disallowing the resources that are allowed to count for resource adequacy purposes.[23] The FPA does not, however, authorize FERC to engage in "direct regulation of generation facilities", because this activity is reserved to the states.[24]

FERC expects transmission entities (e.g., ISOs/RTOs; transmission companies) to carry out long-term planning to ensure reliable service. Also, "the Commission does and will review studies to determine the changes that occur due to a change in the mix and location of resources in a region. The Commission also does and will review planning-related proposals that account for implementation of these proposed EPA regulations."[25] FERC also assesses periodically the ability of demand-response resources to play a role in assuring resource adequacy.[26]

In response to an owner's decision to retire the Potomac River Generating Station in Virginia because of various air pollution standards violations, FERC required an RTO (PJM) and a transmission company (PEPCo) to submit a plan to preserve reliability in the District of Columbia ("DC") in the absence of that generating facility. In that case, the U.S. Department of Energy prohibited the plant from shutting down to maintain the DC area's electric reliability.[27] PEPCo and PJM recommended investing in various transmission upgrades, most of which have now been built and have commenced commercial operation[28],

[20] Testimony of John Hanger, former Pennsylvania Secretary of Environmental Protection, before the House Energy and Commerce Committee, September 14, 2011, p. 7.
[21] Statement of FERC Chairman Jon Wellinghoff before the House Energy and Commerce Committee, September 14, 2011, pp. 5-6, citing 16 U.S.C. § 824o(a)(3) (2006).
[22] FPA Section 206(a), *Connecticut Department of Public Utility Control v. FERC*, 569 F.3d 477 (D.C. Circuit 2009) , *cert. denied*, 130 S. Ct. 1051(2010).
[23] *Sacramento Municipal Utility District v. FERC*, 616 F.3d 520 (D.C. Cir. 2010). (*per curium*).
[24] FPA Section 201(b).
[25] Statement of FERC Chairman Jon Wellinghoff before the House Energy and Commerce Committee, September 14, 2011, pp. 5-6, citing 16 U.S.C. § 824o(a)(3) (2006).
[26] See, for example, FERC Staff, Assessment of Demand-Response and Advanced Metering, November 2011. http://www.ferc.gov/legal/staff-reports/11-07-11-demand-response.pdf
[27] U.S. Department of Energy, Order No. 202-05-2 (December 20, 2005).
[28] See Paul Hibbard, Pavel Darling, and Susan Tierney, "Potomac River Generating Station: Update on Reliability and Environmental Considerations," Analysis Group, Inc., July 19, 2011.

and, according to PJM, have relieved the associated reliability problems.[29]

3. The Role of the States

Many states have direct authority to ensure resource adequacy, or can accomplish that end through a variety of ratemaking authorities. States that exercise traditional regulation over vertically integrated electric companies (and even in some states with restructured electric industries that allow for customer choice) often use integrated resource planning processes to ensure that electric distribution companies build and/or otherwise arrange for sufficient resources to meet projected load and reserve requirements in a least-cost fashion. To ensure resource adequacy, some states also require traditionally regulated utilities to add cost-effective energy efficiency resources, to develop and construct generating resources, to conduct competitive solicitations to determine whether to enter into long-term contracts for energy and capacity, and/or to develop and construct transmission facilities.

4. The Role of the Market

In most parts of the U.S., and particularly in the regions with organized wholesale electricity markets administered by ISOs/RTOs, the market itself plays an important role in ensuring the development and construction of new generation facilities and other supplies needed for resource adequacy. As noted previously, several ISOs/RTOs rely on forward capacity markets to procure the amount of generating capacity and demand-side resources needed to meet future resource requirements.

In those market regions, and in other states, utility and non-utility companies plan for, permit, engineer and construct new power projects. In normal market conditions, it may typically take 2-3 years to fully develop, permit and construct a simple cycle gas turbine that could support peak demand periods, and 3-5 years to fully develop, permit and construct a gas-fired power plant.[30] New coal projects and nuclear plants will likely require much more time. Demand-side resources, however, can be brought on line with much-shorter lead times (e.g., less than one year).

Throughout the country, many projects are underway, spurred by the relatively low prices for natural gas, renewable energy requirements, and the potential retirement of some number of existing power plants. For example, at present, there are 38 GWs of generating capacity under construction (18 GWs of natural gas-fired generating capacity) with another 12 GWs of natural gas-fired generation capacity in advanced stages of development.

New Capacity Additions by In-Service Year

Planned In-Service Year	Lower 48: Total Under Construction Capacity (MW)
2011	6,653
2012	19,623
2013	9,018
2014	1,858
>2014	792
Total	**37,944**

Source: SNL Financial – as of 11-11-2011

[29] Letter from Michael Kormos, PJM, to Chairman Betty Ann Kane of the DC Public Service Commission, September 29, 2011. http://www.dcpsc.org/pdf_files/hottopics/PJM_Evaluation.pdf

[30] There are situations where reliability concerns have caused states to allow for expedited permitting of power plants. See, for example, Susan Tierney and Paul Hibbard, "Siting Power Plants in the New Electric Industry Structure: Lessons from California and Best Practices for Other States," Electricity Journal, June 2002, page 35. Also, directives to state permitting agencies to coordinate their permitting processes can lead to complex permits being issued within a year, as occurred in Colorado when the various public health agencies and the Colorado Public Service Commission reviewed and approved the proposed Xcel power projects under Colorado's Clean Air-Clean Jobs Act of 2010.

