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Smart. Focused. Done Right.

The ScottMadden Energy Industry Update

Highlights of Recent Significant Events and Emerging Trends

Winter 2013–2014

Volume 14, Issue 1

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View from the Executive Suite

Executive Summary

Here Comes the Sun and I Say...It's Alright

A long-term decline in electricity consumption growth, advances in energy efficiency, monitoring, and control technologies, and the surprisingly rapid growth in rooftop solar and other renewable generation are challenging the traditional volume-based utility revenue model. Utilities, regulators, and other players in the power ecosystem are discussing the implications of this changing industry environment and the evolution of the utility business model.

Strategies: Dealing with Transition	❑ While various factors both support and impede merger activity, some companies are pursuing acquisitions as a way to generate earnings growth ❑ Many companies are looking at business and regulatory models suited to a low-growth, smart-grid-enabled, distributed-energy environment ❑ In Europe, Germany's energy transformation—moving quickly away from fossil and nuclear generation to renewables—provides some lessons for North American energy companies potentially undergoing a similar kind of transition (albeit a slower and less dramatic one)
Energy Supply: Structural Changes Ahead	❑ Natural gas prices remain low with abundant supply (for now), but costs still vary widely by shale play; producers are looking to export LNG to fetch higher prices and have secured approval for unrestricted export of up to 10% of output ❑ Meanwhile, traditional gas price basis relationships have been dampened or reversed, increasing the impetus to develop midstream infrastructure to redirect supply ❑ NERC's latest forecast shows some possibly acute power generation capacity shortfalls in a few regions as early as 2016, but a surplus in most regions for the balance of the decade
Distributed Energy: How to Play It?	❑ Distributed generation (particularly solar) is taking off, driven by policy and improving economics. Non-utility solar developers are succeeding, in some cases, with new approaches ❑ Utilities are examining the broader adoption and deployment of distributed generation, divining the implications for business model evolution, and engaging regulators in getting distribution rates and compensation for net-metered power equitable to all customers

Utility Mergers and Acquisitions – Key Drivers in Place...

"Since many utilities are completing or currently at the peak of their capital spending cycle, they will look to diversify their business and attempt to identify new avenues of growth to increase their regulated asset base and earnings."

—Moody's Investors Service

"Because the debt markets are wide open and available at all levels of credit quality, buyers can build a capital structure to acquire assets for cash....Now in 2013, the buy side is well capitalized again, and the market is wide open, with buyers and sellers of everything—midstream, coal, gas, renewables, you name it. In my entire career, I've never seen more things for sale, of all types, in the U.S. power and utility asset space."

—Frank Napolitano, RBC Capital Markets

"As power prices cannot solely be our growth vehicle given the marketplace that we face, one of the things that we look at is are there combinations that will allow us to take cost out of combined companies and to build industrially logical synergies. Through consolidation and through activities of acquisitions and the like, we can do that."

—William von Hoene, Exelon Corp.

Various Factors Are Affecting the Utility M&A Outlook

Area	Supporting and Impeding Factors
Finance	⇧ Continued historically low interest rates ⇧ Improved capital market access ⇧ Interest of financial players in utility yields as alternative to current low-yield environment elsewhere ⇩ Increased valuations over the past couple of years may eventually make deals too expensive ⇩ Expected rate increases (longer term), which could slow M&A due to regulatory uncertainty
Regulation	⇧ Declining allowed returns on equity encouraging quest for returns ⇩ Higher regulatory scrutiny of deals over social issues: headquarters, job reductions, officer succession ⇩ Increasing demand for rate concessions or resistance to rate increases
Strategy	⇧ Ongoing interest in diversifying risk, especially geographically ⇧ Perceived scale economies (bigger balance sheets) for anticipated capital expenditure needs ⇧ Demand slowdown, which encourages interest in properties in high load-growth areas ⇧ Smaller companies as possible targets, especially for adjacent "tuck-in" acquisitions ⇩ Many companies already in the midst of or the backend of the investment cycle, muting need for balance sheet scale

Sources: Moody's Investors Service; SNL Financial; Public Utilities Fortnightly; industry news; ScottMadden analysis

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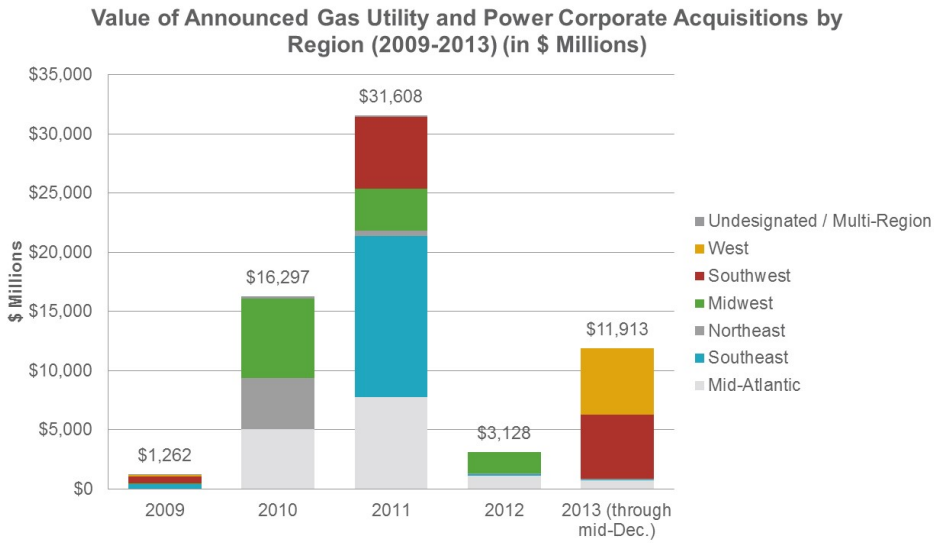
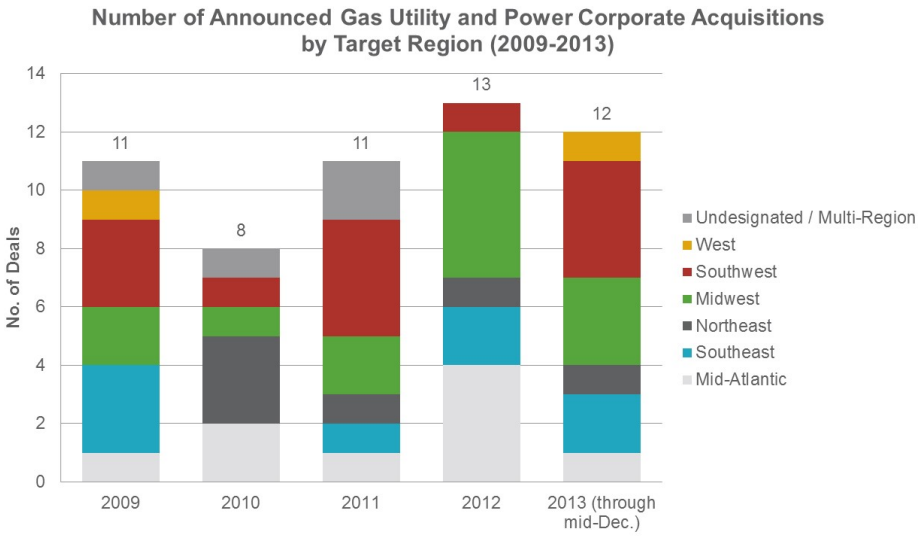
...Are the Opportunities?

