scottmadden
MANAGEMENT CONSULTANTS

Smart. Focused. Done Right.

The ScottMadden Energy Industry Update

Highlights of Recent Significant Events and Emerging Trends

Summer 2014

Volume 14, Issue 2

Table of Contents

scottmadden
MANAGEMENT CONSULTANTS

View from the Executive Suite

Executive Summary

I Feel the Earth Move under My Feet

The energy and utility industries continue to anticipate and react to potential fundamental shifts in the 100+ year-old model of investment, regulation, and earnings. Policy and regulatory changes are big factors driving the design of the new landscape. For many of these changes, significant investment in existing and new infrastructure is needed across all parts of the energy value chain. And by the way, load growth is no longer, so investment and cost recovery are uncertain.

The Energy Supply Chessboard	❑ Continued growth of distributed generation (especially solar PV) is prompting investigation of alternative utility business models ❑ Energy companies are increasingly looking at alternative financing structures like yieldcos for renewable and even gas-fired generation asset development ❑ Continued expansion of environmental regulations—including the U.S. Environmental Protection Agency's proposed existing source CO_2 regulations and other regulations targeting water usage by generators—are creating soon-to-arrive seismic shocks in the power supply landscape
Managing in an Uncertain World of High Expectations	❑ Despite some challenges to some state renewable portfolio standards and the persistent "near-death" experience of federal tax incentives, lower installed costs continue to prompt solar development, while wind has hit the doldrums of late ❑ Last winter's "polar vortex" and physical attacks on the grid have utilities redoubling efforts on both reliability and security, in light of higher customer expectations ("always on") and increasing constraints in the gas-electric interconnection
Seeking Improved Markets	❑ Thanks to Order 1000, transmission is entering a new competitive era, although the pace and nature of the playing field varies between regions ❑ FERC is now looking at wholesale energy markets, still trying to solve the "missing money" problem to incent the right type of supply resources ❑ With shale gas still gushing, there are more discussions of LNG exports, although policymakers and politicians remain torn whether to share the bounty or retain the resource for domestic consumers ❑ Finally, NY's Public Service Commission has launched an effort to rethink the role of the distribution utility; only time will tell what this new "energy vision" is and how much it might cost

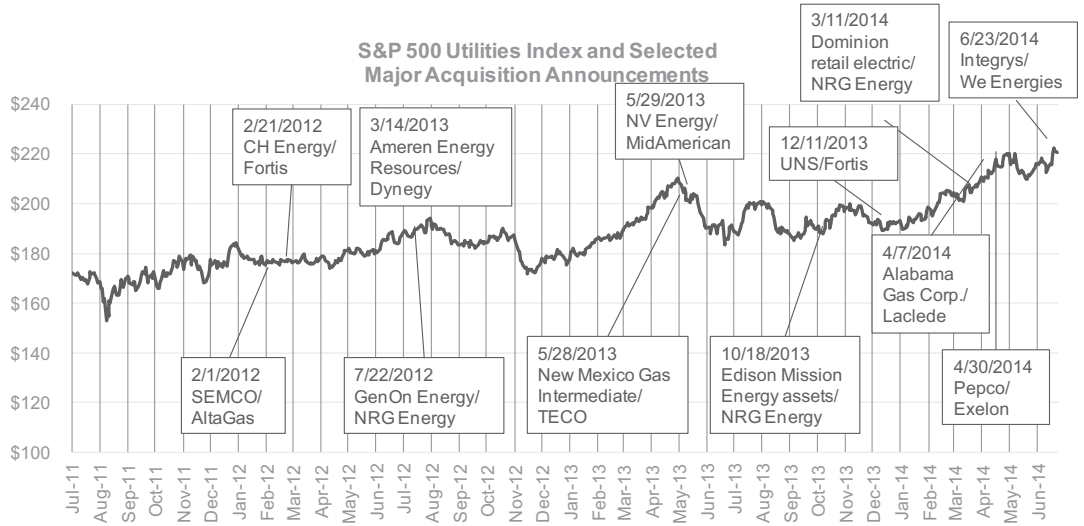
CEO Themes: Messages to Shareholders

Gas LDCs	Gas Pipelines	IPPs/Merchant Power	Energy Delivery	Combination Utilities
❑ **Colder-than-normal temperatures** contributing to success ❑ Continuing addition of retail customers in **growing markets** ❑ Uptick in residential **new-construction** activity ❑ **Investment** in distribution systems and pursuit of recovery of, and earnings on, such investments ASAP ❑ Trend toward separation of distribution business for **greater focus** ❑ Enactment of **improved rate designs** ❑ Acceleration of work and recovery of costs for **pipeline replacement projects** on a current basis	❑ **Fee-based revenue** growth eclipsing the decline in NGL margins ❑ **Construction** of large-scale, market-integrated infrastructure to meet the tremendous appetite for additional transportation capacity ❑ Future growth driven by **strategic expansions and acquisitions** ❑ Organic growth of **capital programs** via small to medium-sized projects, including storage, rail, and dock facilities, as well as gathering and longer-haul pipelines ❑ Need for growing **inland production** to access coastal and export markets	❑ Increasing reliance on **intermittent renewables** and localized natural **gas supply constraints** ❑ Heightened **volatility** driven not only by temporal weather extremes but also longer-term natural gas and regional dynamics ❑ Growth in the **retail** portion of business ❑ Firms offering customers the ability to dramatically **reduce dependence on system power** from the centralized grid ❑ Cultivation of relationships with long-term commercial and wholesale customers (the **origination platform**)	❑ **Investment** in essential storm hardening, clean energy supplies, and advanced "smart" energy systems ❑ **Standardization** across all opcos from top to bottom ❑ Filing of new electric **distribution rate cases** in an effort to align cost recovery and investment in utility infrastructure ❑ Increased **automation**, remote control technology, and grid sensors enabling the close monitoring and operation of systems	❑ Transformation of fleet to a **balanced mix of fuel sources** that reduces dependency on one fuel choice and enables better response to new technologies and environmental rules ❑ **Narrowing of gap between allowed and earned** returns and development of a pipeline of **regulated investment opportunities** ❑ Reduction of **commodity risk** through asset sales ❑ Execution against a long-term inventory of identified **growth and modernization** investments ❑ **Cost management** and financial discipline as a strategic priority

Sources: Company annual reports

scottmadden
MANAGEMENT CONSULTANTS

Utility Mergers and Acquisitions: Various Sectors, Various Rationales



Some Stated Themes and Rationales

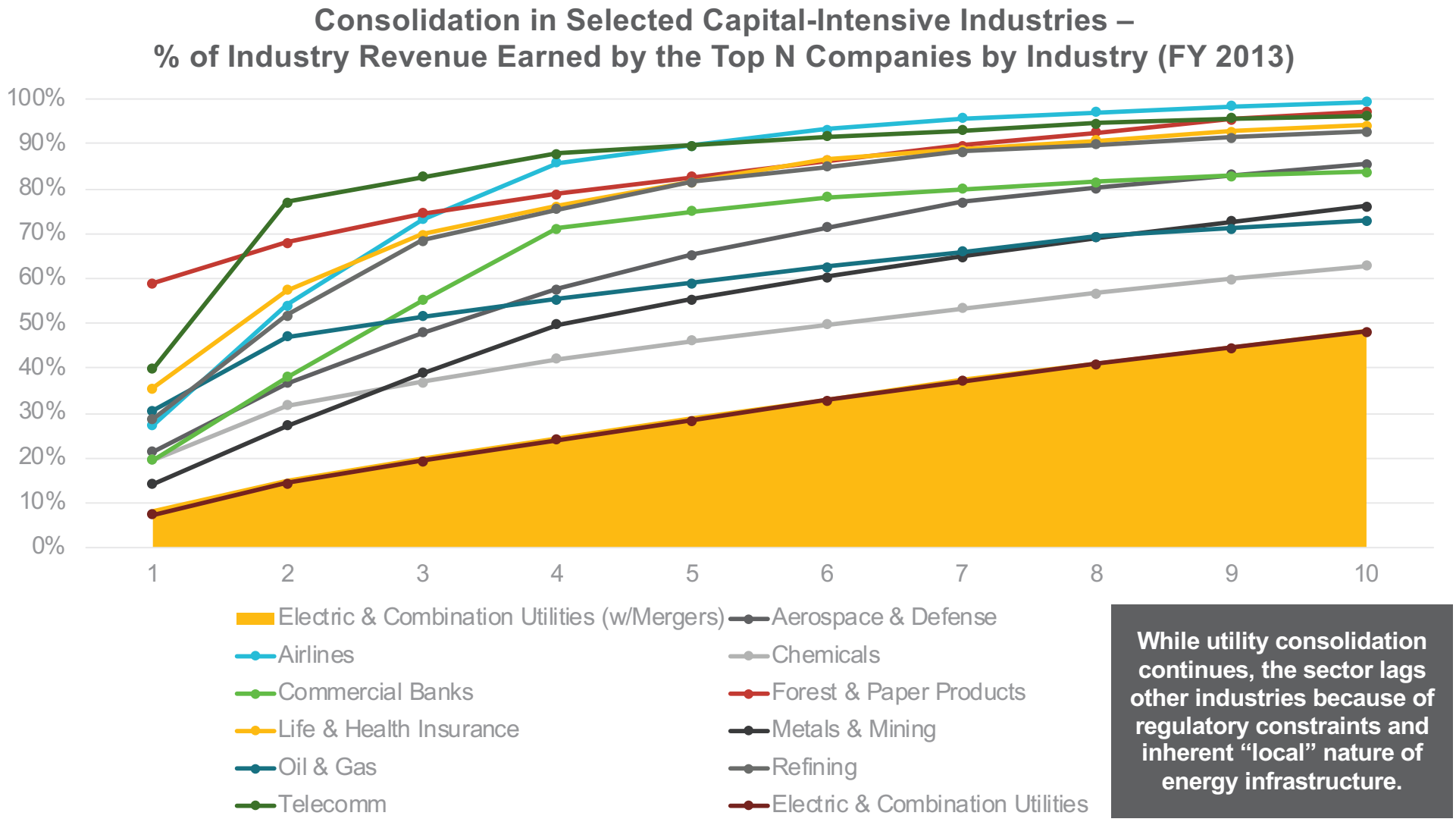
- Regulated, rate base growth strategies
- Geographic and regulatory diversity
- Expanding retail footprints
- Geographic fit, complementary operations, and economies of scale
- Cross-border expansion (especially Canadian investment in the United States)

Summary of Selected Recent Major Utility Acquisition Announcements

Target/Buyer	Target Sector	Announced Transaction Value ($B)*	Target Asset Description	Announcement Date	Completion Date
Integrys/We Energies	Combination utility	$9.1	1.6M gas customers, 443,744 electric customers; 3 GW of generation capacity (54% coal, 42% gas)	6/23/2014	Pending
Pepco Holdings/ Exelon	Electric distribution utility	$12.3	Mid-Atlantic energy delivery property serving about 2M customers in DE, DC, MD, and NJ	4/30/2014	Pending
Alabama Gas/Laclede	Gas distribution utility	$1.6	Largest natural gas distributor in AL; serves about 425,000 customers	4/7/2014	Pending
Dominion retail business/ NRG Energy	Competitive energy retailer	$0.2	Retail electric business serving more than 500,000 customers	3/11/2014	3/31/2014
Philadelphia Gas Works/ UIL Holdings	Gas distribution utility	$1.9	Distribution system of approximately 6,000 miles of gas mains; supplying approximately 500,000 customers	3/3/2014	Pending
UNS Energy/ Fortis Inc.	Combination utility	$8.5	UNS Energy (Tucson Electric) provides gas and electric service for approximately 242,000 customers in AZ	12/11/2013	8/15/2014
Edison Mission Energy assets/NRG Energy	Power generation	$3.0	EME's generation portfolio consists of nearly 8,000 MW and a proprietary trading and asset management platform	10/18/2013	4/1/2014
NV Energy/ Berkshire Hathaway	Electric utility	$10.5	Generation, transmission, distribution, and sale of electric energy in NV to 1.3M customers	5/29/2013	12/19/2013
New Mexico Gas/ TECO Energy	Gas distribution utility	$1.0	Gas service to 509,000 commercial, residential, and industrial customers	5/28/2013	Pending

Note: *Rounded to the nearest $100M
Sources: Industry news; SNL Financial; company press releases and investor presentations

Utility Industry Concentration Lags Other Capital-Intensive Industries



While utility consolidation continues, the sector lags other industries because of regulatory constraints and inherent "local" nature of energy infrastructure.

Note: Industry compilations based upon comparison of domestic (U.S.) companies with same NAICS codes
Sources: Thomson Reuters; ScottMadden analysis

scottmadden
MANAGEMENT CONSULTANTS

Yieldcos—A Fad or Here to Stay?

What Is a Yieldco and Why Use It?

- **Desire for Yield:** Current low interest rate environment has investors looking for liquid, yield-oriented investments in diversified assets with stable, long-term revenues (e.g., power purchase agreements)
- **Reduces Cost of Capital:** Yieldcos ring-fence a project portfolio with a specific risk/liquidity profile and tax depreciation features. They are not commingled with other utility assets, thus lowering the risk premium applied to all
- **Fill Gap for MLPs:** Power generation assets do not qualify for MLP ownership, foreclosing a potential vehicle for yield-hungry power sector investors. Yieldcos can provide a structure to distribute cash from existing projects and solicit more cash to fund more project development
- **Not as Tax Efficient as MLPs, But Close**: Yieldcos are organized as corporations (vs. partnerships), so they are still subject to double taxation; however, this is offset by initial net operating losses and tax credits for early stage projects, and yieldcos throw off cash to investors while shielded from taxes during early years
- **Retention of Control:** Principal owners preserve a majority stake during the IPO, so they can offload some financial risk to outside investors and monetize operational assets but still maintain ultimate control
- **No Development, at Least Initially:** Typically, yieldcos do not develop projects, but right of first offer agreements with parent companies afford them growth opportunities
- **Potential for Broader Application:** Yieldcos have been established mostly for renewable asset development, but other steady earning assets could be amenable to being warehoused in a similar structure (e.g., transmission and distribution)

Selected Historical and Pending Yieldco Public Offerings

	Assets	IPO Proceeds	Parent % Owner-ship*	IPO Date	Dividend Yield
NRG Yield	1.4 GW renewable, thermal gen	$468M	~66%	July 2013	2.74%
Pattern Energy	1 GW wind	$352M	~63%	Oct. 2013	3.99%**
TransAlta Renewables	1.1 GW wind	C$200M	~83%	Aug. 2013	6.75%
NextEra Energy Partners	~1 GW wind, solar	$325M (est.)	~83%	June 2014	2.17%***
SunEdison (TerraForm Power)	0.8 GW solar	$50M (est.)	~67%	July 2014	2.78%***

Sources: Company filings; Evercore; Gibson Dunn*; Thomson Reuters (div. yld.)
Notes: *At initial offering, before subsequent offerings; **Based on FY 2012 results; ***Assuming quarterly distribution stated in the SEC S-1 and share price as of July 28, 2014 at 4 PM EDT