New Capacity Additions by Region

NERC Region (Lower 48)	Total Announced Capacity (MW)	Total Under Construction Capacity (MW)
WECC	145,749	12,940
SERC	43,319	13,200
RFC	48,875	5,078
ERCOT	43,907	1,491
MRO	41,263	1,291
SPP	33,544	1,324
NPCC	17,399	1,171
FRCC	11,063	1,449
Total	**385,119**	**37,944**

Source: SNL Financial – as of 11-11-2011

Natural Gas Capacity Additions by Region

		New Power Plant Capacity (Lower 48) - MW			
Region	Power Plant Technology	Under Construction	Advanced Development	Announced	Total
ERCOT	Natural gas - combined cycle	-	2,977	6,449	9,426
	Natural gas - gas turbine	-	1,400	790	2,190
	Natural gas - other (CAES, fuel cell)	-	-	335	335
	Total Natural Gas	**-**	**4,377**	**7,574**	**11,951**
FRCC	Natural gas - combined cycle	1,295	1,295	2,135	4,725
	Natural gas - gas turbine	-	-	1,282	1,282
	Natural gas - other (CAES, fuel cell)	-	-	-	-
	Total Natural Gas	**1,295**	**1,295**	**3,417**	**6,007**
MRO	Natural gas - combined cycle	300	-	1,645	1,945
	Natural gas - gas turbine	60	-	2,176	2,236
	Natural gas - other (CAES, fuel cell)	-	-	288	288
	Total Natural Gas	**360**	**-**	**4,109**	**4,469**
NPCC	Natural gas - combined cycle	-	350	3,920	4,270
	Natural gas - gas turbine	512	246	-	758
	Natural gas - other (CAES, fuel cell)	-	37	177	214
	Total Natural Gas	**512**	**632**	**4,097**	**5,241**
RFC	Natural gas - combined cycle	938	667	9,163	10,768
	Natural gas - gas turbine	352	-	1,265	1,617
	Natural gas - other (CAES, fuel cell)	6	-	716	722
	Total Natural Gas	**1,297**	**667**	**11,144**	**13,107**
SERC	Natural gas - combined cycle	7,079	1,300	4,108	12,487
	Natural gas - gas turbine	731	-	1,869	2,600
	Natural gas - other (CAES, fuel cell)	-	-	-	-
	Total Natural Gas	**7,810**	**1,300**	**5,977**	**15,087**
SPP	Natural gas - combined cycle	-	-	-	-
	Natural gas - gas turbine	42	-	223	265
	Natural gas - other (CAES, fuel cell)	-	-	-	-
	Total Natural Gas	**42**	**-**	**223**	**265**
WECC	Natural gas - combined cycle	3,409	3,411	13,176	19,996
	Natural gas - gas turbine	3,214	350	2,215	5,779
	Natural gas - other (CAES, fuel cell)	3	-	317	320
	Total Natural Gas	**6,626**	**3,761**	**15,708**	**26,095**
TOTAL Lower 48	Natural gas - combined cycle	13,022	10,000	40,595	63,617
	Natural gas - gas turbine	4,912	1,995	9,821	16,728
	Natural gas - other (CAES, fuel cell)	9	37	1,834	1,879
	Total Natural Gas	**17,942**	**12,032**	**52,250**	**82,223**

Source: SNL Financial – as of 11-11-2011
Note: CAES = compressed air energy storage

B. Reliability Outcomes: System performance including past power outages and blackouts

The U.S. bulk-power system is generally very reliable, delivering uninterrupted power to customers through an interconnected network of transmission lines. As described above, large outages are infrequent because of the many "defense-in-depth" reliability tools in place to protect the bulk power systems.[31]

NERC maintains and reports industry-wide and regional metrics on the performance of the system, including reserve levels, loss of load due to transmission-related outages, and other variables.[32] Most outages on the system arise from weather-related events, not problems in the bulk power system itself.

However, even a short outage can be very disruptive to households and businesses. The largest blackout in American history occurred on August 14, 2003, affecting eight states in the northeastern U.S. and parts of Canada. The blackout affected 50 million people and caused the loss of between $4.5 billion and $12 billion in economic activity.[33] The event was triggered by tree contacts with several high-voltage power lines in Ohio, although the ultimate causes were attributed to violations of multiple NERC standards, which were not enforceable prior to the Energy Policy Act of 2005.[34] Other recent outages have been caused by substation fires, substation malfunctions, and weather-related system failures.