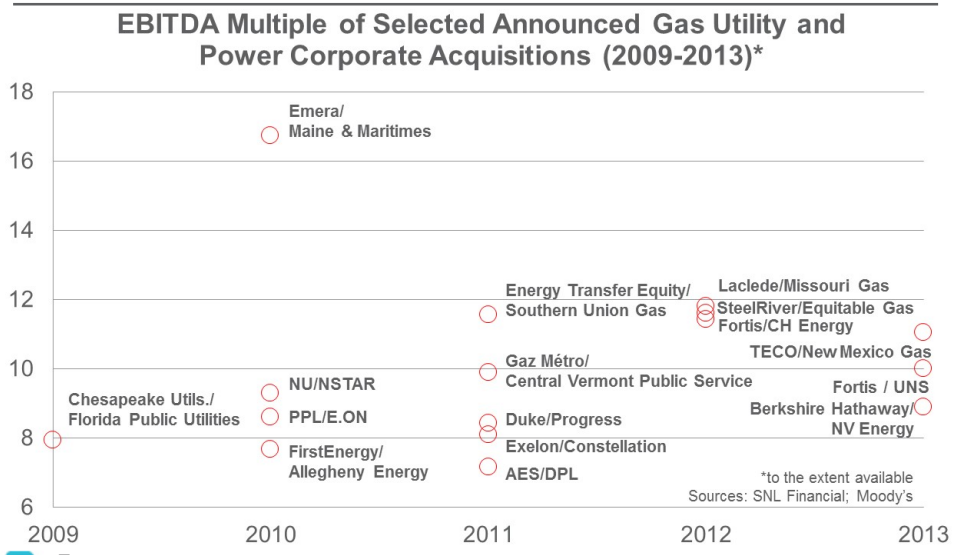
2010 and 2011 Remain Memorable for Large Deals



Announced Deals Largely for Midwest- and Southwest-Based Targets



Valuation Multiples Have Settled Down a Bit



Some more measured outlooks for M&A:

"I suspect that over the next several years, rate case activity will be fairly active, and that might put a dent in the level of M&A activity....For companies whose valuation is dependent on power prices, their stocks are being challenged, and they don't have a strong currency right now to consider acquisitions."

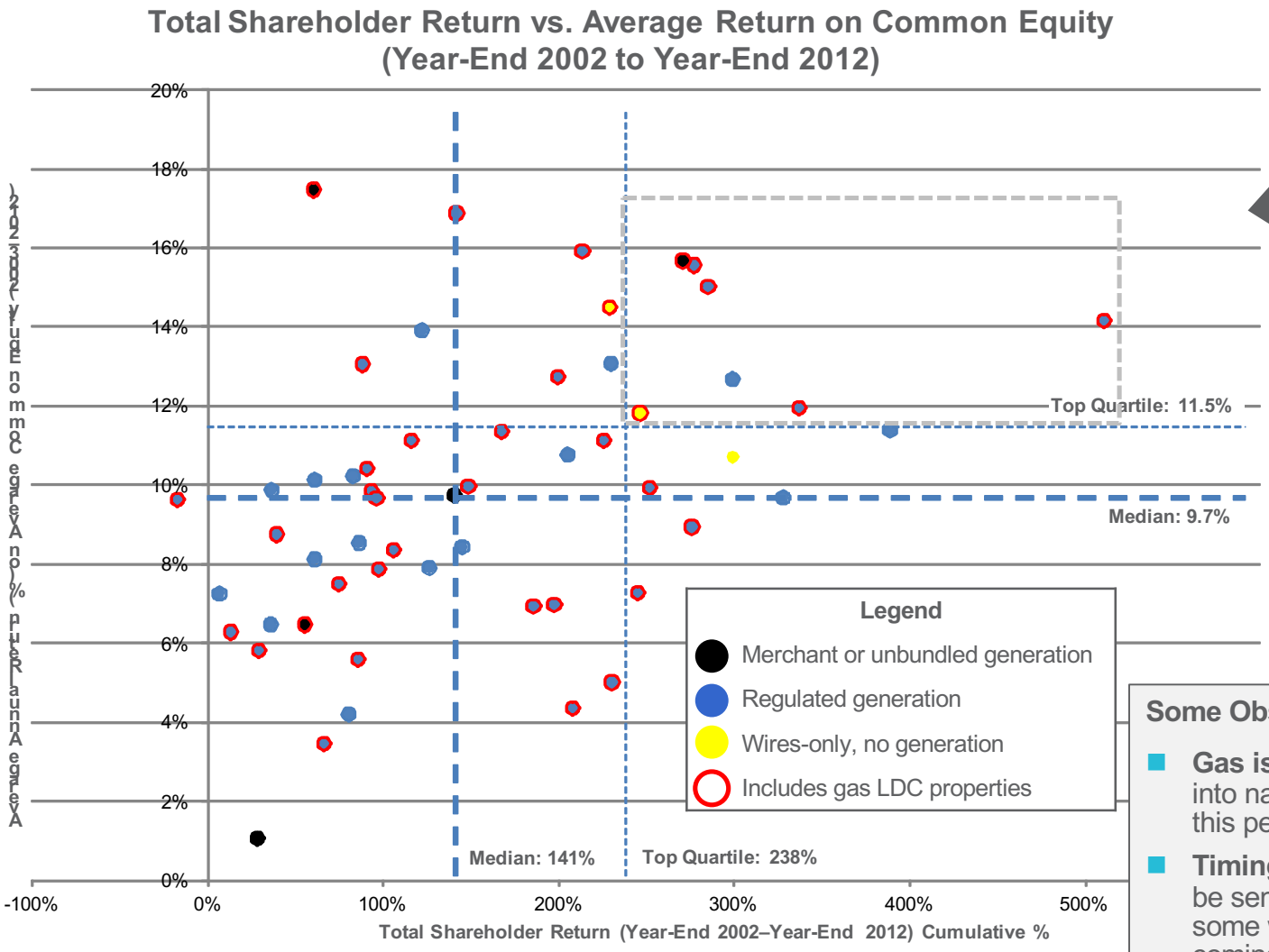
—Peter Kind, Energy Infrastructure Advocates

"It [M&A activity] varies from one jurisdiction to another, but companies tend to view themselves as fully valued in the current stock market. Nobody wants to buy at the top of the market. I think it will get harder for companies to merge. That creates an opportunity for private capital to come in. It won't be a panacea, but it can provide capital in partnering situations."