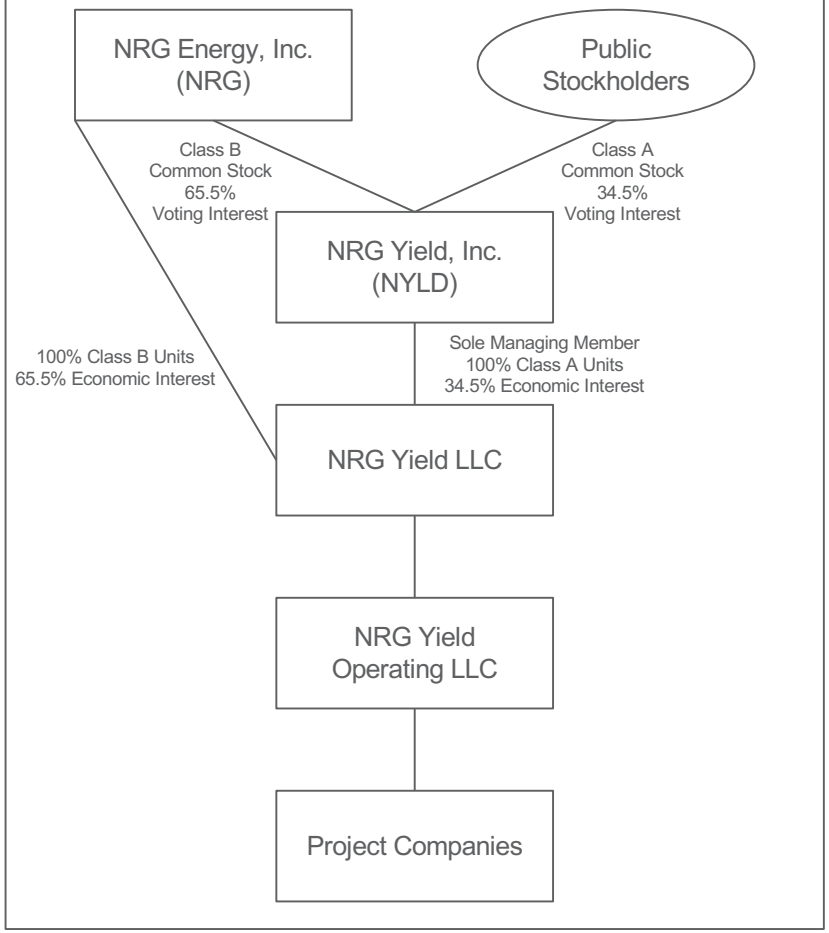
Sources: Latham & Watkins; Evercore; Gibson Dunn; Chadbourne & Parke; Bloomberg; FitchRatings; SNL Financial; industry news; company filings

scottmadden
MANAGEMENT CONSULTANTS

Yieldcos—A Fad or Here to Stay? (Cont'd)

Comparison of Typical Features – Key Differences Between MLPs and Yieldcos*		
Feature	**MLP**	**Yieldco**
Type of entity	❑ Partnership or LLC	❑ Corporation
Common post-IPO capitalization	❑ 49% public ❑ 49% sponsor ❑ 2% general partner	❑ Majority voting control, economics to sponsor
Projection of quarterly distribution increase	❑ No	❑ Yes (20% within first 18 months)
Reliance on NOLs and carry-forwards	❑ No	❑ Yes
Incentive distribution rights*	❑ Yes	❑ No
Yield at IPO (annual $ distribution/IPO price)	❑ Midstream: 4%–6% ❑ Shipping: 6.8%–8% ❑ Refining: 11%–15%	❑ About 5.5%
Shareholder approval to issue >20% equity	❑ No	❑ Yes
Non-compete on specified business activities	❑ Common	❑ No

Example Yieldco Structure
NRG Yield (as of June 16, 2014)



Notes: *Incentive distribution rights provide for larger cash distributions to general partners that improve MLP financial performance as incentive
Sources: *Latham & Watkins

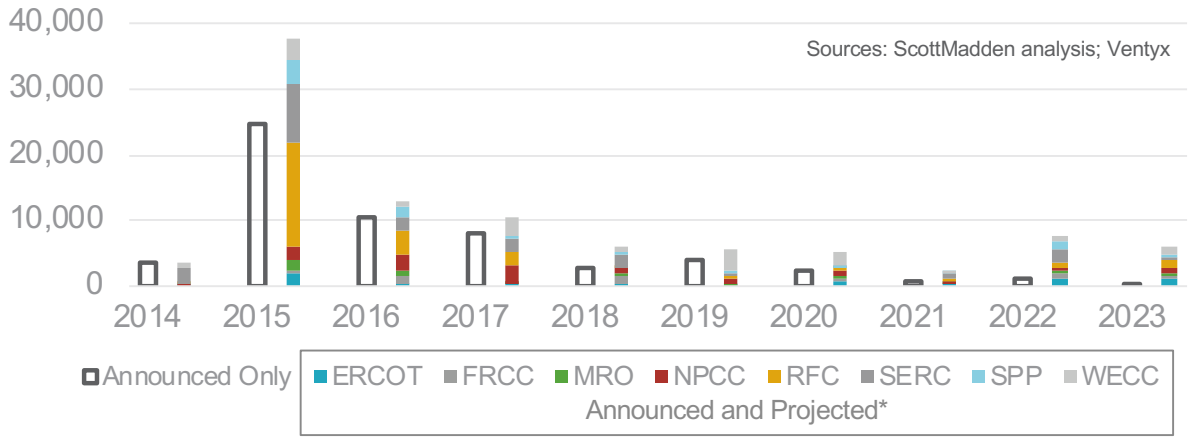
scottmadden
MANAGEMENT CONSULTANTS

Energy Supply, Demand, and Markets

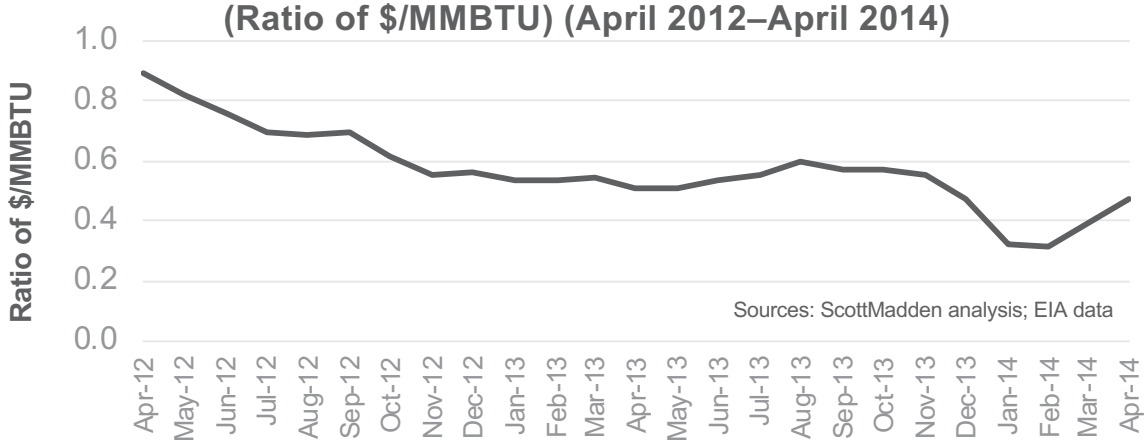
Fossil-Fired Generation: Ninth Inning for Some Units

A Big Wave of Retirements in 2015, with More Retiring Before 2024

Announced and Projected* Fossil Generation Retirements by Region (MWs)



U.S. Coal-to-Natural Gas Price* Ratio (Ratio of $/MMBTU) (April 2012–April 2014)**



The "Perfect Storm" Persists

- **CSAPR** Resurrected:** On April 29, the U.S. Supreme Court reversed a lower court's earlier vacatur of CSAPR. While CSAPR was vacated, predecessor CAIR** served as a placeholder of sorts, and generators were focused on MATS compliance
  - EPA has moved to reinstate CSAPR Phase I beginning 2015
  - Generators must now establish compliance strategies
- **Wrestled to the MATS:** Upheld on appeals weeks before CSAPR verdict, the more stringent MATS (2015 initial deadline) has been the major driver for coal retrofit/retirement plans
- **Gas on Coal:** With gas prices up from $3.00 to $4.50/MMBTU, demand has increased for domestic thermal coal (vs. 2012 when gas prices stayed below $3/MMBTU) and higher demand has buoyed prices for all domestic thermal coal
- **Life after Death:** Last winter, as gas prices spiked during the "polar vortex" and gas-fired generators experienced reliability issues, coal-fired generation proved critical for system reliability. Some ISOs are rethinking planned retirements

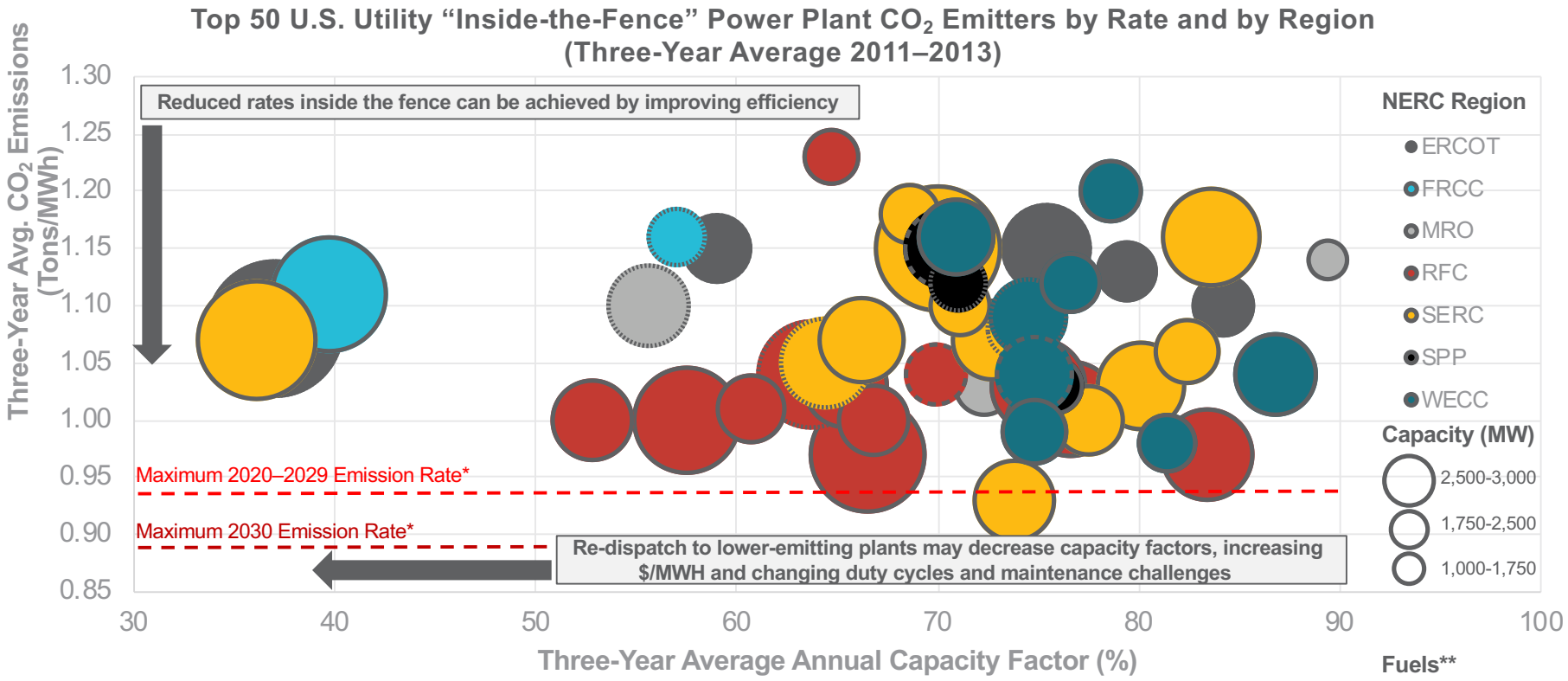
Notes: *Ventyx projections depict announced years (if applicable) and modeled years by unit type and age if no announcement has been made; **CSAPR is Cross-State Air Pollution Rule; CAIR is Clean Air Interstate Rule; ***Prices are average delivered prices at electric generating plants (incl. taxes) by month per EIA

Sources: ScottMadden analysis; Ventyx; SNL Energy; Sanford C. Bernstein & Co; EIA, Monthly Energy Review (Jul. 2014) (Table 9.9, Cost of Fossil Fuel Receipts at Electric Generating Plants)

scottmadden MANAGEMENT CONSULTANTS

Fossil-Fired Generation: Are Proposed Existing Source Greenhouse Gas Standards the Nail in the Coffin?

The Top 50 CO_2 Emitting Plants Are Sizeable Plants Which Provide Baseload Generation for Nearly All Regions in the U.S.



The Incremental Impact of the EPA GHG ESPS (beyond MATS) Remains To Be Seen

- New CO_2 regulations could scramble the calculus of planned investment in back-end air quality control systems, adding to already costly plans for installations and upgrades and leading owners to the conclusion that their coal generators are simply too expensive to operate
- Or, in lieu of the fact that the investments have already been made to comply with MATS, coal generators could stick it out, particularly if it looks like implementation will be delayed by litigation for years

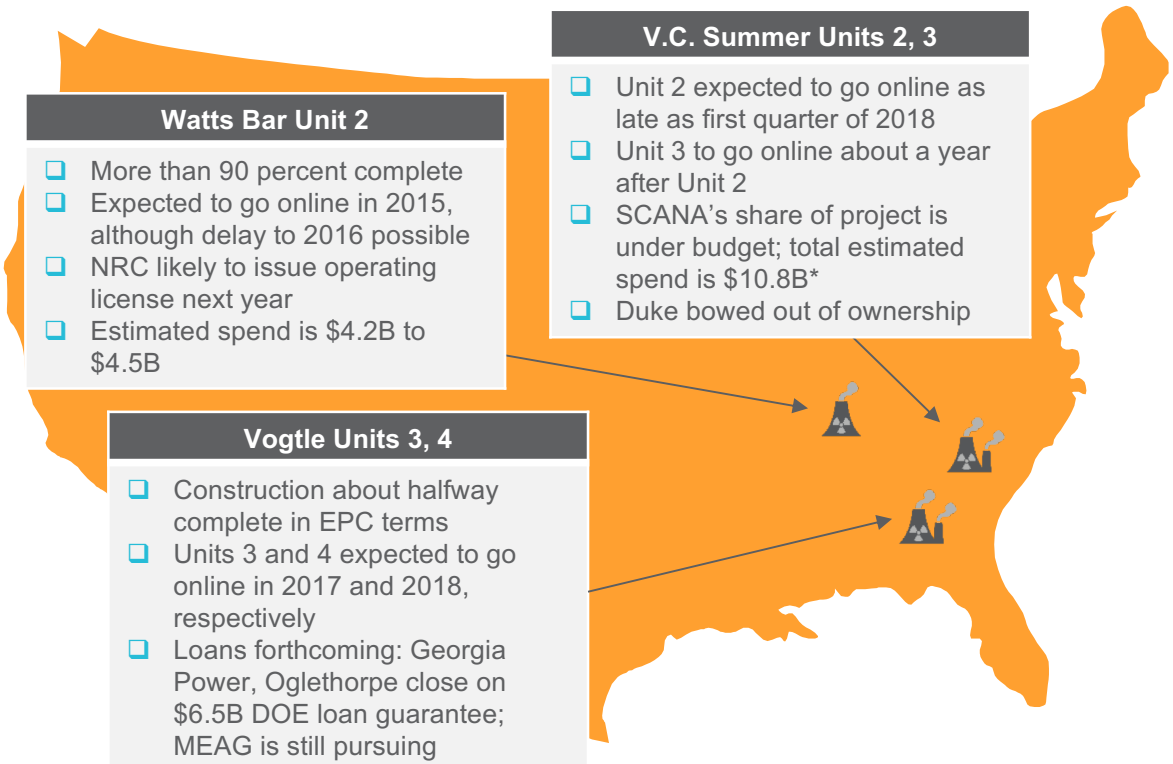
Notes: *Maximum average interim state-level goal from 2020–2029 and maximum goal for 2030 and thereafter outlined in the EPA's "Clean Power Plan" (including all four "building blocks" inside the fence and outside the fence). **Plants with units fueled primarily by fuels other than coal are highlighted