Examples of major U.S. bulk power system outages and their causes

Event	Date	Areas affected	Description and proximate cause
Northeast blackout of 2003	August 14, 2003	Large area including the Northeast, Midwest and Canada	Several high-voltage power lines in Ohio were damaged by trees, causing other lines to trip in a cascade of events that eventually led to over 50 million people in the Northeastern U.S. and Canada losing power.[i] The breadth of the blackout arose from several violations of NERC standards.
2008 Florida blackouts	February 26, 2008	Florida	The combination of a failed switch, operator errors, and a fire at a substation outside of Miami led to multiple power plants across the state going offline, ultimately resulting in over two million people losing power.[ii]
2011 Texas rolling blackouts	February 2, 2011	Texas	Unusually low winter temperatures caused both a spike in demand (two thirds of Texas households heat their home with electricity) as well as cold weather-related failures at power plants. Over 7 GW of capacity was shut down, leading ERCOT to implement rolling blackouts across the state. Over 1 million households lost power for up to an hour.[iii]
2011 Southwest blackout	September 8-9, 2011	Southern California, Arizona and northwestern Mexico	Over 7 million people lost power after a malfunction at a substation in Yuma, Arizona led to cascading events throughout the region. Investigation of the cause is still under investigation[iv]

i. Time Magazine, "Can we prevent another blackout?" 8/11/2008 http://www.time.com/time/health/article/0,8599,1831346,00.html
ii CNN, "Power restored to parts of Florida after outage" 12/26/2008 http://articles.cnn.com/2008-02-26/us/florida.power_1_outage-normal-electric-service-electrical-substation?_s=PM:US
iii. Reuters, "Texas weathers rolling blackouts as mercury drops." 2/2/11 http://www.reuters.com/article/2011/02/02/us-ercot-rollingblackots-idUSTRE7116ZH20110202
iv. Yuma Sun, "Massive power outage not caused by one worker: Officials." 10/27/11 http://www.yumasun.com/news/power-74029-outage-utility.html

[31] In the U.S.-Canada Power System Outage Task Force, "Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations," April 2004 (page 9), the task force identified these "defenses in depth":

1. A range of rigorous planning and operating studies, including long-term assessments, year-ahead, season-ahead, week-ahead, day ahead, hour-ahead, and real-time operational contingency analyses….
2. Preparation for the worst case. …
3. Quick response capability…
4. Maintain a surplus of generation and transmission….
5. Have backup capabilities for all critical functions

[32] NERC website: http://www.nerc.com/page.php?cid=4|331
[33] U.S. Department of Energy, Transforming the Grid to Revolutionize Electric Power in North America.
[34] U.S.-Canada Power System Outage Task Force, "Final Report on the August 14, 2003 Blackout in the United States and Canada: Causes and Recommendations," April 2004, Chapter 3.

II. MANAGING RELIABILITY IN THE CONTEXT OF EPA'S CLEAN AIR RULES

The EPA is finalizing two important air pollution regulations limiting power plant air emissions: the Transport Rule and the Utility Toxics Rule. As the industry prepares to comply with these new environmental requirements, the key issues will be to: (1) manage the retirement and replacement of existing generating units that are uneconomic to retrofit with modern pollution controls; and (2) coordinate any facility outages required to complete pollution control system installations. System operators need to coordinate these outages across the grid so that adequate generating capacity is available to meet peak demand.

Several mechanisms are available under existing law to manage electric system reliability as the industry transitions to a cleaner, more efficient generation fleet.

A. Company Plans: Financial disclosures and statements confirm that many of the Nation's generating companies are well positioned to comply

A survey of recent corporate earnings statements shows that many of the Nation's generating companies impacted by the EPA rules are well positioned to comply because of earlier investments in their fleets. The results of this survey are in Appendix A, with quotes from a sampling of electric company executives indicating that: (1) companies have long anticipated these rules; (2) early investments have positioned these companies well; and (3) the impact on electricity rates is manageable. The quoted companies indicating they are well positioned to comply with the EPA air pollution regulations represent about half of the nation's coal-fired generating capacity and eleven out of the top 15 largest coal fleet owners in the U.S.

B. Additional time for the installation of controls under the Utility Toxics Rule

Under the CAA Congress requires existing, affected sources to comply with the Utility Toxics Rule "as expeditiously as practicable, but in no event later than 3 years after the effective date of such standard." EPA plans to finalize the rule by December 16, 2011. As a result, affected coal-fired and oil-fired power plants will need to comply with the emissions limits of the Utility Toxics Rule by the beginning of 2015. As detailed in Appendix A, most generating facilities have indicated they expect to comply with the Utility Toxics Rule within the Act's timeframe. Notably, however, the CAA also contains exceptions allowing additional time for installation of controls. EPA and state regulatory authorities have the discretion to grant, on a unit-by-unit basis, an additional 12 months for the installation of pollution control systems where necessary.[35] EPA is also considering extending this compliance flexibility to units converting to cleaner burning fuels.

Permitting authorities have used this provision in the past under previous air toxics rules. For example, the following industrial facilities were granted 10-12 month extensions to comply with prior MACT standards: (1) Lincoln Paper and Tissue in Lincoln Maine, (2) Biscoe Iron Foundry in Biscoe North Carolina, (3) Boral Bricks Salisbury Plant in Rowan County North Carolina, (4) Iowa Army Ammunition Plant in Middletown Iowa, and (5) Kaiser's aluminum works in Tacoma Washington. Under existing regulation for all MACT standards, to qualify for a compliance extension, sources must file a request 120 days prior to the compliance date. A request for a compliance extension must include: (1) a description of the controls to be installed to comply with the standard; (2) the schedule for construction and installation of the controls; and (3) the completion date. To facilitate reliability planning and outage scheduling, several of the Nation's

[35] See CAA section 112(i)(3)(B). The process for requesting an extension under a MACT standard is detailed at 40 CFR Part 63.6.