—Matt LeBlanc, JP Morgan Chase

Sources: Moody's Investors Service; SNL Financial; Public Utilities Fortnightly; industry news; ScottMadden analysis

Total Shareholder Return and Average Equity Returns – Themes and Observations



ScottMadden looked at financial performance of 61 power-focused U.S.-listed companies. Among top quartile of both measures:

- ❑ All had power transmission & distribution operations
- ❑ Most had gas LDC operations
- ❑ Most had regulated generation, although almost half had some merchant generation
- ❑ Firm size was split among total asset quartiles, but most were nearly $10 billion in assets or greater
- ❑ The companies' operations were focused in a mix of regions

Some Observations

- **Gas is good:** Diversification by electrics into natural gas is good, at least during this period
- **Timing is everything:** This analysis can be sensitive to periods selected—e.g., for some who had merchant exposure, coming from the valuation "depths" helped improve shareholder return figures greatly
- **Big enough:** Being huge doesn't make a difference, but being "big enough" appears to help

Notes: Total shareholder return was calculated by taking one share at Dec. 31, 2002 stock values and tracing its value through Dec. 31, 2012, assuming dividends are reinvested in shares (assumes partial shares can be purchased) on ex-dividend date at closing price on that date. Return on average common equity (ROACE) is an arithmetic average of annual ROACE during the years 2003 through 2012. Where stock listing began during the relevant period (emerging from bankruptcy or going public), returns are calculated from that first listing date. Four merchant entities, all outliers in one metric or the other, are not shown in the chart above.

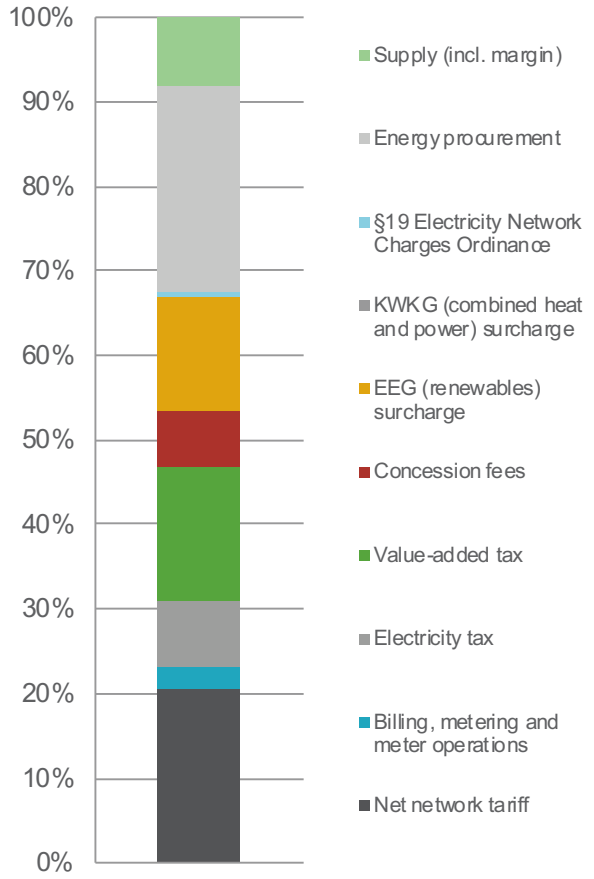
Sources: SNL Financial; ScottMadden analysis

Germany's Energy Transition – Lessons for North America?

- **Energiewende (Energy Change) Plan:** Germany's federal government plans to reduce greenhouse gas (GHG) emissions by transitioning Germany to 35% renewable energy by 2020 (50% by 2030), improving energy efficiency, and expanding the grid. Originally, nuclear plant life extension was part of the plan, but after Fukushima Daiichi, the German government slated the entire German nuclear fleet for retirement by 2022
- **Surcharges Galore:** Renewable energy must be purchased by utilities at government-set Feed-in-Tariff (FIT) rates, which are significantly higher than wholesale energy costs. FIT costs in excess of wholesale are recovered in rates through electricity bill surcharges. These surcharges have been increasing as an influx of renewables combined with flat energy usage is driving down wholesale energy prices
- **Major Grid Investment Coming:** Integrating this increased renewable supply is also driving the need for significant grid investment. In some cases (e.g., offshore wind), resource development is outpacing transmission interconnection and grid capabilities. Germany's grid regulator estimates that 10-year T&D investment will be between €47 billion and €62 billion (about U.S. $60 to $80 billion)
- **Coal Still King?:** Ironically, while mid-merit gas-fired plants are ideal for GHG reduction and grid support, German gas plants generally have low capacity factors: many gas combined-cycle units average only 30% vs. low 40% range in the United States. Given the low European Union (EU) carbon market credit prices, German coal plants fueled by German lignite and imported coal (including from the United States) have kept a relatively steady share of the energy market
- **Sticker Shock:** German households paid nearly 26¢/kWh versus just under 19¢ for the EU. This difference is due in large part to surcharges, which are higher than other EU countries and are projected to increase by 15% to 20%
- **Business Model Fallout:** RWE, a major German utility, is planning to transition its business model from transmitting and selling electricity to becoming a project enabler, operator, and system integrator of renewables. Called "Prosumer," some say the strategy reads more like a consumer electronics company than a legacy utility

Taxes, Fees, and Surcharges Add Nearly 80% to the German Utility Bill

Breakdown of the Electricity Price for German Household Customers (2012)



Source: German Bundesnetzagentur

Sources: International Energy Agency; German Federal Ministry of Economics and Technology; German Bundesnetzagentur (Federal Network Agency); Renewable Energy Industry Institute (Münster); European Union; industry news; German Energy Blog

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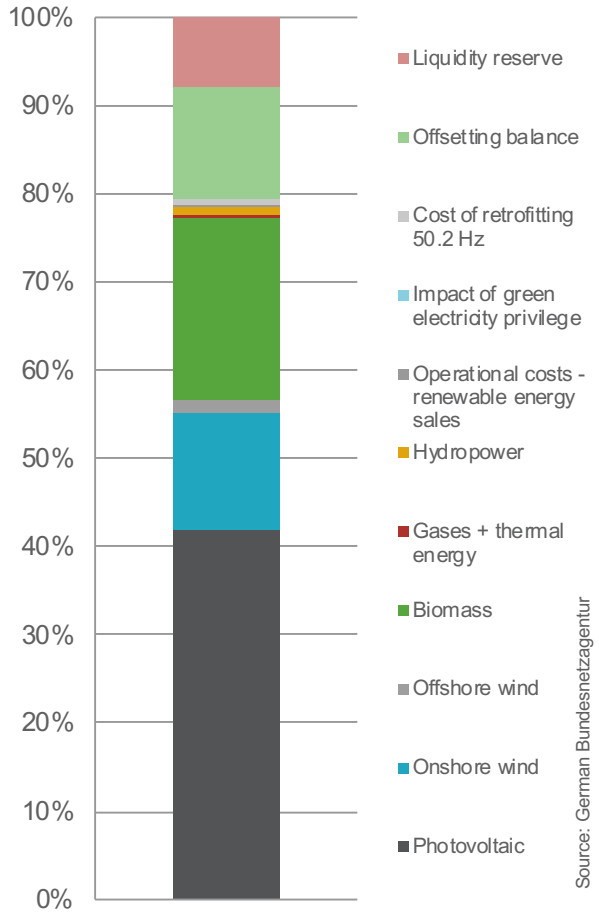
Germany's Energy Transition – Lessons for North America? (Cont'd)

Payments for Solar PV Comprise a Significant Portion of Renewable Surcharges

Breakdown of the Renewables (EEG) Surcharge Costs (2013)