Sources: ScottMadden analysis; Ventyx; SNL Energy; Sanford C. Bernstein & Co

scottmadden
MANAGEMENT CONSULTANTS

Progress and Prospects for New Nuclear

Progress on New Reactor Construction in the United States



Watts Bar Unit 2

- More than 90 percent complete
- Expected to go online in 2015, although delay to 2016 possible
- NRC likely to issue operating license next year
- Estimated spend is $4.2B to $4.5B

V.C. Summer Units 2, 3

- Unit 2 expected to go online as late as first quarter of 2018
- Unit 3 to go online about a year after Unit 2
- SCANA's share of project is under budget; total estimated spend is $10.8B*
- Duke bowed out of ownership

Vogtle Units 3, 4

- Construction about halfway complete in EPC terms
- Units 3 and 4 expected to go online in 2017 and 2018, respectively
- Loans forthcoming: Georgia Power, Oglethorpe close on $6.5B DOE loan guarantee; MEAG is still pursuing

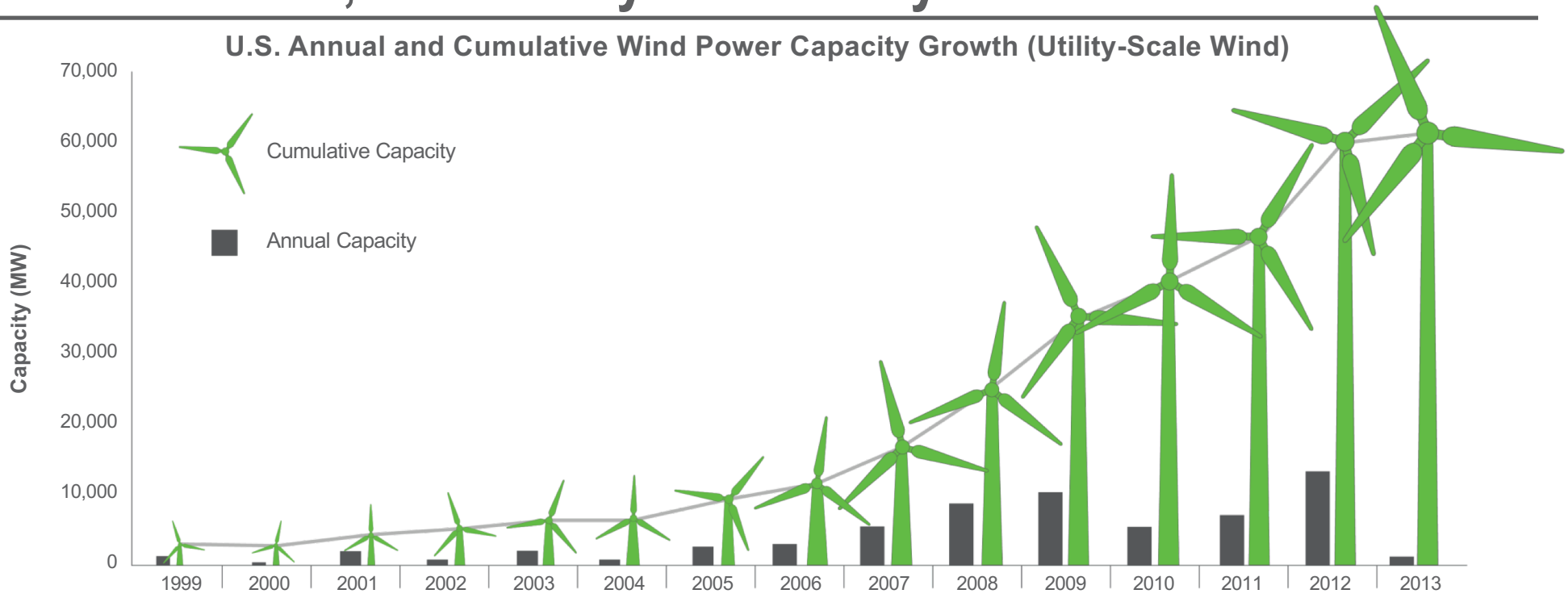
"We're going to have to have base power to meet the projected increases in electricity demand in the future and the best source, which produces no greenhouse gases, is nuclear power."

– Christine Whitman, former EPA Administrator

- **Small Modular Reactors (SMRs):** SMRs still garner much discussion, but progress is halting and there is more demonstration than commercialization
  - Babcock & Wilcox announced in April 2014 it was reducing its investment in SMRs because of a lack of investor interest: its mPower effort had been an industry leader
  - In May, DOE awarded NuScale Power up to $217M in matching funds over a five-year period to perform engineering and testing leading up to its first planned project in Idaho
- **Waste:** Waste uncertainty remains an issue
  - In response to a federal appeals court ruling, NRC's waste confidence** decision and temporary storage rule invalidated in 2012
  - NRC expected to issue a Generic Environmental Impact Statement (GEIS) and suspend final licensing decisions pending issuance of statement; litigation can be expected
- **Market Conditions:** Market conditions remain challenging for nuclear in some regions
  - Failure of Exelon units to clear PJM's 2017–18 capacity auction highlights continued market challenges for nuclear
  - Natural gas prices remain low, affecting the bid of marginal generators and the margins of nuclear power
  - Nuclear operators continue to point to the capacity market rules that fail to "reward" significant (in size), firm power operation

Notes: *SNL Financial estimate; **"Waste confidence" refers to the assurance of long-term, environmentally safe storage
Sources: Chattanooga Times Free Press; SNL Financial; Nuclear News; industry news

Renewables Development: More Steel (and Modules) "in the Ground," But Policy Uncertainty Remains a Barrier

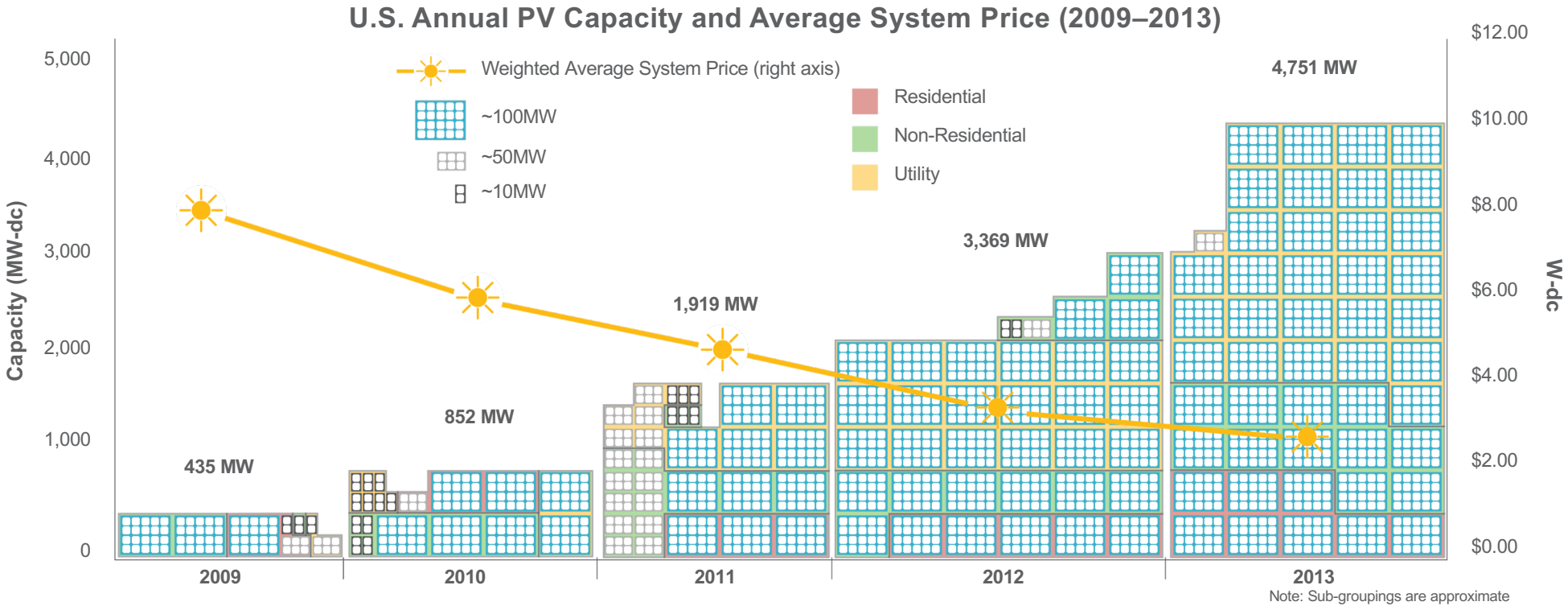


Continued State RPS* Challenges	❑ After some "near death" experiences last year, state RPS's continue to face legislative challenges designed to reduce requirements and broaden eligible resources (e.g., large hydro) ❑ Ohio is the first state to approve a significant curtailment with passage of a law freezing renewable and efficiency standards in place for two years, pending review of RPS costs and benefits ❑ The EPA's Clean Power Plan may function as back door federal RPS as the policy will encourage states to consider maintaining or expanding current RPS requirements
Mid-Terms Derail Possible Bipartisan Policy Efforts	❑ With November mid-term elections approaching, Congress looks like it will be unable to enact even bipartisan energy bills ❑ In May, the bipartisan Shaheen-Portman energy efficiency bill, which sought to encourage deployment of "off-the-shelf" efficiency technologies, failed a vote in the Senate

Notes: *RPS means renewable portfolio standard; PTC means production tax credit; ITC means investment tax credit; REIT means real estate investment trust; PACE means property assessed clean energy
Sources: Industry news; Greentech Media; American Wind Energy Association

scottmadden
MANAGEMENT CONSULTANTS

Renewables Development: More Steel (and Modules) "in the Ground" (Cont'd)



Development in Absence of Mandates in the Peach State	❑ Georgia has emerged as a success story for solar development as it is the only top-10 solar market without an RPS mandate ❑ Demand is being driven by Georgia Power, which is seeking nearly 800 MW of utility-scale solar
ITC* Step-Down Might Not Be a Bad Thing	❑ The federal ITC is slated to fall from 30% to 10% at year-end 2016 ❑ Emboldened by declining installed costs, some solar developers see this as an opportunity to move beyond tax equity financing and use other vehicles (e.g., REITs*, yieldcos, PACE*) ❑ Others are pushing to allow projects under construction on December 31, 2016 to remain eligible for the ITC (similar to recent PTC changes)

Notes: *RPS means renewable portfolio standard; PTC means production tax credit; ITC means investment tax credit; REIT means real estate investment trust; PACE means property assessed clean energy

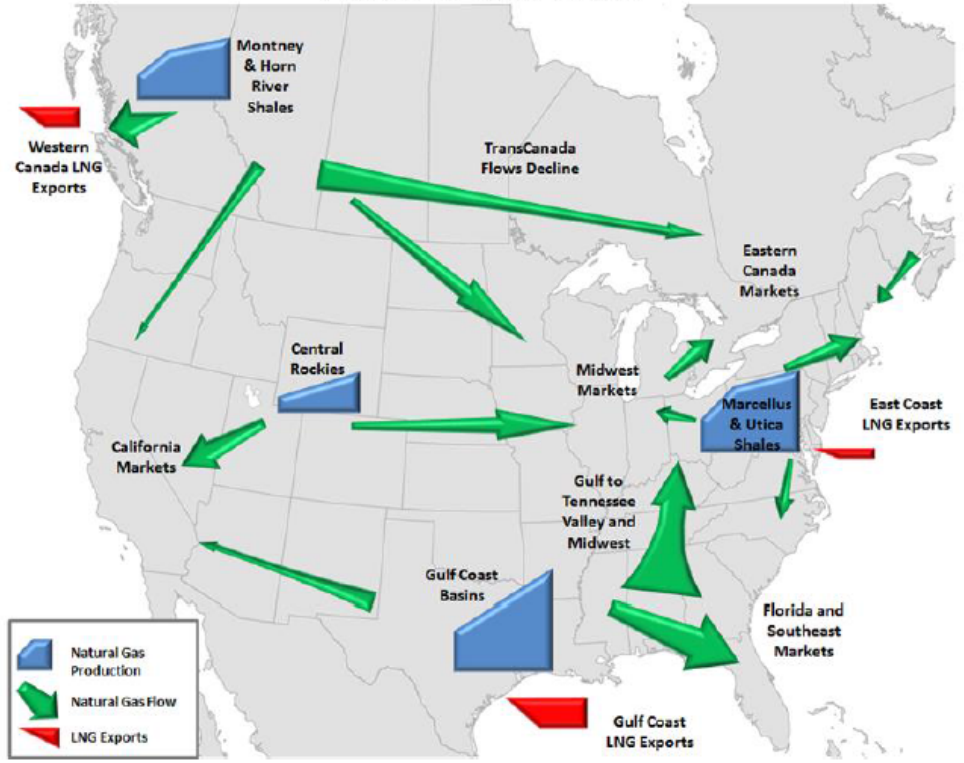
Sources: Industry news; Greentech Media; American Wind Energy Association

Solar capacity has expanded rapidly in Germany as part of its Energiewende. In September 2014, the Solar Electric Power Association (SEPA) and supporting partner, ScottMadden, will lead a group of 25 U.S. energy industry executives to the bellwether energy market of Germany to exchange information with electricity and solar market leaders who are adapting to change in this dynamic and controversial environment. Learn more about our findings in our next Energy Industry Update.

Natural Gas Midstream Infrastructure: Much Thought To Be Needed—Is Enough Happening?

- In March 2014, INGAA released a study examining what gas and liquids midstream infrastructure would be required with expanded North American unconventional natural gas and crude oil supplies, particularly supplies from shale formations
- Key findings included the following:
  - Nearly 40 BCF/day of new inter-regional pipeline capacity is needed by 2035, with more than 23 BCF/day from 2014 to 2020
  - Production increases are greatest in the Marcellus production area, and the shale plays in the Southwest (TX, NM, OK, AR, and LA) and Western Canada
  - Most significant production and market growth is expected to occur in the next 5 to 10 years
  - Of a projected $640B (2012$) of total midstream capital expenditures (including gas, NGL, and oil pipeline infrastructure) needed for North America during the 2014–2035 period, about $255B is required for U.S. natural gas midstream investment (excl. $58B in Canada)

Natural Gas Production Expansion and Midstream Infrastructure Needs: A Stylized Display



In INGAA's base case, about 15,500 miles/year of new pipe is needed. Most of this is gathering line. An average of about 1,650 miles of new gas transmission line are added each year: roughly 850 miles/year of mainline miles and about 800 miles/year for lateral connections, mostly to power plants, processing plants, and gas storage fields.