RTOs have recommended that utility companies should provide this information to EPA and system operators within one year of EPA issuing its final Utility Toxics Rule.[36]

The CAA provides companies the flexibility to schedule the installation of controls across multiple outage periods, thus maintaining electric system reliability while facilitating expeditious installation. Companies will typically construct pollution control systems while their power plants continue to operate. The equipment is then connected or "tied-in" to the plant during a scheduled outage period, coordinated with other generating facilities to ensure reliability. This will typically occur during a month or month(s) when the demand for electricity is relatively low to avoid the hottest summer months and the coldest winter months. A 12-month extension would provide plant operators with an additional two shoulder periods to schedule outages and stagger the installation of controls across a control region.

In granting an extension of time for the installation of controls, existing regulation requires EPA or states to specify "any additional conditions" for the protection of public health during the extension period. To limit the emissions of harmful pollutants, stakeholders have recommended limiting operations of any EGU receiving any compliance extension to only times required to maintain reliability (i.e., "Reliability-Only Dispatch").[37] Operating limitations are commonly placed on generating units and reflected in dispatch decisions, including RMR agreements, startup times, and fuel use restrictions.

If four years is still not enough time to install the necessary controls, EPA has the statutory authority to enter into administrative orders of consent under Section 113(a)(4) of the CAA or consent decrees with power plant operators, allowing additional time for the installation of controls. Again, to protect the public and maximize health benefits during the extension period, such orders or decrees can limit a unit to operating only when required to maintain reliability.

C. Managing unit retirements

Some electric generating units (or whole generating facilities) may choose to retire in lieu of installing air pollution controls. The Bipartisan Policy Center, for example, projects about 20 GW of coal plant retirements as a result of EPA's air, water, and coal ash rules (see table below).

FERC Commissioners recently testified before the House Subcommittee on Energy and Power that they do not expect widespread reliability concerns due to retirements. The FERC Commissioners acknowledged, however, that the retirement of significant amounts of generation could cause some localized reliability issues, for example, voltage stability concerns. FERC Commissioner Cheryl A. LaFleur explained that "in such cases, a time-limited waiver of EPA regulations may be needed. In some cases, a 'reliability must-run' ("RMR") contract may also be needed to allow the power plant to operate within certain discrete parameters for a limited period of time."[38] LaFleur also noted that this process is not unique to EPA regulations, but rather used as a process for any retirements, including those due to market conditions, and the need for such solutions "must be targeted and discrete".

Generating capacity retirements will need to be evaluated by system operators for reliability purposes with several possible outcomes: (1) unit can retire with no adverse reliability impact before the compliance deadline in 2015; (2) transmission system upgrades or new capacity additions are required to avoid reliability concerns and upgrades or replacement power can be completed within 12 months of the compliance deadline; or (3) transmission system upgrades or new capacity additions are required to avoid

[36] Joint Comments of the Electric Reliability Council of Texas, the Midwest Independent Transmission System Operator, the New York Independent System Operator, PJM Interconnection, L.L.C., and the Southwest Power Pool.
[37] Hanger, John. Reliability-Only Dispatch. 2011.
[38] Testimony of Commissioner Cheryl A. LaFleur Federal Energy Regulatory Commission Before the House Subcommittee on Energy and Power of the Committee on Energy and Commerce United States House of Representatives. September 14, 2011.

reliability concerns, but upgrades or replacement power cannot be completed within 12 months of the compliance deadline.

EPA and the states have the statutory authority to address each of these scenarios, just as they have the authority to address reliability concerns in the context of pollution control retrofits. In fact, five of the nation's RTOs have submitted comments to EPA proposing a "targeted backstop reliability safeguard" to address situations requiring additional time. The Joint RTO Commenters anticipate that the reliability safeguard "would not need to be invoked often, if at all".[39] As with retrofit extensions, units can be restricted to operating for reliability purposes only to limit the plant's air pollution emissions during the extension period. This targeted, limited approach ensures that reliability standards are maintained without a blanket delay in implementing these important air pollution rules.

Estimated Projections of Retrofits and Retirements through 2015

Source	Projected Coal Retirements (GW)	Projected Pollution Control Retrofits (and existing controls)[1]				
		Scrubbers	Baghouses	DSI (Trona)	ACI	SCR
Bipartisan Policy Center Modeling of Utility MACT, Transport Rule, BART, 316(b), coal ash, and various state rules through 2015 (low NG price scenario)	35 GW **Note:** 18 of which is attributed to new air, ash, and water regulations	92 GW	203 GW[2]	20 GW	137 GW	32 GW
Existing Control Installations in the U.S.		190 GW	79 GW	<5 GW	49 GW	123 GW

1. Retrofit figures reflect total retrofits through 2015, not simply the incremental retrofits above Reference Case levels.

2. BPC makes a conservative assumption that control of metals will require a fabric filter for all coal units. Studies indicate that existing electrostatic precipitators (or upgrades to existing precipitators) may be sufficient to comply.

Source: BPC. Environmental Regulation and Electric System Reliability. June 2011.