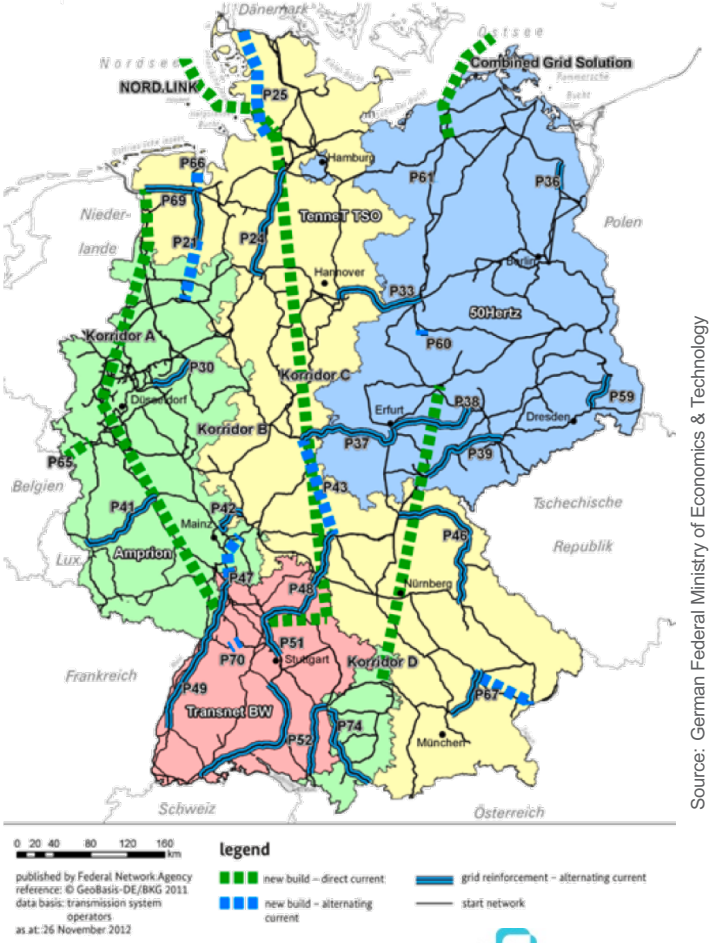
Sources: International Energy Agency; German Federal Ministry of Economics and Technology; German Bundesnetzagentur (Federal Network Agency); Renewable Energy Industry Institute (Münster); European Union

Germany's Lessons for North America's Energy Transition

- Significant investment in the grid will be needed, possibly leading to grid consolidation and federal/state/regional collaboration
- Beware of unintended consequences
- When theoretical costs become real (societal benefit charges, renewable acquisition costs, etc.), even green proponents may object to rate increases
- Depending upon incentive structure, renewable capacity can be added perhaps more quickly than expected. Germany added 7.6 GWs of solar generation in 2012 alone
- As experienced by Germany's large electric utilities, transformation, and particularly lower consumption, prolific distributed solar PV penetration, and lower wholesale power prices can cause significant financial distress

Along with Major Supply Changes Comes Significant Investment in Grid Development

Grid Development Plan as Approved by Germany's Federal Network Agency



Source: German Federal Ministry of Economics & Technology

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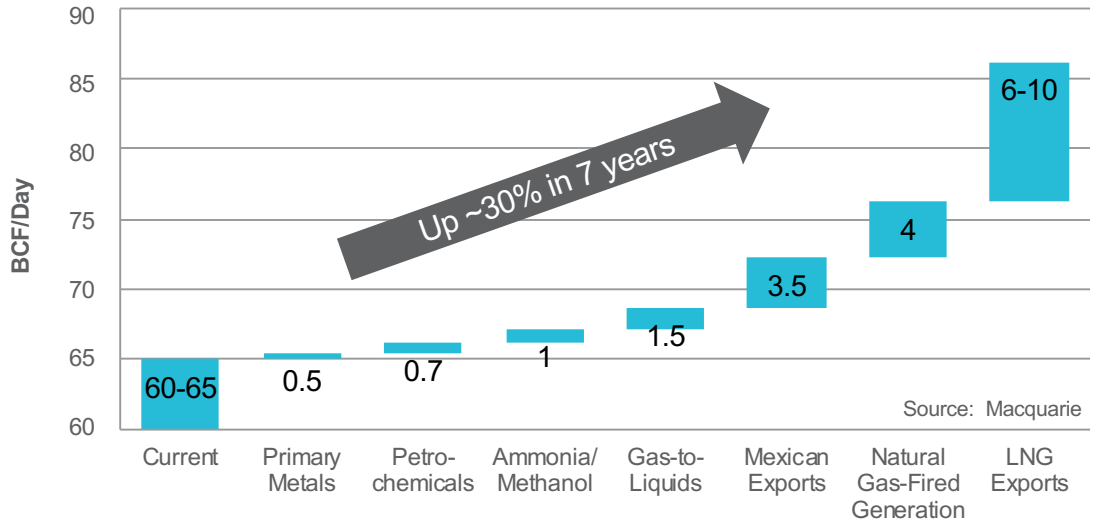
Energy Supply, Demand, and Markets

Natural Gas Prices: Making a Turn in 2015?

- With the advance of shale gas, prices in the natural gas market have shifted from demand-clearing to supply-clearing
- However, many expect a step change in 2015–2016 as demand from power generation and LNG exports picks up
  - Credit Suisse estimates base case LNG exports of 8.5 BCF/day
  - Macquarie sees cumulative natural gas demand growth of 18 BCF/day by year-end 2018 over current 65 BCF/day, more than 25% annually
- Continued strong demand is expected from industrial customers including petrochemicals
- Shifts in basis differentials continue as well
  - Observers say that Henry Hub may be waning as the benchmark for Eastern U.S. gas prices for power generation and end use
  - Increasingly, supply/demand dynamics are reversing, with Northeast U.S. supply and Gulf Coast demand
- Production growth is expected to expand in 2014 despite still-low prices

Potential U.S. Gas Demand Growth through 2020 (BCF/Day)



Various Forecasts Show Still Low Gas Prices for Years, but Demand May Push Them up after 2014

Projected Natural Gas Price ($/MMBTU)	2013	2014	2015	2016	2017	2018
BMO		3.85	4.00			
Deutsche Bank	3.71	4.25	4.50	4.75		
Morgan Stanley	3.65	3.50	4.00	4.25	4.70	
Credit Suisse	3.70	3.90	4.20	4.40	4.50	
Macquarie	3.69	3.64	4.18	4.66	5.00	5.25

Sources: Investment analyst reports; Energy Intelligence *Natural Gas Week;* SNL Financial; Industry News