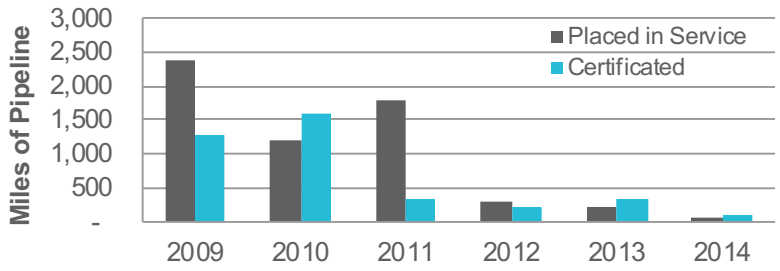
Sources: INGAA Foundation Report; *Pipeline & Gas Journal*; SNL Financial; ScottMadden analysis

scottmadden MANAGEMENT CONSULTANTS

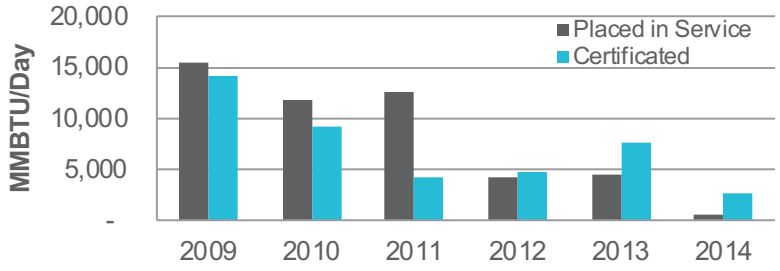
Natural Gas Midstream Infrastructure: Much Thought To Be Needed—Is Enough Happening? (Cont'd)

Recent History Doesn't Match to 1,600 Average Annual Miles of Mainline and Laterals*

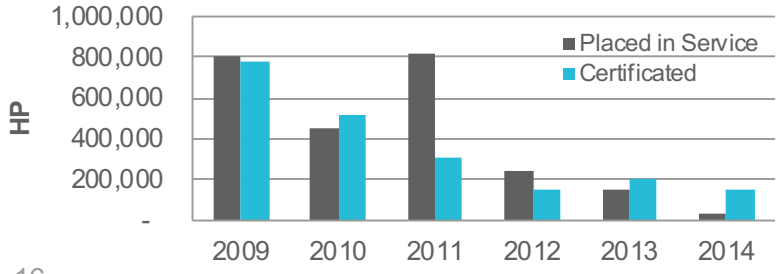
Miles of Natural Gas Pipeline Capacity Certificated and Placed in Service (2009–2014 through May)



Volume of Natural Gas Pipeline Capacity Certificated and Placed in Service (2009–2014 through May)



Amount of Natural Gas Pipeline Compression Certificated and Placed in Service (2009–2014 through May)



Growing Gas Infrastructure Is Harder than It Sounds

- Siting in areas like the northeastern U.S.—where much of the unconventional gas supply is coming from—is challenging
  - NIMBY and environmentalist objections slow development, as environmental groups oppose gas infrastructure as prolonging fossil fuel dependence and encouraging fracking
  - Environmental reviews and permitting also creates additional time and expense, as FERC permitting and planning can take three or four years
- While INGAA's latest study estimated costs per $155,000 per inch-mile (or $3.7M per mile,* a 65% increase over assumptions in its last report released in 2011), some industry experts believe that, especially in the Northeast, the cost runs about $5.5M per mile,* or about 50% higher
- Moreover, new pipeline is not always the answer
  - Some long-haul pipelines are under-capacity, as supplies are redirected to other locations
  - Pipeline companies can also leverage line reversals (backhaul), conversions to transport different products (e.g., NGLs), and abandonment of existing lines
- Much of the U.S. existing transmission pipeline is 40 years or older and will need to be replaced at the same time the new midstream infrastructure is needed
- Finally, dry gas prices must recover enough to justify the transport of commodity to demand centers, especially for dry plays that do not have NGLs to help fund production

Notes: *The INGAA Foundation Report base case estimates that average annual completions of 800 miles each of mainline and lateral pipeline and 13,800 miles of gathering line is needed

Sources: INGAA Foundation Report; *Pipeline & Gas Journal*; SNL Financial; FERC Office of Energy Projects, Energy Infrastructure Updates (2009–2014); ScottMadden analysis

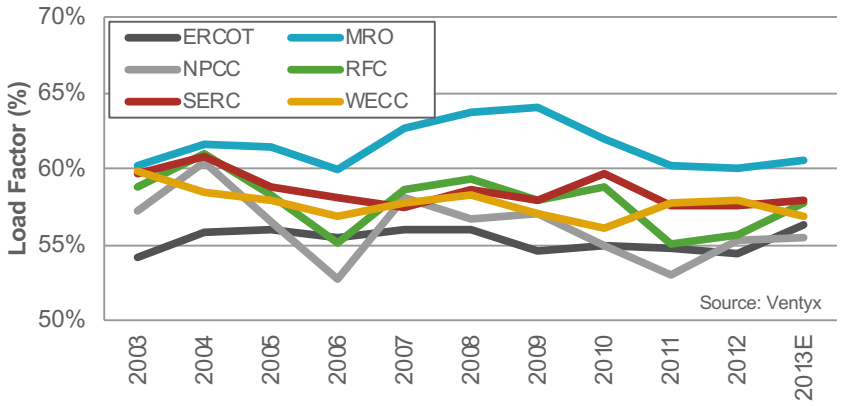
scottmadden MANAGEMENT CONSULTANTS

Power Demand and Prices: Peakier and More Volatile?

- Energy (kWh) consumption growth has been relatively flat, but in some regions (New England, Southeast, West) has been outpaced by peak demand growth
- Power prices have been moderated by lower natural gas prices—elevated by strong winter demand, but now tempered by a mild summer in the East and higher than expected gas storage refill
- Western power prices were higher in 2013 and into 2014 because of lower hydro production and the introduction of GHG cap-and-trade in California
- Some observers expect plant retirements, heavier reliance on natural gas for baseload generation, and unpredictable hydrology will tighten power markets and increase price volatility; electricity is one of the most price-volatile commodities

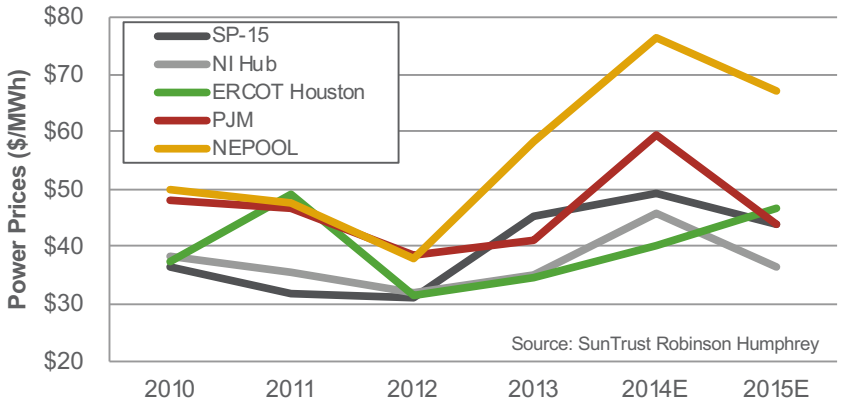
Power Demand Is Peakier in Texas, New England, But Trending That Way in Other Regions

Load Factor for Selected Reliability Regions (2003–2013)



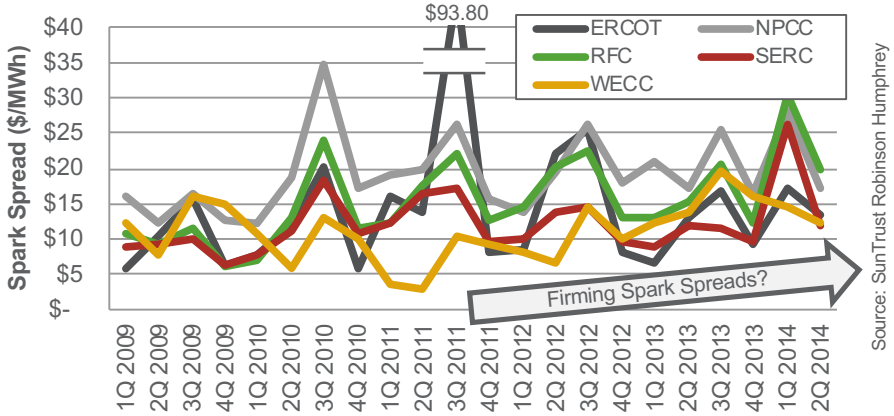
Power Prices Have Been Trending Upward Since 2012

Around-the-Clock Power Prices for Selected Hubs (2010–2015 Est.)



Spark Spreads Remain Volatile from Quarter to Quarter, But a Firming Trend May Be Emerging

Implicit Spark Spreads for Selected Reliability Regions (Q1 2009–Q2 2014)



Notes: Implied spark spreads based upon 7 MMBTU/MWh heat rate and calculated using on-peak pricing
Sources: FER Staff, *2013 State of the Markets* (Mar. 20, 2014); Macquarie; SunTrust Robinson Humphrey; Ventyx; SNL Financial; industry news; ScottMadden analysis

Managing the Energy and Utility Enterprise

EPRI's Integrated Grid Vision

In early 2014, EPRI released a concept paper outlining the possible impact on the electric grid of distributed energy resources (DER)—operationally, technically, and financially

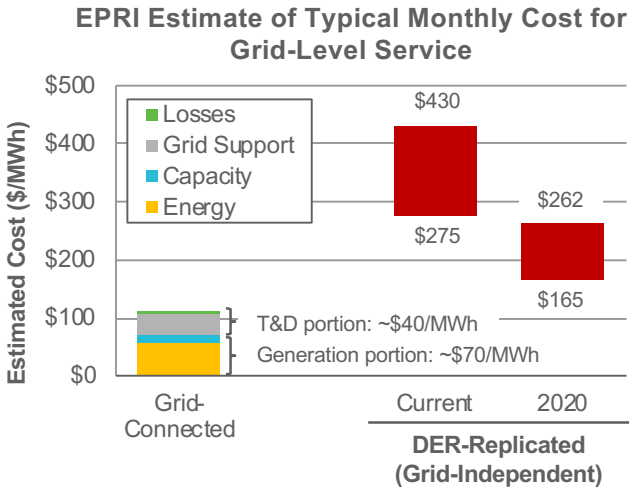
Some key points:

- DER and the grid are complementary
- In the future, DER will need to be both connected and integrated into grid operations
- DER, when grid integrated, is cheaper than when operated independently
- Germany offers a case study in consequences of DER growth without planning, coordination, and integration

Value of Grid Service to DERs

Service	Issues	Value of Grid
Reliability	▪ Diurnal variability and overcast or cloudy conditions	▪ Grid provides instantaneous balancing of both real and reactive power, leveraging pooled capacity with high (97%) reliability
Start-Up Power	▪ PV may be insufficient to start some systems (e.g., A/C* compressor)	▪ Grid provides instantaneous "in-rush" current without severe voltage fluctuation
Voltage Quality	▪ Higher voltage harmonic distortion from DER – Malfunctioning, sensitive consumer devices – Heating, causing reduced life in appliances, motors, and A/C	▪ Higher-quality voltage: limits harmonic distortion and regulates frequency in a tight band
Efficiency	▪ DER may have to adjust output to local load variation	▪ Grid "offtake" capability allows rotating-engine-based DER to operate steadily near full output
Energy Transaction	▪ DER sizing is critical and load dependent	▪ Grid-connected DER sizing is less critical: DER owner can get energy when needed and send excess to grid

EPRI Posits Grid Connection Is Cheaper When Integrated Versus Recreated by DER



Some quotes from EPRI's concept paper

- "With increasing penetration of variable generation (distributed and central), it is expected that capacity and ancillary service-related costs will become an increasing portion of the overall cost of electricity"
- "Presently, most DER installations are 'invisible' to T&D operators. The lack of coordination among DER owners, distribution operators, and transmission operators makes system operations more difficult, even as system operators remain responsible for the reliability and quality of electric service for all customers"

Notes: *A/C is air conditioning
Source: EPRI, The Integrated Grid: Realizing the Full Value of Central and Distributed Energy Resources (2014)

scottmadden
MANAGEMENT CONSULTANTS

Gas-Power Interdependence: No Shortage of Studies, But Will the Industry Be Ready for Next Winter?

- The "polar vortex"—extreme cold weather in winter 2014—has created renewed interest in gas-power infrastructure interdependence
- Since a series of events in 2011 and 2012 cast a light on mismatches in operating cycles between gas and power generation markets and pipeline capacity shortages, a FERC NOPR has been issued and multiple collaborative bodies have been formed to identify regional issues and propose possible solutions (see map at right)
- A number of RTOs have established task forces on electric and gas coordination, looking at information sharing, operations coordination, and process improvements
- More recently, after a gas-electric working group failed to agree on a new gas day start time to accommodate power generation, NAESB's board recommended three new intraday nomination cycles: 10 AM, 2:30 PM, and 7 PM*

Western Interstate Energy Board

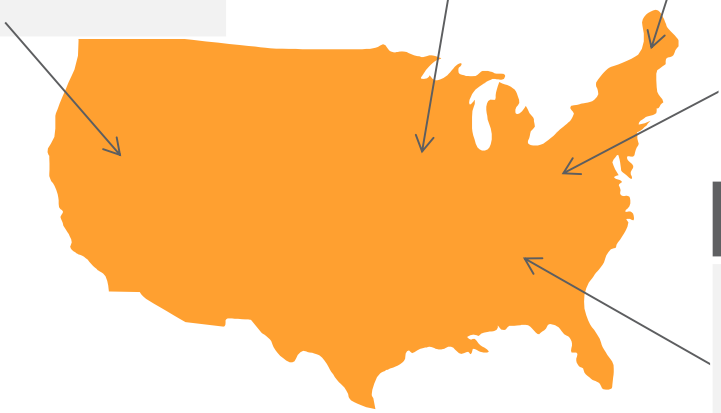
- Developing "Natural Gas-Electric and System Flexibility Assessment"
- Initial assessment found that gas and power are highly interdependent in the West and that gas infrastructure generally adequate except under extreme winter conditions
- Now studying short-term flexibility of gas system to meet hourly power industry gas demand, specifically the interrelationship between hydro, wind generation, and pipeline ramping during electric peaks

Midcontinent ISO

- Conducted gas/electric coordination field trial with ANR, Northern Natural Gas pipelines
- Found monthly review of maintenance and system conditions and additional coordination and information sharing was beneficial
- Planning to formalize protocols

New England States Committee on Electricity

- New England governors have developed a controversial proposal for a new contract entity to enter into new long-term pipeline capacity contracts: pipeline charges would be socialized through ISO-NE's FERC network service tariff
- Proposal must still be evaluated by NEPOOL and approved by FERC



Eastern Interconnection Planning Collaborative

- Target 1 report assessed existing gas-electric system
- Now evaluating gas systems needs for next 10 years
- Northeastern RTOs working with EIPC on initiative

Eastern Interconnection States' Planning Council

- Completed a long-term infrastructure requirements study
- Looking now at co-optimization (gas and power) to evaluate transmission options throughout the Eastern Interconnection