[39] Joint Comments of the Electric Reliability Council of Texas, the Midwest Independent Transmission System Operator, the New York Independent System Operator, PJM Interconnection, L.L.C., and the Southwest Power Pool.

V. CONCLUSION

Reliable electric supply is essential to the nation's economy and the health of its citizens. The electric industry is well-positioned to maintain the reliability of the bulk electric system while transitioning to a cleaner, more efficient generating system.

The electric power sector relies on a wide range of proven planning and operational tools and market mechanisms to maintain the reliability of the nation's bulk electric power system. These include processes to ensure adequate electric resources to meet future need, including an added margin of safety to handle unexpected stresses on the electric grid. NERC, the Nation's electric reliability organization along with , regional reliability entities, system operators, RTOs, transmission companies, and other organizations routinely conduct assessments to identify reliability issues that need to be managed. The assessments include, for example, long-term system studies, unit or plant-specific analyses of upcoming generating capacity additions or retirements, as well as operational studies focusing on localized operating requirements.

These comprehensive, coordinated planning processes are overseen by federal and state regulators, as well as NERC. In many cases, the results of reliability assessments and system studies provide concrete information about actions that must be taken to maintain grid reliability. Other studies provide signals to market participants about the timing and location of needed resource additions, thus helping to inform investment and business decisions by generation developers and suppliers of demand response and other resources.

The market is responding already to the EPA air pollution rules. For example, new power projects are under construction, in part due to the availability of abundant, domestic natural gas resources as well as expectations of potential retirements. Developers of natural gas projects have 18 GWs under construction and another 12 GWs in advanced stages of development. Additionally, eleven out of the top 15 largest coal fleet owners in the U.S., representing half of the Nation's coal capacity, have indicated they are well positioned to timely comply with EPA's air pollution rules. According to FERC Commissioner Marc Spitzer, "the electric industry recognizes its obligation to comply with both environmental regulations and FERC-approved reliability standards and to plan their systems to reliably serve consumers while complying with environmental requirements."[40]

Finally, a range of options are available under existing law to manage electric system reliability as the industry makes the investments necessary to comply with EPA's clean air rules. These tools include EPA's authority to make unit-by-unit determinations that allow for an additional 12 months for the installation of pollution control systems where appropriate, beyond the three years allowed under the CAA. If four years is still not enough time to install the necessary controls while also ensuring reliability, EPA has the statutory authority to enter into administrative orders of consent or consent decrees with power plant operators, allowing additional time for the installation of controls. Several of the Nation's RTOs have also proposed a "targeted backstop reliability safeguard" to address situations in which additional time is required before a unit retires. Any additional time provided for compliance should be accompanied by restrictions on plant operations so that they run only to meet reliability needs.

With the proper planning, communication and use of available tools outlined in this paper, the American public can have clean air and a reliable electric power system.

[40] Testimony of Marc Spitzer, Commissioner Federal Energy Regulatory Commission Before the House Subcommittee on Energy and Power of the Committee on Energy and Commerce United States House of Representatives. September 14, 2011.

APPENDIX A

Company Statements in Response to EPA Regulations – November 9, 2011

No.	Company	Statements
1	**AES**	"So we're not prepared to put a CapEx number out today, but the regulation, as you're aware, in Indiana would allow us to recover those costs through rates. The balance of our North America fleet is mostly already scrubbed and has NOx control, so we don't anticipate any significant capital on the balance of our fleet … [W]e feel, overall, like we're in pretty good shape and certainly didn't get any what we would consider to be significant surprises, and I think anticipate that the MACT rules that come out will actually drive what the CapEx requirements will be." - Ned Hall, Q2 2011 Earnings Call, 8/5/2011 (transcript) "Outside of IPL and DPL, certainly, our plants that have contracts, or the few that are still remaining that are merchant, are largely scrubbed for SO_2 and NOx. So we're in pretty good shape as far as the CSAPR rules go from those facilities. IPL may have to actually make some investment. But there's clarity in how that would work … that investment would be anticipated to be recovered through rates as it is made. And DPL is actually in pretty good shape in terms of NOx and SOx requirements as well. So overall, I think we're feeling like we're in a good position." - Ned Hall, Q3 2011 Earnings Call, 11/4/2011 (transcript [corrections by MJB&A])
2	**Ameren**	"This compliance strategy is a win for our customers, our shareholders, and the State of Missouri. As a result of this strategy, we will be able to avoid estimated rate increases for our customers of approximately 15% to 20% by 2017 that might otherwise have been required to meet the SO_2 emission standards of this rule. We believe that this strategy will benefit the State of Missouri by keeping Ameren Missouri's electric rates among the most competitive in the nation helping the State better retain and attract new businesses … It's something we've been doing for some time to try and anticipate where these regulations were going to come and we were able to execute the strategy successfully." - Thomas Voss, Q2 2011 Earnings Call, 8/4/2011 (transcript)
3	**Buckeye Power Cooperative**	"The one-two punch of environmental regulations found in the new Cross-State Air Pollution Rule (CASPR) and pending Utility Maximum Achievable Control Technology (MACT) rule aimed at mercury emissions will reduce coal-fired power plant generation and require unit closures, but Buckeye Power, Inc. is well positioned for compliance. … "We started down this path almost 10 years ago" with investment in selective catalytic reduction (SCR) systems and SO2 scrubbers at Cardinal units 2 and 3, O'Loughlin said … O'Loughlin is confident Buckeye is poised to meet the new EPA regulations. "We've got the tools," he said. "We've got among the best scrubbers in the world." - (website 10/14/2011; cached)
4	**Calpine**	"On the environmental front, the EPA's cross-state air pollution rule is being challenged by group of coal generators in States seeking to stay the rule from becoming effective on January 1, 2012. Calpine has intervened to fully support the EPA and its efforts to enforce this long anticipated rule, for which the environmental control technologies have been available for decades … We would not be surprised to see continued congressional efforts to blockade EPA action, but remain hopeful that the EPA will stay the course on both CSAPR and the Utility MACT." - Jack Fusco, Q3 2011 earnings call, 10/28/2011 (transcript)
5	**CMS Energy**	"The bottom line: we are well positioned to comply with these new laws with the plans we have in place." - John Russell, Q3 2011 Earnings Call, 10/27/2011 (transcript)
6	**Constellation**	"We believe EPA schedules for rule completion and for compliance are appropriate and feasible based on our own experience with available control technologies and installation timelines to make our own fleet cleaner. Because we already made investments in pollution controls and lower emitting generation plants, Constellation's fleet should benefit from the new and forthcoming EPA regulations as higher power and capacity prices more than offset any incremental costs of compliance." - Mayo Shattuck, Q2 2011 Earnings Call, 8/3/2011 (transcript)