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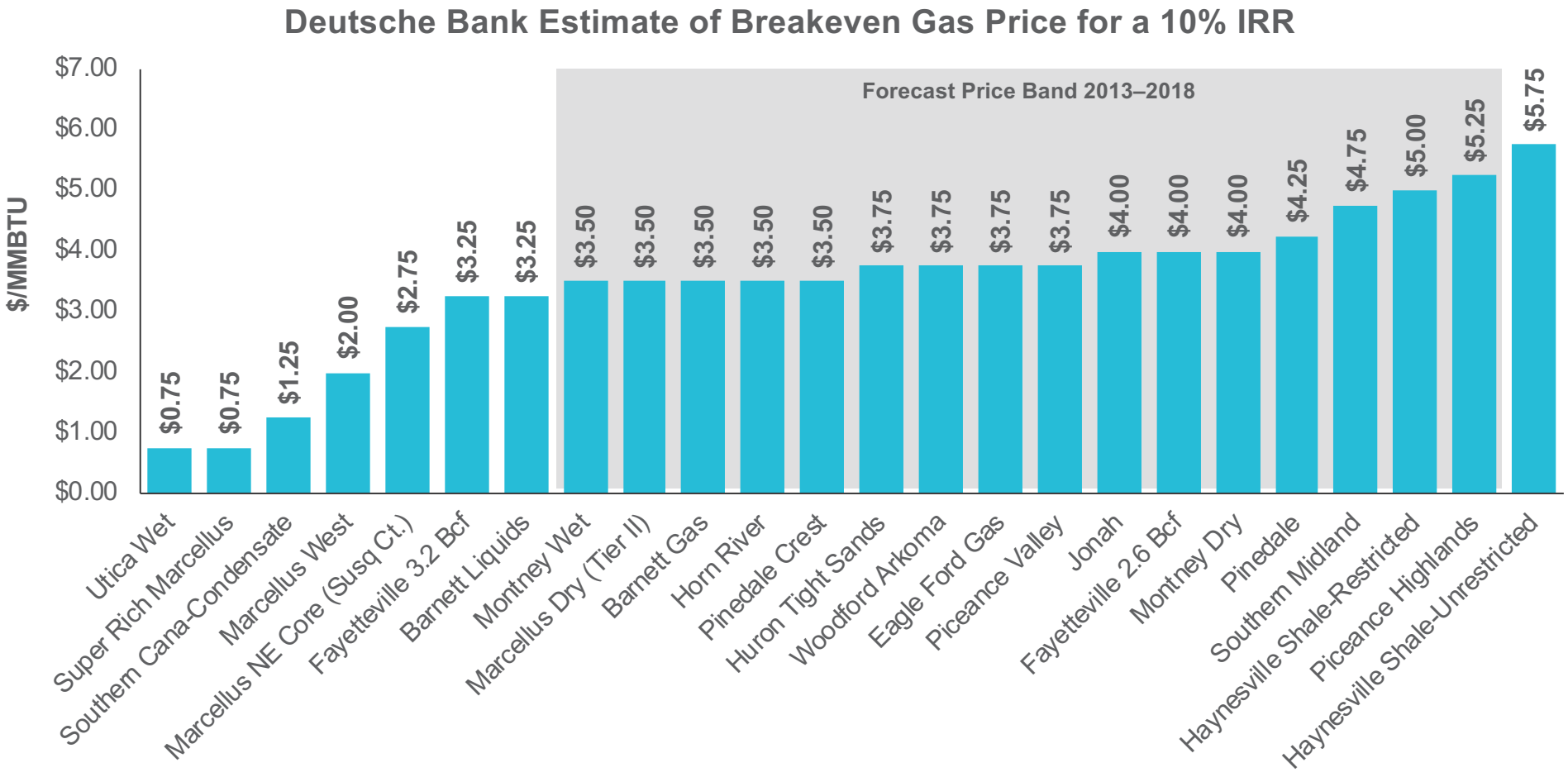
Natural Gas Prices: Making a Turn in 2015? (Cont'd)

One View of Supply Economics: Wet Plays Continue to Keep Breakeven Prices Low, but Large Variation in Economics of Various Plays



Source: Deutsche Bank
Note: Half-cycle return not including leasehold acquisition expense or allocated costs. Assumes natural gas liquids prices at 40% of West Texas Intermediate crude, regional natural gas price differential, and company disclosed well drilling and completion costs and recoveries.

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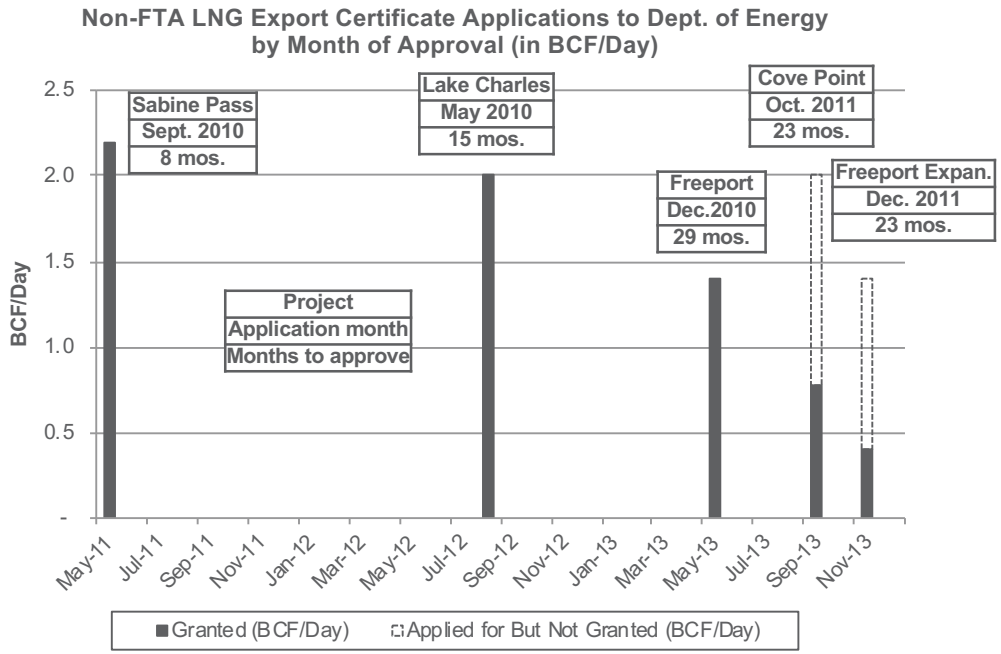
LNG Exports:
DOE Continues Measured Approach to Authorizations

"They're basically making the rules up as they go along. We're spending $4 billion per train, if you can get an extra five or ten or 15% out of the train you should be able to sell [the gas] after making that kind of capital commitment."

— *Freeport LNG CEO Michael Smith, reacting to partial authorization of expanded LNG exports to non-Free Trade Agreement countries*

Approvals Picking up, but Lead Times Remain Long and a Recent Trend toward Partial Authorizations



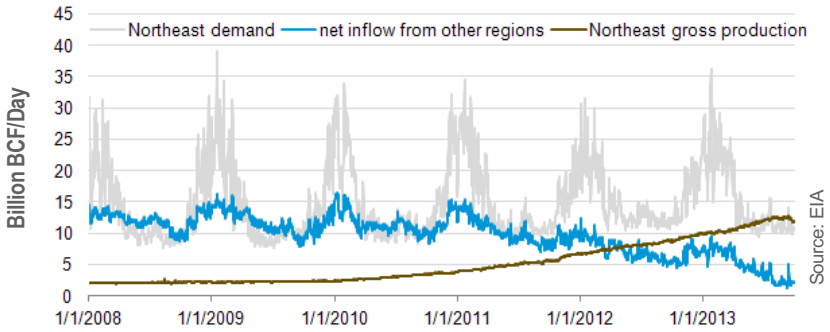
Sources: Dept. of Energy; dailyfinance.com (citing Goldman Sachs); Platts; LNG export applications