Notes: *All Central time; different than proposed in FERC NOPR and excluding a proposed 4th nomination cycle proposed in the FERC NOPR

Sources: Industry news; FERC Staff, Gas-Electric Coordination Quarterly Report to the Comm'n (Jun. 19, 2014); RTO; collaborative organization web sites

A Maturity Model Emerges for Renewable Energy

- As renewable energy continues to grow, utilities are faced with important decisions regarding how best to meet growing compliance requirements and customer expectations while continuing to operate within existing regulatory frameworks
- Industry conversations have centered largely on technology, regulatory frameworks, and utility business model; however, little attention has been paid to the effect that the integration of renewables has had on utilities' organizational models and staffing
- ScottMadden's Renewable Energy Organization Maturity Model, developed in conjunction with the Solar Electric Power Association, describes the general pathway utilities follow from initial renewable energy projects to fully integrated renewable resources

Renewable Energy Organization Maturity Model

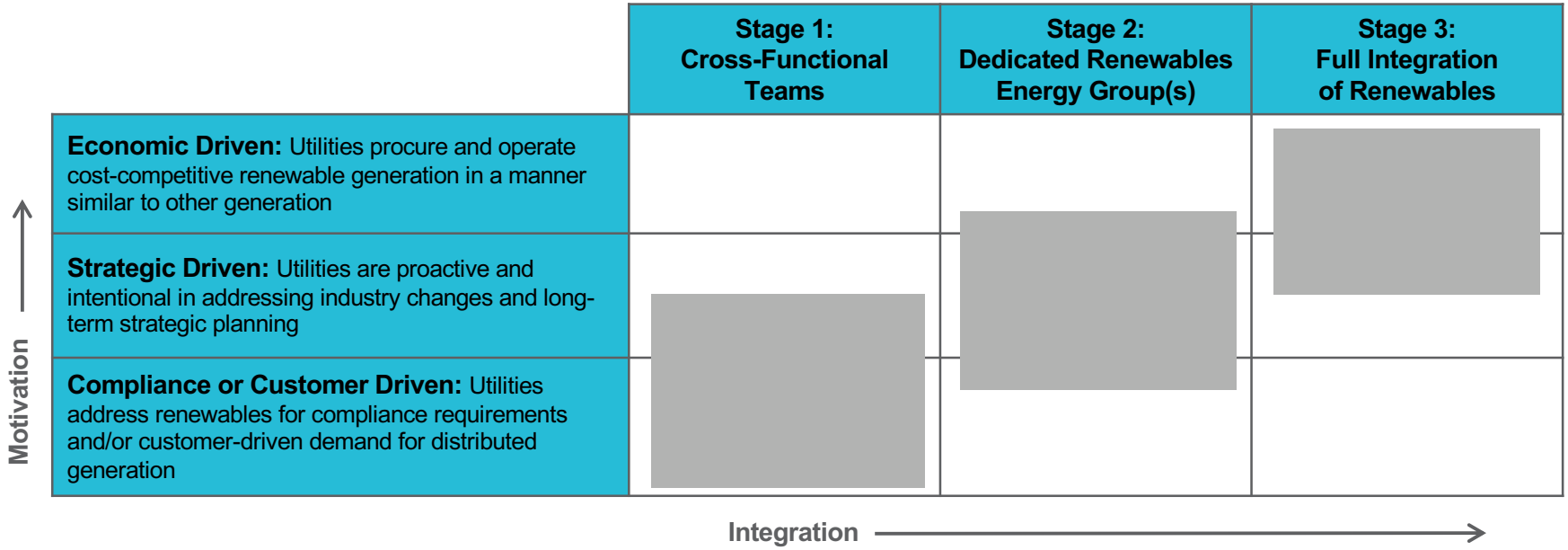
	Stage 1: Cross-Functional Teams	Stage 2: Dedicated Renewable Energy Group(s)	Stage 3: Full Integration of Renewables
	■ Collateral accountabilities for staff	■ Core accountabilities for staff	■ Renewables are treated as a normal part of business operations
Market Profile	■ Limited number of distributed interconnections ■ Utility-scale renewables used to meet RPS policies	■ Critical mass and strong growth in distributed generation ■ Utility-scale renewables used to meet RPS policies	■ Significant penetration of distributed generation ■ Utility-scale renewables competitive with other sources of new generation
Typical Drivers	■ Minimal distributed generation interconnection requests ■ Limited utility-scale PPAs or capacity connected to the grid	■ Growing or strong potential for distributed generation ■ Existence of a variety of utility-scale renewable energy PPAs and/or interconnections	■ A critical mass of distributed generation or utility-scale renewables is connected to the grid ■ Renewables growth may begin to slow, allowing focus on operations
Utility Experience	■ Secures and manages PPA contracts for utility-scale renewables ■ Outsources O&M responsibilities	■ Leverages lessons from operational experience; include in strategic planning ■ Owns and operates renewable assets	■ Explores opportunities to improve operations (e.g., O&M) of utility-owned assets
Renewables Organization	■ Utility incorporates renewable functions into work flow of existing functional teams to reactively solve tactical needs	■ Utility establishes core teams dedicated to distributed and/or utility-scale renewables	■ Utility manages renewable capacity similar to other generation assets

Sources: ScottMadden; Solar Electric Power Association

scottmadden
MANAGEMENT CONSULTANTS

A Maturity Model Emerges for Renewable Energy (Cont'd)

- A variety of motivations, which can change over time, drive a utility through the maturity model
  - Cross-functional teams are generally driven by compliance requirements or interest in customer service
  - Dedicated renewable groups often form within utilities seeking a strategic positioning, but may also arise from compliance, customer service, or economic motivations
  - Full integration is found in utilities engaging in renewables for strategic or economic purposes; the stage is characterized by a cultural shift within a utility, rather than a particular staffing design
- Expanding experience with renewable technologies (e.g., signing PPAs, owning renewable assets, etc.) plays a critical role in allowing utilities to refine operational and business models, thereby allowing them to advance to the next stage
- Regulatory complexity and rapid market growth are challenges that can prevent utilities from moving to full integration in the maturity model; these factors create significant uncertainty and/or a reactive environment for the utility



Sources: ScottMadden; Solar Electric Power Association

scottmadden
MANAGEMENT CONSULTANTS

The Polar Vortex: Can We Avoid Trouble Next Winter?

In January 2014, extreme cold weather affected natural gas and electricity markets in the upper Midwest, the Northeast, and the Southeast for several days. For some regions, particularly the Mid-Atlantic, loss of available power generation nearly led to emergency conditions and gas pipeline capacity utilization was pushed to its limits.

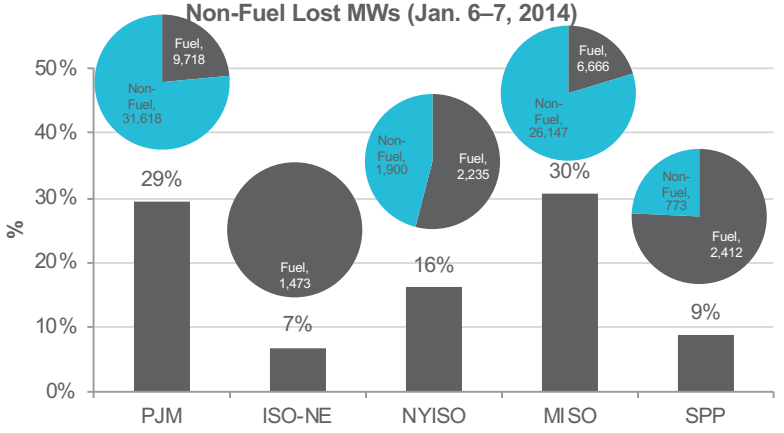
Observations and Issues

- **Pipeline capacity was tight:** Pipeline capacity was an issue in New England, even without significant gas burn for power generation. For example, at five key gas delivery points in the North, utilization was more than 92% on Jan. 22–23
- **Many outages were not fuel related:** In some cases, combustion turbines would not start
- **Fuel issues were not limited to natural gas:** Movement of barges and trains was hampered by freezing temps and coal; related handling equipment froze. Timely replenishment of oil inventories was difficult
- **Fuel diversity was critical:** Available gas capacity in the Mid-Atlantic, New England, and the Midwest was far less than "advertised" capability. In some cases, oil-fired units dispatched before gas. Coal and nuclear units were critical supply-side resources
- **Generators faced significant fuel price risk:** Mismatch between gas and power days led generators to assume gas price risk in advance of dispatch, even as gas prices soared to $100/MMBTU. Moreover, maintaining oil inventories is expensive, even as those units face uncertain dispatch during normal weather

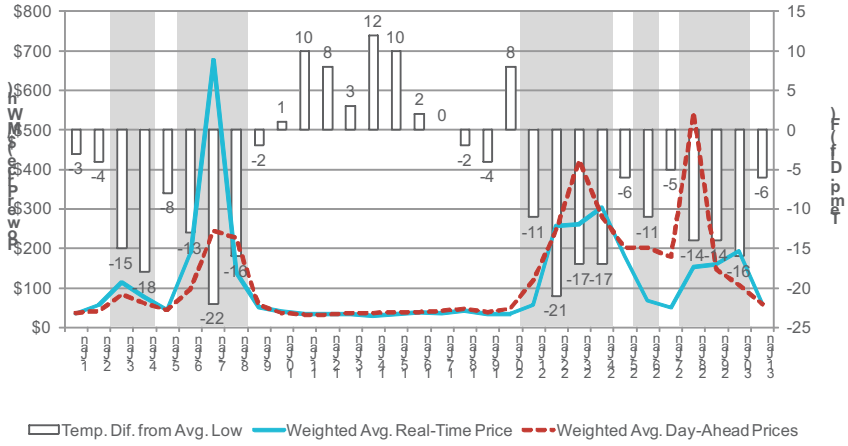
Will the Gas and Power Industries Be Ready for the Next One?

- **Demand response (DR) uncertainty:** More than 2,000 MWs of DR in PJM were called upon three separate days. It is unclear how system reliability might have been had that DR not come through
- **Rethinking retirements:** A significant amount of coal and oil capacity is slated for retirement beginning this coming winter. After last winter's experience, further consideration is being given by ISOs of which units may need to be maintained, at least for an interim period, for reliability
- **Gas/power alignment:** Industry and regulators continue to work on making their power and gas supply operations compatible

% of MW Lost vs. Peak Load and Split between Fuel and Non-Fuel Lost MWs (Jan. 6–7, 2014)



Jan. 2014 PJM-Wide Day-Ahead and Real-Time Power Prices vs. Temperature Difference from Average Low (°F) (Philadelphia, PA)



Sources: FERC Technical Conference on Winter 2013–14 Operations and Market Performance in RTOs and ISOs (Apr. 1, 2014); PJM; AccuWeather; industry news; ScottMadden analysis

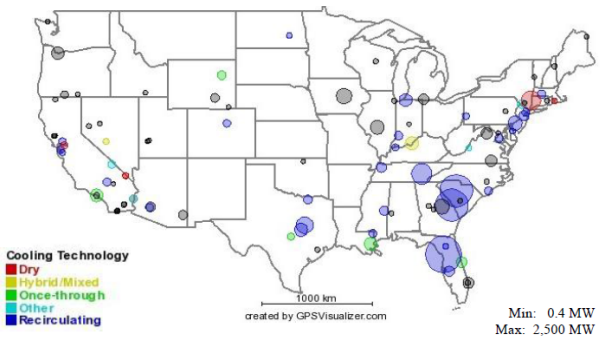
scottmadden
MANAGEMENT CONSULTANTS

Water and Energy: A Persistent Concern

This year's western drought is a reminder of water's linkage to energy

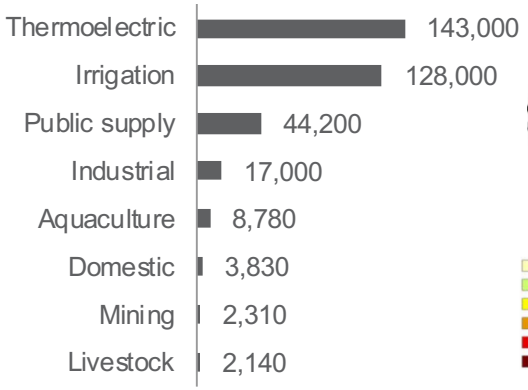
- Only 3% of Earth's water is freshwater
- 68.7% of the freshwater is trapped in ice, glaciers, and permanent snow
- 30.1% of freshwater is in the ground
- 0.3% of freshwater is surface water (e.g., lakes, streams, rivers)
- The Great Lakes constitute 84% of North America's surface freshwater

Planned Additions of Generation Units by Cooling Technology (2013–2022)

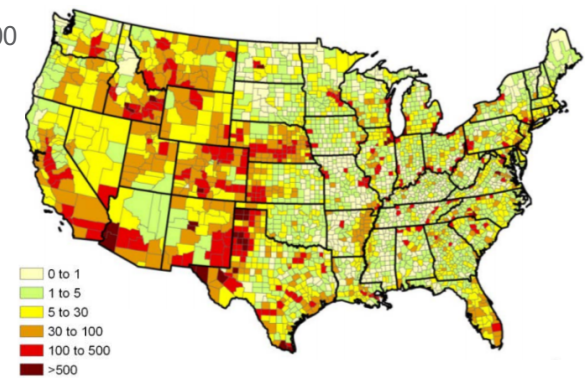


Power Generation Withdraws Much Water and Agriculture Consumes Much More, But Both Uses Compete for Scarce Freshwater

U.S. Freshwater Withdrawals (2005) (in MM Gallons/Day)



U.S. Freshwater Withdrawals as % of Available Precipitation (2005)



EPA Updates Effluent Rules	❑ EPA began a rulemaking in April 2013 to limit toxic metal discharges from steam-fired power plants ❑ Updated limits targeting flue gas desulfurization, fly ash, bottom ash, flue gas mercury control, and gasification of fuels such as coal and petroleum coke ❑ Key battle: technology-based rules or best available technology standard
Keeping out of Hot Water	❑ Thermal limits, both on intake and discharge, can affect plant performance ❑ In July 2012, U.S. nuclear power production hit its lowest seasonal levels in nine years as heat and drought limited output
First Come, First Served	❑ In normally water-abundant east, water can be "reasonably" used by adjacent landowners without regard to downstream uses ❑ New power generating capacity and new uses (gas extraction) could increase both intra- and interstate battles over water
The "Hydro" in Hydraulic Fracturing	❑ Drilling in a shale formation requires two to nine million gallons of water ❑ Depending on geology, 15% to 80% of injected water volume will flow to surface once pressure is released

Sources: EPA; DOE; *Inside EPA*; SNL Financial; U.S. Geological Service; EPRI; Bloomberg

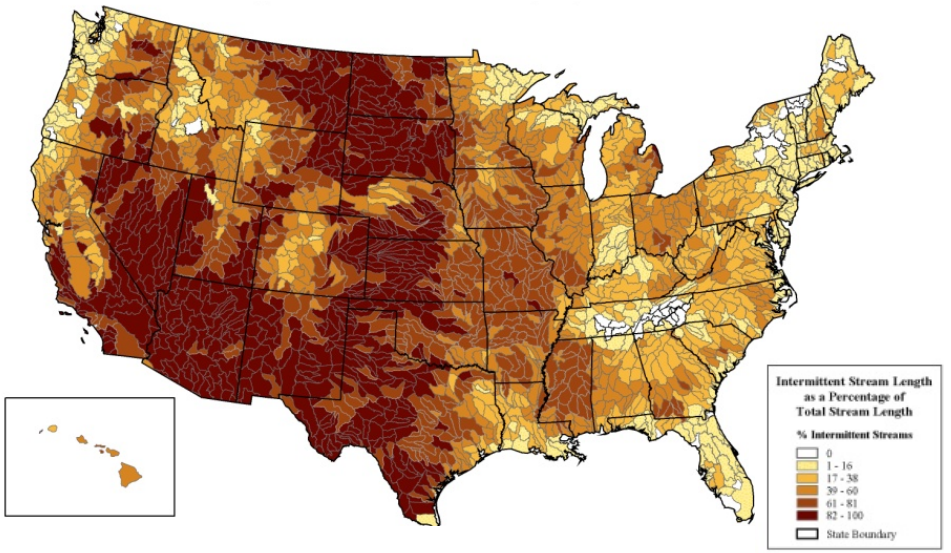
Water and Energy: A Persistent Concern (Cont'd)

"Waters of the U.S." Jurisdictional Reach

- EPA and the Army Corps of Engineers are proposing revisions to the definition of U.S. waters subject to regulation in addition to navigable waters and interstate waters, tributaries, and wetlands
- "Other waters" with a "significant nexus" to navigable waters, including tributaries, intermittent streams, and perhaps floodplains, would get automatic protection under the Clean Water Act
- For better or worse, proposed EPA jurisdictional expansion may affect state control over water regulation. But even with proposed consolidation, water regulation will remain inherently local as resource availability, uses, and ecosystems vary by geography
- Effect of the proposed rule: increased federal reach into water regulation in areas affecting agriculture, ranching, and oil & gas development

Status: Rule still pending; comments through late July; subject to House inquiry

Percentage of Intermittent Streams by Watershed (Potentially Subject to Regulation as "Waters of the U.S.")