No.	Company	Statements
7	**Dominion**	"There's a lot of activity around our generator facilities and we believe we are well-positioned to meet the challenges." - Thomas Farrell, Q1 2011 Earnings Call, 4/28/2011 (transcript) "[T]he so-called CSAPR rules have no material impact or significant impact on our environmental plans." - Thomas Farrell, Q2 2011 Earnings Call, 7/28/2011 (transcript)
8	**Duke**	"Even though CSAPR is more restrictive and the compliance periods are more aggressive than originally proposed, the provisions are within our long-term planning assumptions … the anticipation of more stringent environmental regulations has long been part of our long-term strategic planning process." - Jim Rogers, Duke Q2 2011 Earnings Call, 8/2/2011 (transcript) "When our modernization program is complete, nearly 100% of our coal generation capacity will have scrubbers in operation. This positions us well, as the EPA continues to finalize more stringent environmental regulations … We are well along with our strategy to achieve the new [CSAPR] compliance limits by January 1." - Jim Rogers, Duke Q3 2011 Earnings Call, 11/3/2011 (transcript) "I think three years is doable," Jim Rogers, chief executive of Duke Energy Corp., said in an interview, referring to Duke's compliance schedule for the EPA rules. - Jim Rogers, news article, 11/8/2011
9	**Dynegy**	"[W]e have made substantial capital investments in state-of-the-art air pollution control devices. Any efforts to delay or derail CSAPR would undermine the reasonable, investment-backed expectations of Dynegy." - CEO Ralph C. Flexon, letter to House Committee on Science, Space and Technology, 9/12/2011 (quoted in EESI issue brief)
10	**Edison International**	"We installed the necessary equipment [for compliance with the Toxics Rule] back in 2009 and are already achieving these limits. U.S. EPA's rule contained other draft provisions covering acid gases and non-mercury metals, which we can meet by installing the pollution control equipment we have been planning to use at Midwest Gen to meet our SO_2 emissions commitments to the Illinois EPA." - Theodore Craver, Q1 2011 Earnings Call, 5/2/2011 (transcript) "With respect to the coal fleet, EMG has met and continues to remain committed to meeting all of its environmental obligations on time, as spelled out in the 2006 Illinois Combined Pollutant Standard agreement and more recent U.S. EPA regulations. We believe that the efforts to identify cost-effective compliance solutions and the financing strategies to support them will serve us well in the long run even though they present considerable challenges for us in the near term." - Theodore Craver, Q2 2011 Earnings Call, 8/4/2011 (transcript)
11	**Exelon**	"Being clean is a competitive hallmark for Exelon. It will become even more advantageous as we move into this new era of EPA regulations. More and more, through a combination of economics, gas prices and pending environmental regulations, we expect to see the market bias towards cleaner forms of energy." - John Rowe, Q2 2011 Earnings Call, 7/27/2011 (transcript) "The rules have been in the works for about a decade, and the electric utility industry is well-positioned to respond, with more than 60% of coal-fired power plants already equipped with pollution controls," said Joseph Dominguez , senior vice president of federal regulatory affairs, public policy and communications for Exelon. "Those companies that have done little or nothing to improve or update antiquated, inefficient plants should start planning for compliance now, instead of lobbying for categorical extensions or legislative delays." … "Exelon's experience demonstrates that there are existing mechanisms that would allow the health and economic benefits of the rules to take effect as quickly as possible, as opposed to a blanket compliance extension that would unnecessarily prolong the public's exposure to dangerous pollution," said Dominguez. "Implementation of the rule also provides the regulatory certainty utilities need to make substantial capital investments in modernizing the nation's electric system, which will create jobs." - Press release, 9/15/2011