- **Plodding on:** The DOE continues to process methodically LNG export applications to non-Free Trade Agreement (FTA) countries. About 6.77 BCF/day in such non-FTE export authorizations have been approved through early December 2013
- **"Plan B":** Attention is increasingly being given to FTA countries that are interested in U.S. LNG supplies (e.g., South Korea, Panama), either as a first resort or where applied-for, non-FTA volumes have not been approved. For example, Freeport LNG expects to use excess capacity to export to SK E&S, a South Korean utility
- **Pause and reassess:** In its November 2013 partial authorization of Freeport LNG's proposed export expansion, the DOE observed that cumulative approvals to date only moderately exceed the 6 BCF/day volume evaluated in a "low-export" volume scenario in its analyses of potential impacts of exports
  - Some expect the DOE to temporarily hold off new authorizations pending updated gas resource data and effects on domestic supply and demand fundamentals, but may approve one more application (Cameron LNG, 1.7 BCF/day, filed Dec. 2011) before that hiatus
  - Goldman Sachs has said that the United States can sustain 7.7 BCF/day in LNG exports without significantly affecting natural gas prices. However, only a couple more authorizations will achieve that anticipated level
  - Where a project is in the application queue may matter going forward: DOE says it will "continue to assess the cumulative impacts of each succeeding request"

Gas Infrastructure:
Changes in Latitude, Changes in Attitude

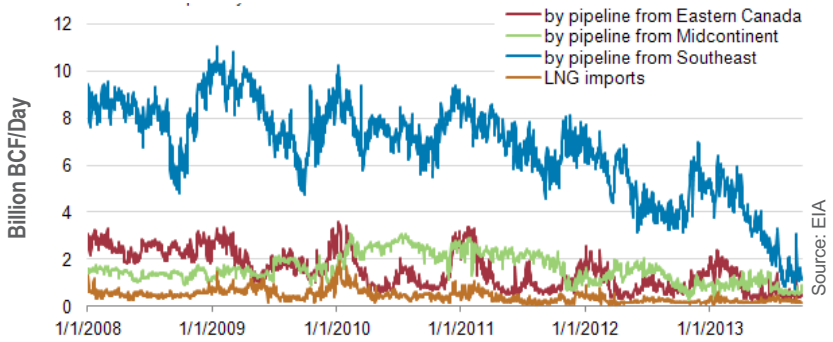
Northeastern Gas Demand Met with "Local" Supply

Northeast U.S. Natural Gas Demand, Production, and Net Inflows



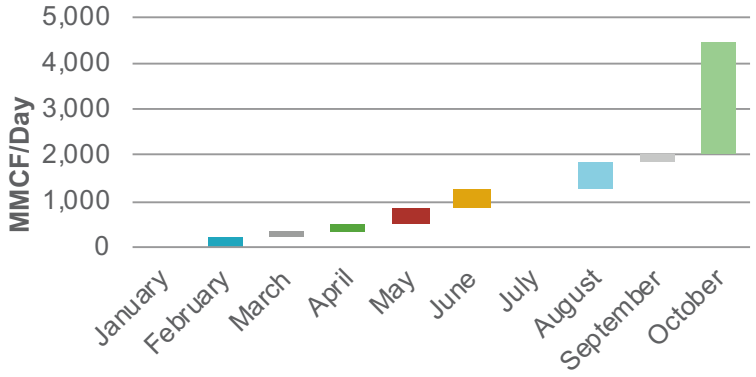
...Significantly Impacting Gulf, Southeastern Sources

Northeast U.S. Natural Gas Net Inflows by Source



About 4.5 BCF/Day of New Gas Pipeline Placed in Service in First 10 Months of 2013

U.S. Pipeline Capacity Placed in Service by Month (Jan. 2013–Oct. 2013)



- Pipeline development continues as oil and gas companies establish routes to market for both dry gas and natural gas liquids
- Increasingly, Marcellus production is "crowding out" traditional Gulf of Mexico gas production, and Canadian production to a lesser extent, and hence affecting pipeline utilization from those regions
- As more U.S. LNG export terminals become certificated and constructed, this trend of reversal of pipeline flows from north to south may accelerate. In addition, pipeline reconfiguration can move Marcellus and Utica gas, as well as Midcontinent production, to markets like Florida
- Some are raising safety issues for resolution as pipeline flows are reversed or pipelines are repurposed for more liquids that have historically brought dry gas to market in certain patterns

Sources: EIA; Dept. of Energy; Energy Intelligence *Natural Gas Week*; *Pipeline & Gas Journal*; Platts; industry news

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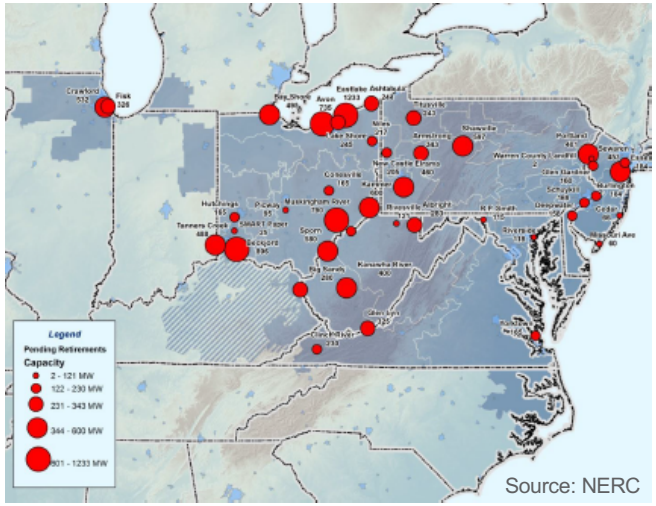
Coal-Fired Generation Retirements: How Close to the Edge Are We Getting?

About 9.7 GW of Announced Coal Plant Retirements in PJM from 2014 to 2023 (More than 5% of Existing PJM Fleet)

PJM Pending Retirements (Announced as of Fall 2013)



Source: NERC

"The summer of 2016 is going to have some big challenges for several parts of the country. Texas, Boston, Southern California, we have to stay on our toes here."
—FERC Commissioner Philip Moeller