Supporters Say

"Polluters right now potentially can benefit from this kind of uncertainty about what is actually covered. And so the proposed rule will hopefully just help to make that more clear."

– Stacey Detwiler, American Rivers' Associate Director for Clean Water Supply and Government Relations

Opponents Say

"The Obama administration continues to undermine scientific inquiry in order to fast-track its partisan agenda. Even though Clean Water Act jurisdiction is ultimately a legal question, the agency's refusal to wait for the science undercuts the opportunity for informed policy decisions."

– Lamar Smith (R-Texas), House Science Committee Chairman

Sources: EPA; *Inside EPA*; SNL Financial; U.S. Geological Service

Rates, Regulation, and Policy

Organized Capacity and Energy Markets: The Saga Continues

The Price is Right? FERC Still Trying to Get Wholesale Market Pricing Right	❑ Market design remains a work in progress in many RTOs ❑ After centralized capacity markets proceedings in 2013, FERC will now study energy price formation: how to ensure proper price signals encouraging development of adequate resources ❑ Areas of inquiry will include: — Use of uplift payments (and impacts of uplift not earned via markets or competition) — Offer price mitigation or price caps (with concern about market power and artificially low energy and ancillary service prices) — Scarcity and shortage pricing (and efficacy of administrative pricing mechanisms, like ERCOT's operating reserve demand curve, to reflect degrees of scarcity) — Operator issues (to the extent non-economic resources are regularly called upon for reliability and bypass more economic resources) 
Win Some, Lose Some in PJM	❑ PJM established bidding rules, seeking to keep generators from "double-bidding" capacity in multiple markets, but those changes were rejected by FERC. Capacity import limits, intended to shore up "firmness" of imported resources, were approved by FERC ❑ However, PJM did reduce the volume of limited demand response (DR) resources that could clear the auction and make DR an "operational resource," subject to dispatch before emergencies ❑ PJM capacity prices doubled in the May 2014 auction (for 2017/2018 delivery) to $120/day. PJM saw that as good sign for the new market rules 
Who's in Charge Here? Demand Response Jurisdiction Battle	❑ FERC's Order No. 745, issued in March 2011, established a framework (full LMP*) for compensating cost-effective DR in energy markets operated by ISOs and RTOs ❑ In May 2014, the D.C. federal appeals court vacated Order 745, finding that FERC's jurisdiction was limited to wholesale sales of energy and that "demand response is not a wholesale sale of electricity; in fact it is not a sale at all." Moreover, while DR can affect wholesale rates, that is insufficient for FERC jurisdiction. The court gave jurisdiction over DR to the states ❑ Impact of the case is unclear: pending FERC's appeal, ISOs and RTOs may still have payment approaches for DR, although the schemes may be subject to state regulatory jurisdiction 

Notes: *LMP means locational marginal pricing
Sources: *RTO Insider*; UBS; FERC; PJM; ERCOT; *The Wall Street Journal*; Van Ness Feldman; SNL Financial; industry news

In a New York State of Mind:
The Empire State's "Reforming the Energy Vision" Initiative

On April 25, 2014, the New York Public Service Commission (NYPSC) commenced its Reforming the Energy Vision (REV) initiative. The public proceeding "aims to align electric utility practices and our regulatory paradigm with technological advances in information management and power generation distribution"

- The order included a staff report challenging two traditional assumptions: (1) demand is inelastic and (2) economies of scale make centralized generation and bulk transmission invariably cost effective
- An NYPSC Staff report details a new business model in which the distribution utility initially functions as a Distributed System Platform Provider (DSPP); other stakeholders may serve in that role at a later time
- The proposed role of the DSPP is to actively coordinate distributed energy resources (DER) and provide a market in which customers can optimize their priorities while receiving compensation for providing system benefits
- The proposed model would address many of the operational, technical, and financial challenges cited in the EPRI concept paper*
- Utility-specific implementation plans are expected to follow stakeholder work groups evaluating energy reforms in two parallel tracks (see table below)

NYPSC's Policy Goals:

1. Enhanced customer knowledge and tools that support effective management of their total energy bill
2. Market animation and leverage of ratepayer contributions
3. System-wide efficiency
4. Fuel and resource diversity
5. System reliability and resiliency
6. Reduction of carbon emissions

NYPSC's Regulatory Track for Energy Reform

Track	Sample of Key Issues	Milestones
Track 1: Distributed System Platform Provider	▪ Identify products and services the DSPP will purchase or sell to DER providers and customers ▪ Define, measure, and evaluate costs and benefits of products/services ▪ Identify strategies that maximize customer engagement	▪ Aug. 2014: straw proposal ▪ Dec. 2014: generic policy determination
Track 2: Regulatory Changes and Ratemaking Issues	▪ Ensure rate design reflects bi-directional transactions between customers and DSPP as products and services become unbundled ▪ Revise existing performance mechanisms; consider additional incentives needed to encourage desired outcomes ▪ Define default service and ensure commitment to affordable universal service	▪ July 2014: straw proposal ▪ Q1 2015: generic policy determination

Notes: *See "EPRI's Integrated Grid Vision," at p. 19 of this Energy Industry Update
Sources: Reforming the Energy Vision, Case 14-M-101; REV Collaborative Meeting presentations

In a New York State of Mind (Cont'd): The Empire State's "Reforming the Energy Vision" Initiative

- **Is this the revolution?** Under the DSPP model, the distribution utility would expand its functions from primarily being a physical conduit for delivery of electricity to being a transactional platform for the distribution-level market. The anticipated responsibilities of DSPP include:
  - Plan traditional utility investments relating to transmission and distribution (T&D) assets
  - Plan customer-sited generation and demand response resources
  - Manage DER products and services in real time
  - Monetize value of DER products
  - Serve as the local balancing authority, forecasting load and dispatching resources in real time to meet customer needs and maintain reliability
- **What is it worth?** Value of benefits (see table at right) are expected to be influenced by location, resource, time of day, resource variability, predictability and visibility, price, and other factors
- **Keeping up with the Joneses.** The Massachusetts Department of Public Utilities issued grid modernization orders in June 2014. This plan focuses on combining real-time two-way communication from advanced meters with time-variable pricing. While both states emphasize technology platforms and customer engagement, New York's effort is more ambitious as it recasts stakeholder responsibilities
- **What could possibly go wrong?** Success will require significant infrastructure investment, diverse and autonomous utilities adopting a single business model, customer participation in a new and complex market, and alignment with other policy initiatives (i.e., NY Energy Plan and NY Energy Highway)

Potential Products and Services To Be Purchased by the DSPP		
Market Sector	**Product Example**	**Anticipated Benefits**
Base load modifications	▪ Local energy production/supply side increases ▪ Permanent load shift/reduction	▪ Avoided or deferred T&D investments ▪ Reduced line losses ▪ Increased system flexibility ▪ Reduced operating costs ▪ Fuel diversity ▪ Emission reductions
Peak load modifications	▪ Distributed energy resources offsetting generation ▪ Demand response ▪ Flexible capacity to address ramp rate	▪ Improved asset utilization/load factor ▪ Improved local reliability ▪ Improved system stability ▪ Improved capacity utilization ▪ Climate change mitigation ▪ Lower energy/capacity costs
Non-bulk ancillary services	▪ Frequency response and regulation ▪ Spinning and non-spinning reserves ▪ Power factor correction ▪ Voltage support	▪ Local optimization of services ▪ Improved power quality ▪ Improved efficiency ▪ Improved reactive support ▪ Additional revenue to offset operating expenses ▪ Reduced fuel consumption
Planning and contingency	▪ Resource adequacy ▪ Black start ▪ Emergency power islands	▪ Improved resiliency ▪ Improved emergency response ▪ Improved system restoration ▪ Increased proliferation of DER, particularly clean ▪ Public health and safety benefits

Sources: REV, Case 14-M-101; REV Collaborative Meeting presentations; MA Order 12-76-B; MA Order 14-04-B; industry news

scottmadden
MANAGEMENT CONSULTANTS

Existing Source CO_2 Emissions Regulation: Dealing with the Muddle

Implementation Timeline for Existing Power Plant CO_2 Rule (Clean Power Plan)

2014	2015	2016	2017
Clean Power Plan released (6/2/14)	Comment period ends (9/30/14)	Final rule issued (June)	State compliance plans due (June)	Possible extension period with progress (June)

Projected Impact: A Numbers Game

Absolute Reduction	Time Significance
❑ 30% by 2030 relative to 2005	❑ 2005 is cited by EPA as frame of reference
❑ **18% by 2030 relative to 2012**	❑ **2012 is basis for compliance target calculation**
❑ 25% by 2030 relative to 2030 business as usual	❑ Impact is compared to EPA's business as usual case

"If these rules are allowed to go into effect, the administration for all intents and purposes is creating America's next energy crisis."
– Mike Duncan, president and CEO of the American Council for Clean Coal Electricity

"This is the beginning of the end of America's long, dirty power plant era."
– Sen. Edward J. Markey, D-MA

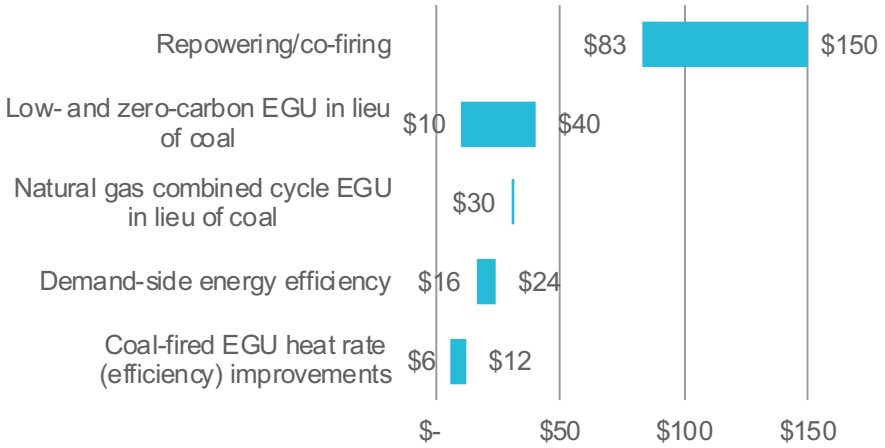
The Targets	❑ State-specific emission rates (ton CO_2 per MWh) for existing fossil fuel plants starting in 2020, with a final rate in 2030 — Most reductions (25%) targeted to come by 2020 — States have some flexibility to push compliance out toward 2030 so long as they show they are making progress ❑ States must average annual emissions (interim goal) over 2020–2029 period (measured in rolling two-year periods), then meet a final goal by 2030. Goals are established on a state-by-state basis and specified in the rule, and CO_2 limits vary widely by state ❑ States can employ mass-based targets (total tons CO_2 emissions) based upon those rate targets using EPA-approved methodologies for conversion
States' Obligation and the Three Bs	❑ States are obligated to formulate plans which must reflect the **best system of emissions reduction (BSER)** ❑ EPA envisions use of one or more of four **"building blocks"** that it used in setting CO_2 caps: (i) improved efficiency at EGUs* dispatching; (ii) lower-emitting EGUs; (iii) zero-emitting energy sources; and (iv) end-use energy efficiency ❑ The systemic mandate means that states can consider **"beyond the [power plant] fence"** methods
Possible Implications	❑ Several states have already indicated that they consider any "outside the fenceline" options to be outside the authority of EPA, virtually ensuring that the 111(d) guidelines will be in litigation, potentially pushing back implementation months or years ❑ Many predict that the cost of electricity will increase as a result of this program (although EPA believes cost reductions from efficiency gains will more than offset any cost increases)

Notes: EGU means electric generating unit
Sources: EPA; SNL; Bloomberg New Energy Finance; Brattle Group; *Inside EPA*

Existing Source CO_2 Emissions Regulation: Dealing with the Muddle (Cont'd)

Assumed CO_2 Reduction Costs Relied upon Estimates of Costs of "Building Blocks"

EPA's Estimates of Relative Cost of CO_2 Reduction ($/Metric Ton)

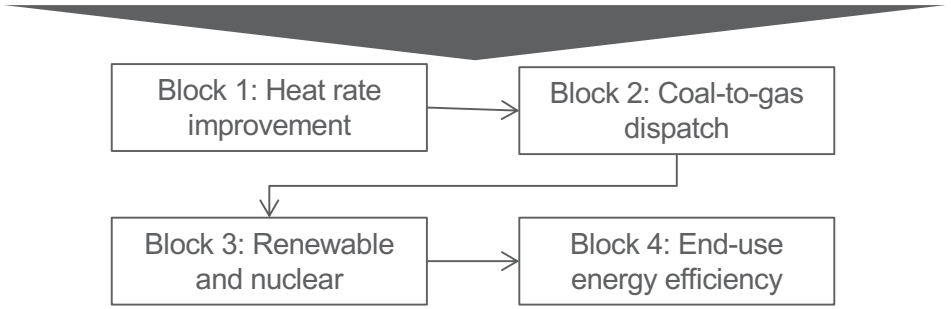


Potential Implementation Considerations and Issues

- Measuring "negawatts" from energy efficiency and calculating as CO_2 savings
- Real world costs of CO_2 reduction options (versus EPA's modeled costs)
- Possible renewed interest in new nuclear generation
- Multi-state approaches and climate, emissions trading exchanges (RGGI, Western Climate Initiative) may be buoyed by regulatory scheme that year
- Challenge of using 2012 as base year: low natural gas prices, economic sluggishness, strong renewables development, and mild weather kept CO_2 emissions unusually low

Constructing State-Specific Goals with the "Building Blocks"

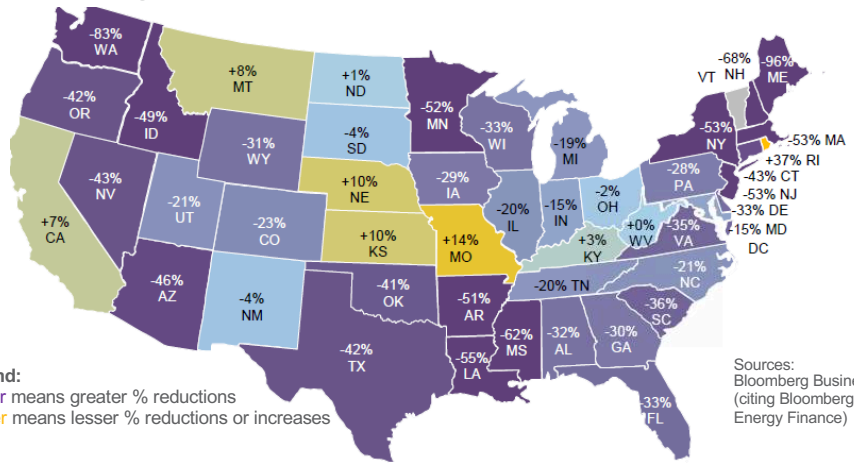
$$\text{2012 Emission Rate} = \frac{\text{EGU lb } CO_2}{\text{EGU MWh}}$$



$$\text{State Goal} = \frac{\text{EGU lb } CO_2}{\text{EGU MWh + Nuc MWh + Renew MWh + EE MWh}}$$

Complexity of Formula Results in Some States Increasing Total Emissions in 2030 Compared to 2012

Percentage-Based CO_2 Cuts: 2030 Reductions vs. 2012 Levels



Legend:
Darker means greater % reductions
Lighter means lesser % reductions or increases

Sources:
Bloomberg BusinessWeek (citing Bloomberg New Energy Finance)

Notes: EGU means electric generating unit
Sources: EPA; SNL; *Bloomberg BusinessWeek*; Bloomberg New Energy Finance; Brattle Group; Van Ness Feldman

Competitive Transmission: Why Is This So Hard?