No.	Company	Statements
12	**FirstEnergy**	Anthony Alexander: "Even so, today, we are much better positioned than many other companies to address these new requirements. In fact, more than 90% of our production is from non-emitting nuclear, low-emitting natural gas, scrubbed coal or renewable facilities." James Lash: "And as they evolve, we are confident we are well positioned to handle the final requirements that will come from [EPA's regulations] ... While we agree with others in our industry that current timetables are really unrealistic and that the impact on prices paid by customers will be significant, it is important to remember that unscrubbed supercritical coal is not significant in the context of our overall portfolio." - Anthony Alexander and James Lash, Q1 2011 Earnings Call, 5/3/2011 (transcript) "In general, we believe we are in pretty good shape relative to other coal generators, thanks to the work that has been completed across our fleet. Looking at our competitive base load generating capacity, most of the air pollution control equipment is already in place to meet the EPA's new NOx and SO2 emission reduction requirements." - Anthony Alexander, Q2 2011 Earnings Call, 8/2/2011 (transcript)
13	**GenOn**	"We expect to make some capital expenditures, but we expect those expenditures to be manageable ... We also expect that any reduction in GenOn's earnings as a result of those retirements will be more than offset by higher earnings from increases in market prices as a result of industry retirements." - Edward R. Muller, Q1 2011 Earnings Call, 5/9/2011 (webcast [quote transcribed by MJBA]) "We also expect that any reduction in GenOn's earnings from retirements of its units resulting from the environmental regulations, if and when implemented, will be more than offset by higher earnings from increases in prices resulting from industry retirements." - Edward R. Muller, GenOn Q2 2011 Earnings Call, 8/8/2011 (transcript)
14	**Great Plains Energy**	"Regardless of the outcome of the challenges, KCP&L is well positioned to meet the requirements of the new rules without having to involuntary shut down any units. Any shortfall in allocated allowances is anticipated to be addressed through a combination of permissible allowance trading, installation of nominal emission control equipment, changes in plant processes or purchases of additional power in the wholesale market." - M.J. Chesser, Q3 2011 Earnings Call, 11/4/2011 (transcript)
15	**Lower Colorado River Authority**	"With our scrubbers, we will be in compliance with (new EPA) air pollution rules," said Michael McCluskey , manager of generation resource development at the LCRA. When the rules take effect, "we will comply while other utilities may have difficulty taking steps to comply. It's a problem we've already solved." - Austin American-Statesman article, 8/1/2011
16	**NextEra**	"I don't believe that replacing 50-year-old fossil plants with new, more efficient units will be the train wreck we have been hearing so much about, nor do I believe that putting pollution controls on many of the remaining plants is all that terrible ... While there is no free lunch, the cost of this upgrade to the nation's generation fleet is likely to be far less than the costliest predictions. Consider our own utility. In 2010, FPL recorded a SO2 emissions rate 76% below the industry average, a NOx emissions rate 65% below the industry average and a CO2 emissions rate 36% below the industry average. Yet despite having one of the cleanest generation fleets of any utility in the nation, FPL's typical residential customer bills were 24% below the national average at the year-end 2010. We are proof that utility can be clean and cost-effective at the same time." - Lewis Hay, Q1 2011 Earnings Call, 4/29/2011 (transcript)
17	**Northeast Utilities**	"We believe that this technology will provide us with some of the cleanest coal burning units in the country and will position us well to meet the EPA's proposed rules on hazardous air pollutants." - Charles Shivery, Q1 2011 Earnings Call, 5/6/2011 (transcript)

No.	Company	Statements
18	**NRG**	"[T]he key takeaway is that we do not expect at this time any additional environmental CapEx beyond what we have previously announced … So I think on our environmental CapEx, we really are focusing on controlling mercury through ACIs, and for Big Cajun, it's fabric filters to control mercury and SO_2. And we think that with that, we will be able to comply with the rules." - Mauricio Gutierrez, Q1 2011 Earnings Call, 5/5/2011 (transcript) "We believe that incremental compliance costs are not material and can largely be offset the by impact in electricity prices as we saw in the previous slide." - Mauricio Gutierrez, Q2 2011 Earnings Call, 8/4/2011 (transcript)
19	**PowerSouth Electric Cooperative**	"In response to the CAIR rule, PowerSouth constructed a $400 million Air Quality Control project at the Lowman Power Plant to build additional equipment to reduce SO_2 and NOx emissions at the plant. Because of PowerSouth's proactive approach to CAIR, Lowman Power Plant is already in compliance with the Cross-State Air Pollution Rule." - website, September 2011
20	**PPL**	"We stand to be in a very good position going forward in that we've already spent the money and spent it at the right time." - James Miller, Q4 2010 Earnings Call, 2/4/2011 (transcript) "Overall, we do not see the need to increase capital expenditures to comply with the CSAPR requirements. Overall, PPL's competitive supply fleet is well-positioned with respect to these rules and can clearly benefit from coal plant retirements that will tighten up the supply situation in PJM." - William Spence, Q2 2011 Earnings Call, 8/5/2011 (transcript)
21	**Progress**	"Over the past decade or so both companies have been aggressively installing new environmental controls on their largest coal plants … As a result of these combined actions, we believe the new company will be well-positioned to meet the new EPA MACT regulations expected later this year and into 2012. We still have much work to do to comply with these new rules, which could require significant additional capital investments and additional announced plant closures. However, we are further down the road on compliance than many other companies with large coal fleets. We should also benefit by combining best practices in our fleet modernization efforts." - Bill Johnson, conference call announcing Duke-Progress merger, 1/10/2011 (transcript)
22	**PSEG**	"During the past 5 years, we have invested more than $2 billion to replace inefficient, older generating units and to upgrade our existing facilities to meet new environmental restrictions. PSEG is a long-time advocate of the Clean Air Act Regulations. We view the EPA's recent technical adjustments to the Cross-State Air Pollution Rule, more commonly referred to as CSAPR as favorable for our fleet. We are also well-positioned to meet the anticipated requirements under EPA's HAPs/MACT regulation, which is scheduled to be issued on December 16. We believe these regulations are long overdue. Our experience shows that it is possible to clean the air, create jobs and power the economy, all at the same time. The issuance of these regulations will also provide the industry with much-needed certainty to invest in long lived capital intensive projects such as power plants." - Ralph Izzo, Q3 2011 Earnings Call, 11/1/2011 (transcript)