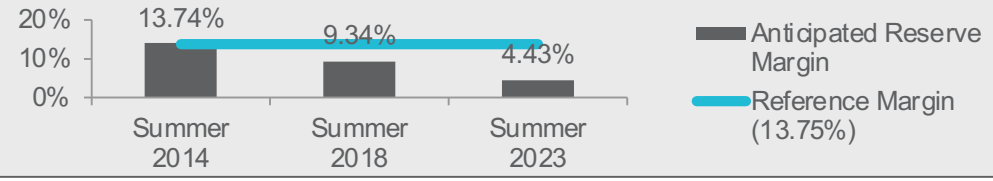
News from the Front	❑ After retirement announcements in 2012 of ~8.8 GWs of coal-fired generation, about 5.8 GWs in 2013 announcements are expected ❑ NERC estimates 63 GW of 2014–2023 retirements (a fifth of all coal-fired plants) ❑ MISO says ~8 GW of coal is on the fence
Increasing Activism Is a Factor	❑ Buoyed by a sizeable contribution by New York City billionaire and former mayor Bloomberg, the Sierra Club is spending significant amounts on local mobilization under its "Beyond Coal" campaign including litigation vs. planned projects and pressures on PUCs
A Fraction Will Be Repowered; Some New Gas Build Is Occurring	❑ About 1.7 GWs of coal capacity were converted to burn other fuels from 2008 to 2012 ❑ SNL estimates that ~11 GWs are being considered for conversion ❑ Natural gas was 52% of 2013 installed capacity (6.8 GWs), solar and wind was 30%, and coal was just 12% of total installations (total installed capacity through November 2013). This compares to the same period in 2012, where natural gas was 33% of new capacity (6.6 GWs), solar and wind 46%, and coal 16%
Retirement Remorse? Possible Trouble Ahead in Some Regions	❑ A recent white paper noted that more than 3 GWs of non-price generator retirement requests were made for the next forward capacity auction in New England, about three times what has been seen in seven prior auctions. Retirement of large units (e.g., Brayton Point's 1,525 MWs) in a smaller market can quickly take it from oversupply to undersupply ❑ Another recent study noted that coal retirements could increase PJM East peak energy prices by $9 to $11 per MWh during peak hours (about half that during off-peak hours) ❑ NERC projects shortfalls in ERCOT (2014), MISO (2015), and Ontario sub-region (2018) ❑ Generators complain that market structures and prices are not enough to incent new build today. CCGT lead times are three to five years.

Sources: ICF International White Paper, "ISO-NE's Turnaround in Supply/Demand Balance and Capacity Price Implications" (Nov. 20, 2013); Brattle Group White Paper, "Coal Plant Retirements: Feedback Effects on Wholesale Electricity Prices" (Nov. 30, 2013); SNL Financial; NERC, 2013 Long-Term Reliability Assessment (Dec. 2013); FERC Office of Energy Infrastructure; industry news

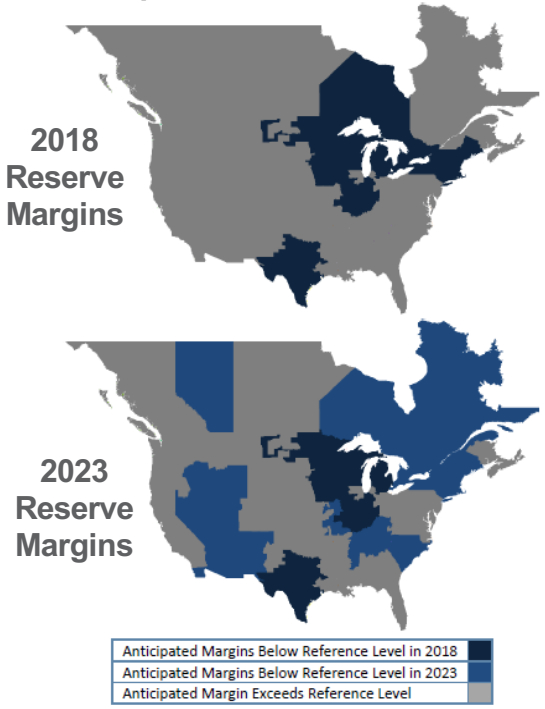
Out of Time? NERC's Latest Reliability Assessment

Texas and MISO Midwest Are Shorter Sooner, and Maybe Very Short	❑ ERCOT's reserve margins fall slightly below recommended levels in 2014 and remain dramatically short over NERC's 10-year forecast horizon ❑ MISO Midwest reserve margins begin to fall short in 2015, as plant retirements and environmental retrofits kick in. By 2018, projected reserve margins range from 5.5% to 21.6%, vs. the 14.2% target, depending on how much prospective and potential capacity actually gets built
Integrating Wind, Solar into Grid Isn't Easy	❑ With more than 46 GWs of wind and solar capacity additions projected nationwide, traditional system planning and operational models must be updated
Coordinating Coal Retirements	❑ More than 85 GWs of fossil generation are expected to be retired through 2023, requiring another look at reliability impacts
Shifting to Gas Generation Isn't Just Flipping a Switch	❑ With 28 GWs of gas-fired capacity planned (and another 108 GWs conceptual*), planning and coordination is required to mitigate gas supply and transportation issues in areas rapidly integrating this type of generation
DSM Is a Two-Edged Sword	❑ Demand side management avoids incremental capacity needs, but creates uncertainties for system planners—both in performance and availability
Are Nukes Next?	❑ About 4.2 GWs of nuclear capacity have retired or announced decommissioning. With other plants aging, facing relicensing, and/or being economically challenged, the industry must study the potential reliability and operating impacts of nuclear plant closures

Texas Summer Reserve Margins Are 1/3 of Desired in 10 Years



Reserve Margins Fall Short in Some Regions in Five Years, More Widespread Shortfalls in 10 Years



Notes: *Conceptual resources include those that have been identified or announced on a resource planning basis through one or more of the following: (1) corporate announcement; (2) in the early stages of an approval process; (3) included in a generator interconnection (or other) queue or study; (4) "placeholder" generation for use in modeling.

Sources: NERC, 2014 Long-Term Resource Assessment (Dec. 2013); ScottMadden analysis

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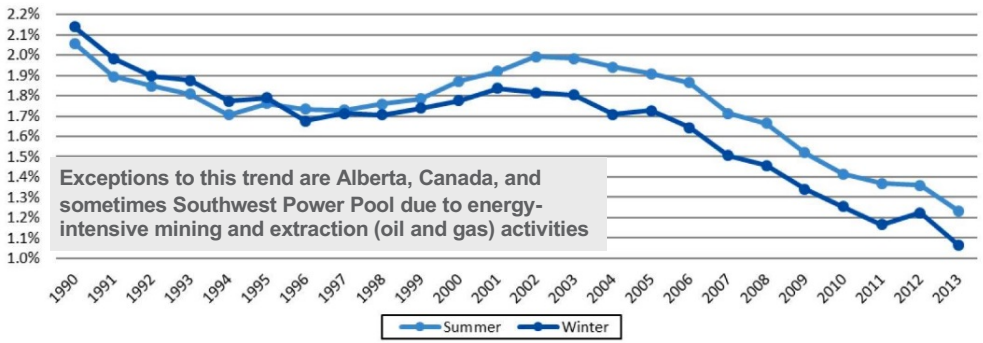
Out of Time? NERC's Latest Reliability Assessment (Cont'd)

In Face of Emerging Reserve Margin Shortfalls, A Long-Term Trend toward Slower Growth in Peak Demand

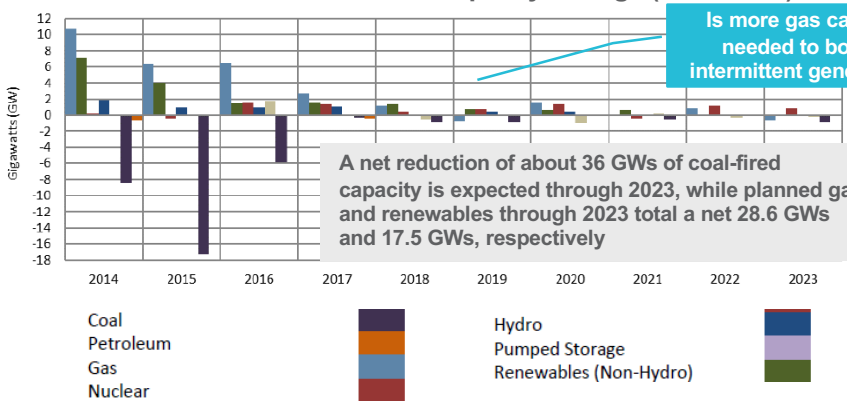
NERC-Wide 10-Year Compound Annual Growth Rate in On-Peak Demand