Order 1000 is introducing competition to the transmission portion of the electrical grid and substantially changes the landscape for transmission development

- RTOs will have to manage open, transparent processes by which qualified bidders compete to build projects
- Transmission owners and developers will have to compete to build new transmission

The RTOs are developing by which various entities will compete to build transmission

- The entities proposing to plan and build the transmission system are now a very mixed group
- The RTOs have set very different thresholds for competitive projects; rules are evolving differently across the country
- As the RTOs are stakeholder driven, there is significant work to incorporate the perspectives of increasingly diverse stakeholders
- States have responded in dramatically different ways. Some have put in place their own ROFRs, and others are welcoming competition
- According to FERC, states' ROFRs need to be considered in the RTO planning processes

All of the potential competitors have to learn how to manage the new environment

- Incumbent utilities have to build new competencies to compete with new entrants. Internal organizational structures, governance, and affiliate rules can all stymie the development necessary competencies
- New entrants have to learn the grid to compete against the incumbents; transmission planning capabilities will be key
- All parties have to learn the new "rules of the road"

Status of Competitive Processes

	ISO-NE	NYISO	MISO	SPP	PJM	CAISO
Published project evaluation criteria	○	○	●	●	●	●
Published solicitation window		●	●	●	●	●
Held solicitation				●	●	●
Awarded project(s)					●	●

● = completed and posted

○ = evaluation criteria included in FERC filing

Notes: Projects in states with state ROFR can be considered earlier in the regional-planning process instead of at the evaluation stage per FERC Order on Rehearing and Compliance issued May 15, 2014, in dockets ER13-198, ER13-195, ER13-90; all public policy projects must be competition-eligible

Sources: SNL Financial; Gibson Dunn; Brattle Group; regional compliance filings

scottmadden
MANAGEMENT CONSULTANTS

Latest in Regional Competitive Processes Under Order 1000

	ISO-NE	NYISO	MISO	SPP	PJM	CAISO
Projects Eligible	❑ Projects more than 115 kV, reliability (with expected in-service date of more than three years), public policy, and economic projects ❑ Reliability projects needed within three years or for which incumbent is only party to submit a bid are exempt	❑ Economic projects ❑ Reliability projects unless timeline hits "trigger date" to address reliability issues or less than three years in future, in which case "backstop" solution (in parallel with alternative solution) is enacted	❑ Multi-value projects (public policy and/or reliability, economic 100 kV or above, >$20M) ❑ Market efficiency projects (primarily 345 kV or above, >$5M) ❑ Baseline reliability projects are exempt ❑ Upgrades are exempt (unless >50% of total cost is for new line sections and each section is ≥5 miles in length)	❑ Projects more than 300 kV ("highway" projects) ❑ Projects between 100 to 300 kV ("byway projects") ❑ Projects with in-service dates within three years are exempt ❑ Reliability and local projects are exempt	❑ Long-lead reliability projects (needed in five+ years) ❑ Short-term reliability projects (needed in four to five years) ❑ Immediate need reliability projects (needed in two to three years or less) may or may not be eligible for competition ❑ Market efficiency projects	❑ All regional projects (all more than 200 kV, some less than 200 kV) ❑ Upgrades/additions to existing lines or on existing rights of way/substation are exempt
Recent Developments	❑ Submitted a revised regional compliance plan in November 2013 ❑ In the filing, requested an effective date of the "later" of May 1, 2014, or 60 days following the issuance of a Commission order addressing the revisions ❑ FERC responded in May; 120 days to respond	❑ Along with NYTOs, made second joint compliance filing on October 15, 2013 ❑ In July 2014, FERC provided an order responding to the revised regional filing ❑ Commenced new reliability planning process January 1, 2014; will start public policy planning in 2014 Q4 ❑ Published solicitation on August 1, 2014	❑ Posted pre-qualification application in January 2014 ❑ MTEP14 report including qualified projects posted on August 8, 2014; approval by year-end 2014 ❑ Developer bids open January 2015 for a six-month window; decisions made by year-end 2015	❑ The first Qualified RFP Participants (QRP) process started in April 2014 ❑ Various detailed project proposals already submitted for 2015 projects ❑ RFPs will be published after January 1, 2015; 90-day response window ❑ Seeking industry experts to assess projects	❑ Two solicitations completed to date; one project was recommended to the PJM board per the market efficiency process ($8M project proposed by FirstEnergy); other solicitation still under consideration (Artificial Island) ❑ A third solicitation was issued in June 2014	❑ Two solicitations conducted to date; projects awarded to incumbents partnered with non-incumbents

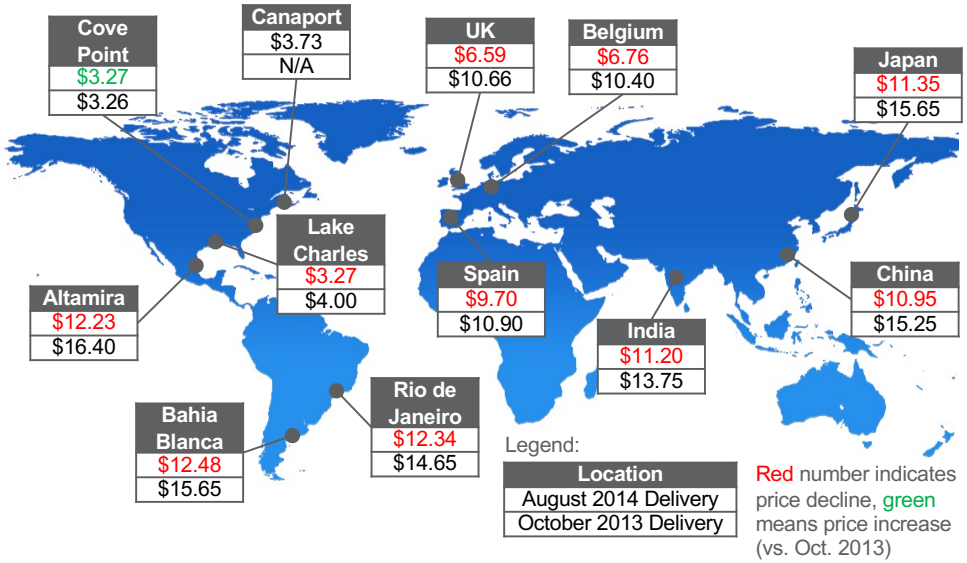
Notes: Projects in states with state ROFR can be considered earlier in the regional-planning process instead of at the evaluation stage per FERC Order on Rehearing and Compliance issued May 15, 2014, in dockets ER13-198, ER13-195, ER13-90; all public policy projects must be competition-eligible. NYTOs means New York transmission owners

Sources: SNL Financial; Gibson Dunn; Brattle Group; regional compliance filings

scottmadden
MANAGEMENT CONSULTANTS

LNG Exports: Application Reshuffling and More Studies, But Development Continues

World LNG Estimated Landing Prices



U.S. LNG Non-FTA Export Applications (Grouped by Status)				
DOE Non-FTA Status	**# Projects**	**FERC Status**	**Volume (BCF/Day)**	
Approved	3	Approved	4.46	**10.18**
	1	Final EIS	1.80	
	1	Final EA	0.82	
	2	Formal Application	3.10	
Under Review	1	Draft EIS	2.10	**22.69**
	5	Formal Application	5.45	
	3	Pre-Filing	10.47	
	9	N/A	4.67	
N/A	5	N/A	8.40	**8.40**
Total	**30**			**41.27**

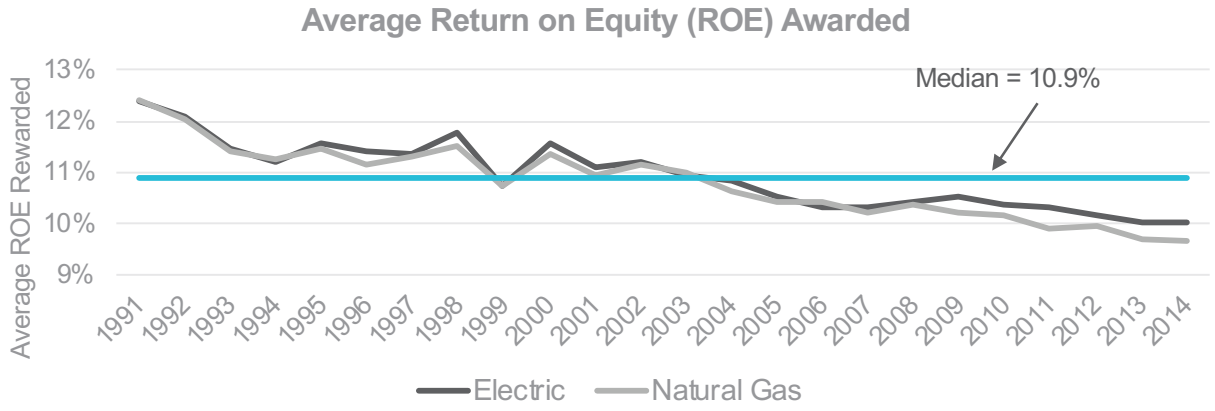
- **Price Declines Do Not Discourage...Yet:** Landed LNG prices have declined in some regions, but gas producers continue to look at supply overseas demand. As of late June 2014, proposed U.S. LNG export capacity had expanded to just over 41 BCF/day, up from almost 33 BCF/day proposed as of December 2013
- **DOE Reprioritizes:** In late May 2014, DOE proposed changing its review prioritization for long-term non-FTA* export applications
  - DOE considering where applications are in FERC environmental review process
  - Stated focus is on "more commercially advanced projects"
  - New process explicitly makes FERC an application bottleneck
- **Another Economic Impact Study:** DOE has commissioned a study of potential impacts, including on domestic natural gas prices, of exports of up to 20 BCF/day of natural gas
- **House Turns up the Heat:** Amid debate about the strategic and economic benefits and risks (including climate impacts) of exporting U.S. natural resources, specifically LNG, the U.S. House of Representatives passed H.R. 6, which calls for speedier disposition by DOE of non-FTA export applications (within 30 days of environmental review)
- **Other Dynamics in Play:** As regulators, policymakers, and industry participants gradually advance LNG exports, other factors are playing a role in those market dynamics, including:
  - Pace of pipeline capacity to move gas to proposed LNG liquefaction facilities
  - Emergence of Qatar as a major global LNG supplier
  - Increased attention of LNG exports as a geopolitical tool (e.g., Europe)

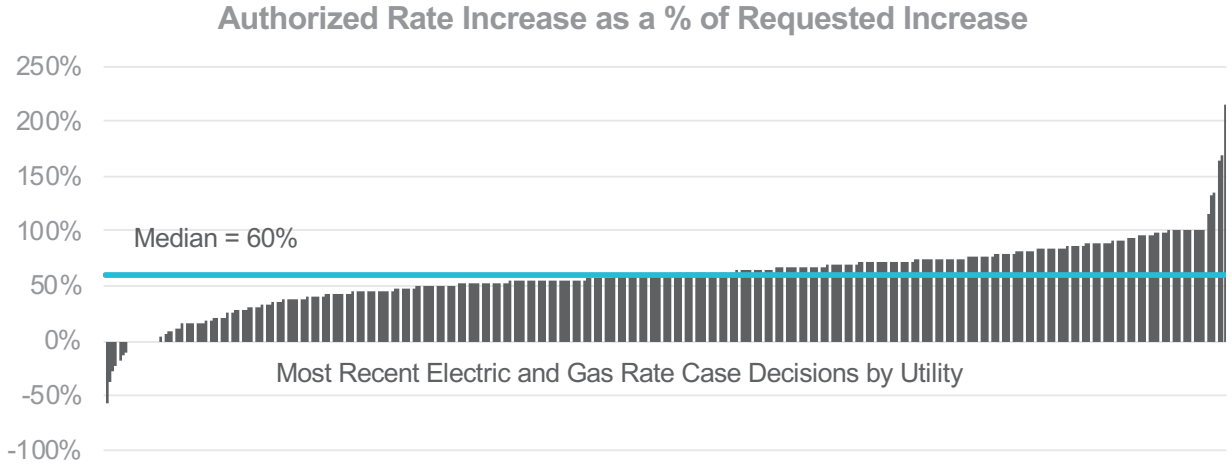
Notes: *FTA means countries with whom the United States has a free trade agreement
Sources: Industry news; FERC; DOE; SNL Financial; ScottMadden analysis

scottmadden
MANAGEMENT CONSULTANTS

Current Regulatory Landscape: You Can't Always Get What You Want…But Can You Get What You Need?

The Downward Trend in Returns Allowed by Regulators Continues





Utilities never get 100% of requested increases, but a sound approach to rate case management can help increase the odds of success.