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23	**Santee Cooper**	"Fortunately, at Santee Cooper, proper planning and foresight has made us well positioned to comply with these new standards when they take effect next year … I am happy to say that Santee Cooper has already installed the necessary equipment — SO_2 limestone scrubbers and NOx reducing selective catalytic reactors — to be well below any transport rule targets. In the past 10 years, in fact, we've reduced SO_2 and NOx emissions from our coal-fired units by 61 percent and 72 percent, respectively, while increasing coal-fired generation by 18 percent. We were well aware that at some point in the future, EPA would require reductions for a number of reasons. The key was to be able to do it at the lowest impact to our customers. A great example was finding a market for the scrubber byproduct created by the removal of SO_2. This material, synthetic gypsum, is used at the American Gypsum wallboard plant in Georgetown and has also been used in cement manufacturing and as soil amendment. Every bit is recycled. Good planning has put Santee Cooper in a position to comply with these new standards, while minimizing the impact to our customers and contributing to the local economy." - Company blog post, 7/13/2011
24	**SCANA**	"But in the short term we don't see any impacts to our fleet, and we believe that the scrubber and SCR technologies along with the baghouses and/or electrostatic precipitators we have installed in those bigger units should put us in compliance for those units." - Steve Byrne, Q3 2011 Earnings Call (Q&A), 10/26/2011 (transcript)
25	**Seminole Electric Cooperative, Inc.**	"If the EPA adopts a mercury rule as currently proposed, Seminole would already be meeting the standard," said Mike Opalinski, Seminole's senior vice president of energy policy … While other utilities may have to choose between huge investments in pollution controls or shutting down plants, Seminole is not in that hard position. The investment in pollution-control equipment early on was good for the environment. It also proved to be cost effective … So contrary to many opinions, today's modern coal plants can protect the environment while providing reliable and affordable electricity." - Website, 10/6/2011 (link)
26	**TECO Energy**	"TECO Energy is supportive of national and state efforts that encourage others to invest in pollution control technologies or repower or retire uncontrolled units … Because of our on-going environmental accomplishments and initiatives, we believe that we are well positioned to comply with these emerging regulatory initiatives." - 2010-2011 Corporate Sustainability Report
27	**TVA**	"Yes, we will be able to comply with the new EPA rules and we will spend more money in doing so. We have announced scrubbers (to control sulfur dioxide) for Allen and Gallatin fossil plants and SCRs at Gallatin (to control nitrogen oxides); Allen already has SCRs. This new control equipment along with the 17 scrubbers and 21 SCRs we already have in place will help us meet all EPA rules as well as the mercury rule. We continuously review our clean air strategy and we are reviewing whether to retire, idle or control additional coal units in the TVA system." - Barbara Martocci, APR, TVA Media Relations 11/16/2011
28	**Vectren**	"As seen with EPA rules proposed in March, which focused on mercury and other hazardous pollutants, our significant investment in emissions control equipment for this region is again paying off and will ensure we comply with this new rule [CSAPR]," said Carl Chapman, Vectren's chairman, president and CEO … "More than a decade ago, we chose to move forward with these investments to improve the air quality for our region, which has positively impacted southwestern Indiana's quality of life and serves as an advantage from an economic development standpoint," added Chapman. "As such, our customers' rates increased throughout the past 10 years to reflect the cost of these investments. However, we now find ourselves in a position to comply, while other regional utilities may be required to consider retiring some uncontrolled coal generation units or make significant investments to lower emissions." - Press release, 7/28/2011

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29	**Wisconsin Energy**	"We really see very little impact on customer electric rates or our capital plan between now and 2015 as a result of all the new EPA regulations that have been proposed … We might see 1% to 2% increase our best guess. So that gives you an example of how well we are positioned from the environmental standpoint in terms of complying with even the new proposed rule." - Gale Klappa, Q1 2011 Earnings Call, 5/3/2011 (transcript)
30	**Xcel**	"Our proactive steps to reduce emissions through the MERP project in Minnesota and our plans for the Clean Air-Clean Jobs Act in Colorado put us in good position to comply with these rules [utility MACT]." - Paul Johnson, Q1 2011 Earnings Call, 4/28/2011 (transcript)