The Regulatory Environment Is Not Getting Any Easier

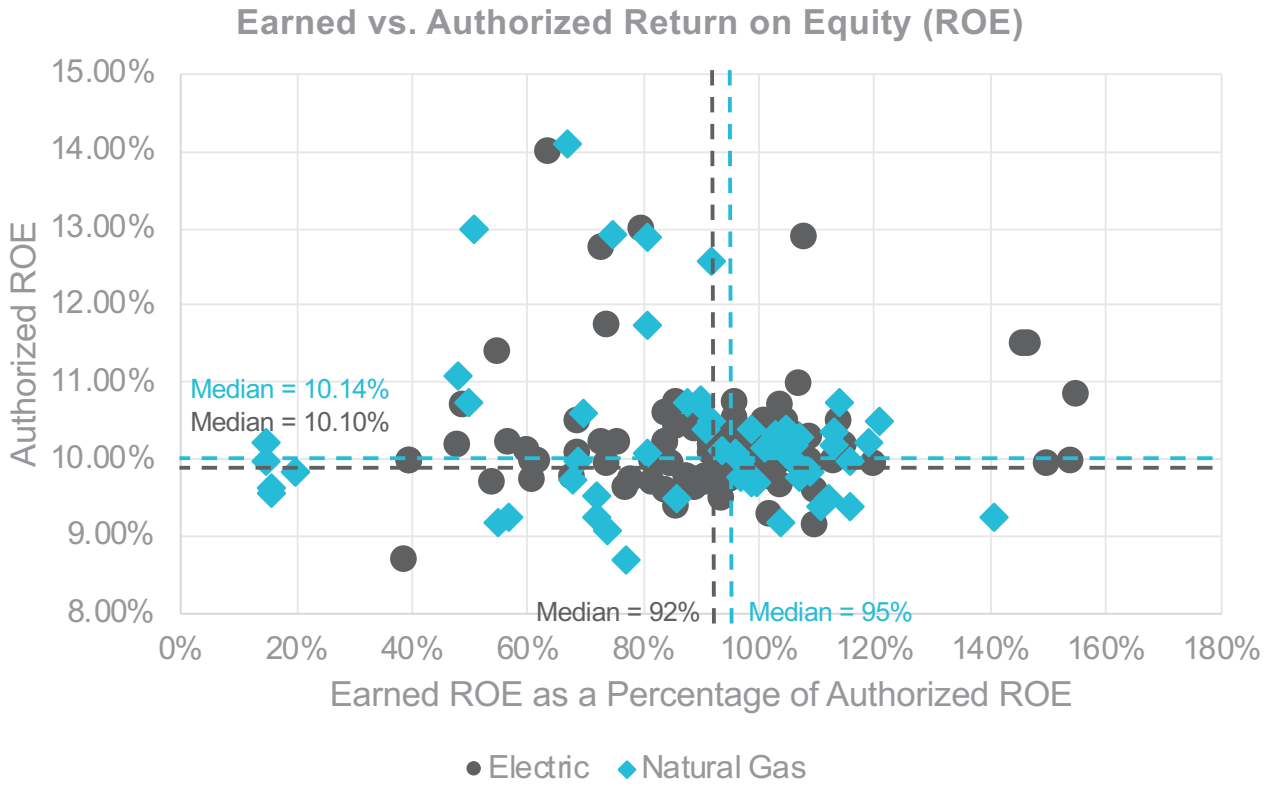
- **Adding to Rate Base:** Utilities are increasingly concerned about treatment of new rate base items
  - New capacity, including renewables
  - New delivery infrastructure, including system-hardening investments required by regulators
- **To File or Not to File:** Utilities are faced with a dilemma. They can either:
  - File a new rate case to address their increasing O&M and capital expenditures, or
  - Maintain their current (likely higher) ROEs
- **Predictability Elusive:** While predictability continues to be a principle concern, commissions have been reluctant to approve rate increases while the economy is still in the midst of recovery
- **Room for Improvement:** Utilities were only awarded 60% of their requested increases in rates, suggesting that opportunities exist to improve regulatory outcomes

Sources: ScottMadden; SNL; RRA; EEI

scottmadden
MANAGEMENT CONSULTANTS

Current Regulatory Landscape: Authorized Returns Have Declined, But Actual Results Are Improving

Gap between Earned and Authorized Returns Has Narrowed



- Median earned ROE as a percentage of authorized ROE results have improved in the past two years
  - 2013 Electric = 92%
  - 2013 Gas = 95%
  - 2011 Electric = 91%
  - 2011 Gas = 87%
- Though authorized returns have been consistently between approximately 9% and 12%, earned ROE as a percentage of authorized ROE varied widely
  - Electric utilities ranged from 39% to 155%
  - Gas utilities ranged from 15% to 141%

A Combination of Different Initiatives Are Being Pursued by Most Utilities to Improve Rate Case Outcomes

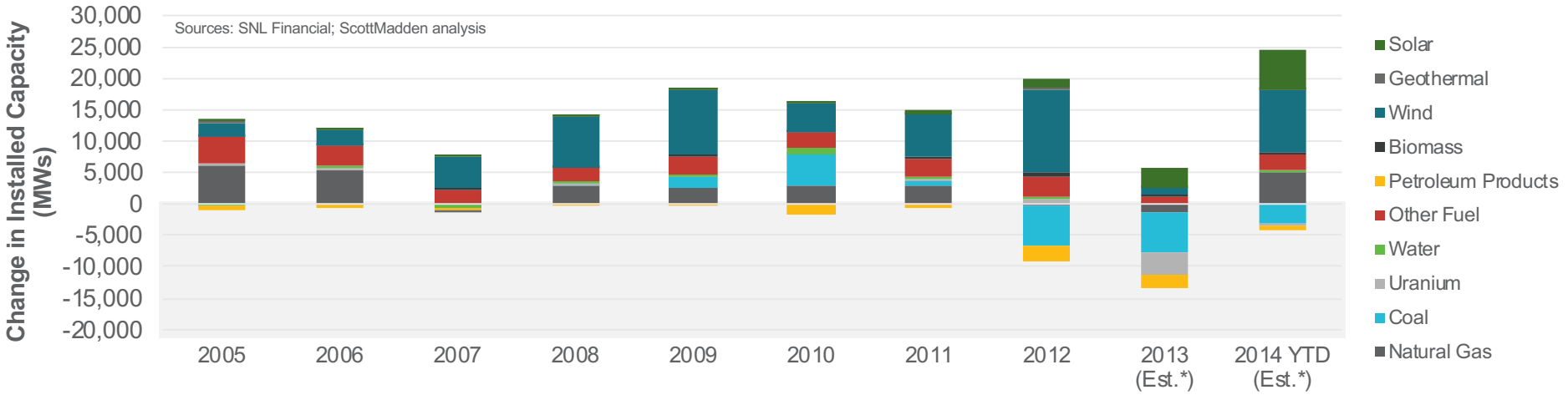
- Alternative cost recovery: future test year and multi-year filings, pass-throughs, riders, and trackers to reduce regulatory lag
- Improved rate design to minimize cross-subsidies and increase recovery of fixed costs: higher customer charges, decoupling, and migration to rate parity
- Re-energized regulatory relationships: working more cooperatively with commissions and interveners to address concerns

Notes: "Earned ROE" is FY2013 return on average common equity for the relevant operating company; Authorized ROE is the most recent ROE approved by the state PUC
Sources: ScottMadden; SNL; RRA

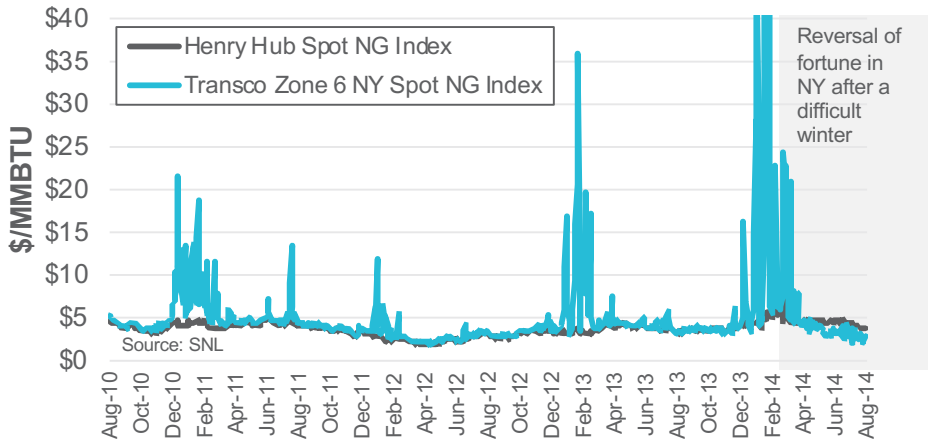
The Energy Industry by the Numbers

The Energy Industry by the Numbers

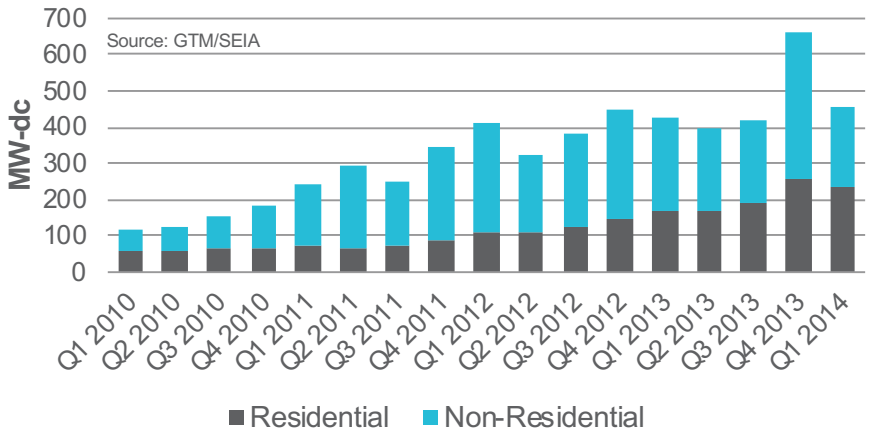
Change in Installed Capacity (MW) by Fuel (2005–YTD 2014 Est.)



Historical Natural Gas Spot Prices – Henry Hub vs. New York City (Aug. 2010–Aug. 2014) ($/MMBTU)



U.S. Distributed Solar PV Installations by Quarter (MW-dc)



Notes: *SNL estimates from available Form 860 filings and SNL research
Sources: SNL Financial; GTM Research/SEIA, U.S. Market Insight; ScottMadden analysis

scottmadden
MANAGEMENT CONSULTANTS

Recent ScottMadden Insights – Available at ScottMadden.com

Clean Tech & Sustainability	***Climate Risks and Utilities: A Story of Confusion,*** by V. Fomenko and C. Vlahoplus, http://www.scottmadden.com/insight/738/climate-risks-and-utilities-a-story-of-confusion.html
	Complying with Federal Sustainability Initiatives, by C. Vlahoplus and B. Hosken, http://www.scottmadden.com/insight/690/complying-with-federal-sustainability-initiatives.html
Fossil Generation	***Coal's Twilight Gets Expensive,*** by S. Sanders and Q. Watkins, http://www.scottmadden.com/insight/756/coals-twilight-gets-expensive.html
	Light or Heat, by T. Williams, S. Sanders, and Q. Watkins, http://www.scottmadden.com/insight/674/light-or-heat.html
Natural Gas	***Gas Utility Infrastructure Investments,*** by E. Baker, J. Davis, and J. Payton, http://www.scottmadden.com/insight/686/gas-utility-infrastructure-investments.html
Rates & Regulation	***Innovative Ratemaking – Multiyear Rate Plans,*** by R. Starkweather and P. Young, http://www.scottmadden.com/insight/683/innovative-ratemaking-multiyear-rate-plans.html
Renewables	***Hitting the Blend Wall – Proposed Reductions in the EPA 2014 Renewable Fuel Standard,*** by A. Cerwin, M. Coppedge, and C. Vlahoplus, http://www.scottmadden.com/insight/716/hitting-the-blend-wall-proposed-reductions-in-the-epa-2014-renewable-fuel-standard.html
Transmission & Distribution	***Changing Resources and Implications for Transmission,*** by C. Lyons, http://www.scottmadden.com/insight/688/changing-resources-and-implications-for-transmission.html
	Confirming Compliance – Do You Have Proper Oversight of Your Contractors?, by C. Lyons and L. Martin, http://www.scottmadden.com/insight/672/confirming-compliance-do-you-have-proper-oversight-of-your-contractors.html
Utility Management	***Improving Productivity,*** by D. Kohut, http://www.scottmadden.com/insight/684/improving-productivity.html
Utility Strategy	***Survey: Distributed Generation – What's on the Horizon,*** by C. Lyons and P. Quinlan, http://www.scottmadden.com/insight/698/survey-distributed-generation-whats-on-the-horizon.html
	How I Learned to Stop Worrying and Love Distributed Resources, by S. Pearman, http://www.scottmadden.com/insight/692/how-i-learned-to-stop-worrying-and-love-distributed-resources.html

scottmadden
MANAGEMENT CONSULTANTS

2014 Fact-Finding Mission: Exploring the Energy Transition in Germany

September 14–18, 2014

The Mission

In September, SEPA and supporting partner, ScottMadden, will lead a group of 25 U.S. energy industry executives to the bellwether energy market of Germany to exchange information with electricity and solar market leaders who are adapting to change in this dynamic and controversial environment.

- Select group of executives
- Goal of returning with insights and practical knowledge that can be applied to planning and business decisions in the United States
- Face-to-face meetings with thought leaders and decision makers from the electric power industry, government, trade and industry associations, and market experts

The Focus

The program will be interactive and will focus on questions including:

- **What are the objectives of the Energy Transition**, and have the selected policies been effective in meeting those objectives?
- **What unanticipated impacts have emerged**, and how are they being addressed?
- **What new business models can help electric utilities to adapt and grow** in a market with significant distributed generation penetration and declining revenue?
- **What tools are needed** to cost-effectively shift from a traditional fuel mix to a greater renewable resource mix without sacrificing reliability?
- **Who has developed a successful road map** for energy company transition?

Energy Practice

ScottMadden knows energy.

Since 1983, we have been energy consultants. We have served more than 300 clients, including 20 of the top 20 energy utilities. We have performed more than 2,400 projects across every energy utility business unit and every function. We have helped our clients develop strategies, improve operations, reorganize companies, and implement initiatives. Our broad and deep energy utility expertise is not theoretical—it is experience based.

Part of knowing where to go is understanding where you are. Before we begin any project, we listen to our client, understand their situation, and then personalize our work to help them succeed.

Our clients trust us with their most important challenges. They know that, chances are, we have seen and solved a problem similar to theirs. They know we will do what we say we will do, with integrity and tenacity, and we will produce real results.

The energy industry is our industry. We are personally invested in every project we take on.

For more information about our Energy Practice, contact:

Stuart Pearman
Partner and Energy Practice Leader
spearman@scottmadden.com
919-781-4191

Research

ScottMadden Research provides clients with valuable insight on developments, trends, and practices in energy and sustainability. Through its semi-annual *Energy Industry Update* and other occasional publications, our research team helps clients discern and analyze critical issues and inform their business decisions.

We also provide customized, project-based research and analytical support on matters of interest to our clients.

For more information about our research capabilities or content, see the *Insight* section of our web site or contact:

Brad Kitchens
President
sbkitchens@scottmadden.com
404-814-0020

Stuart Pearman
Partner and Energy Practice Leader
spearman@scottmadden.com
919-781-4191

Chris Vlahoplus
Partner and Clean Tech & Sustainability Practice Leader
chrisv@scottmadden.com
919-781-4191

Greg Litra
Partner and Energy, Clean Tech & Sustainability Research Lead
glitra@scottmadden.com
919-714-7613

scottmadden
MANAGEMENT CONSULTANTS