Exceptions to this trend are Alberta, Canada, and sometimes Southwest Power Pool due to energy-intensive mining and extraction (oil and gas) activities

Significant Coal Plant Retirements in 2014–2016, with Capacity Offset by Other Planned Plants

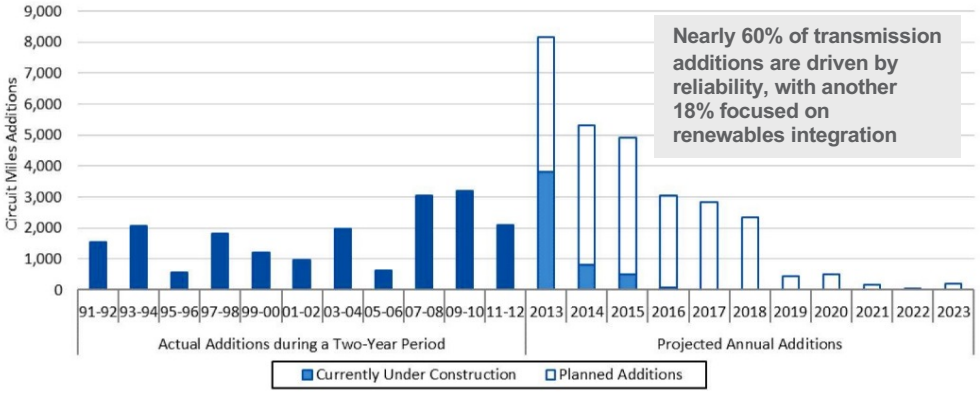
NERC-Wide Annual Planned* Capacity Change (2014–2023)



Is more gas capacity needed to bolster intermittent generation?

A net reduction of about 36 GWs of coal-fired capacity is expected through 2023, while planned gas and renewables through 2023 total a net 28.6 GWs and 17.5 GWs, respectively

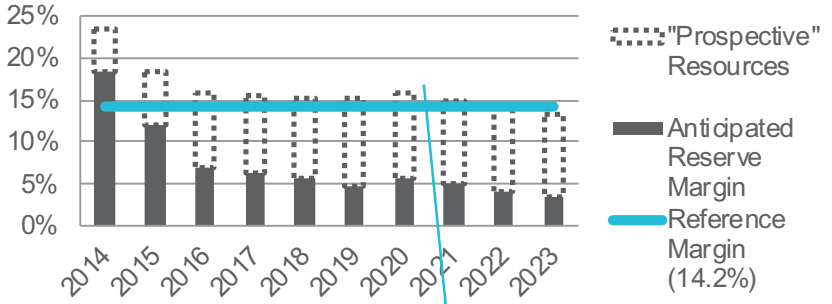
Transmission Additions Can Aid Reliability, but Relatively Few Miles from 2014 and beyond Are Under Construction



Nearly 60% of transmission additions are driven by reliability, with another 18% focused on renewables integration

Coal Plant Retrofitting Outages and Retirements Hit Home in the Midwest Beginning in 2015

Midcontinent ISO Projected Summer Reserve Margins



Filling this gap depends upon prospective* generation (NB: a gas combined-cycle unit takes roughly three years from plan to operation), outage coordination, and adequate gas supplies and access. Inclusion of Entergy generation assets in the South into the MISO market may provide some relief.

Notes: *Prospective resources include anticipated resources (effectively firm capacity) plus those that may be available to deliver during peak demand but may be curtailed or interrupted including: (1) resources with non-firm transmission; (2) curtailable energy-only resources; (3) mothballed generation; or (4) generation constrained for other reasons and expected non-firm transactions.

Sources: NERC, 2014 Long-Term Resource Assessment (Dec. 2013); ScottMadden analysis

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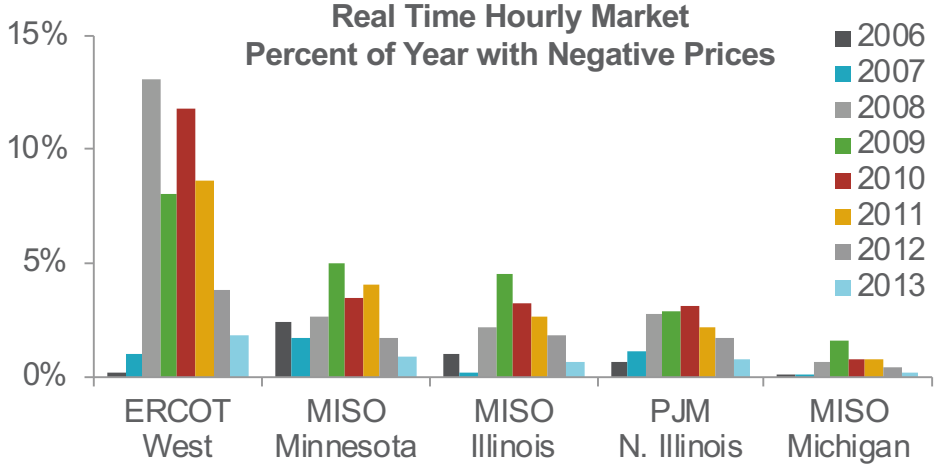
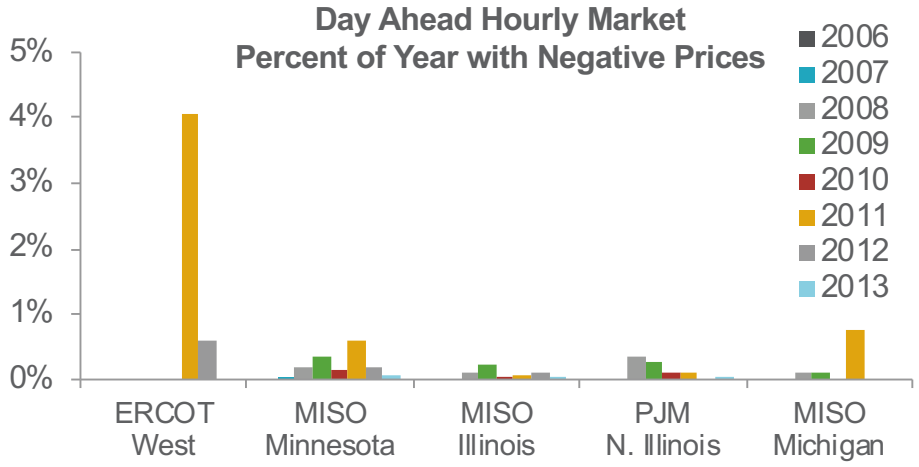
Impact of Renewables: Spotlight on Wind and Negative Prices

- **Negative Real Time Hourly Prices:** Several stakeholders have argued the expansion of wind capacity increased the frequency of negative prices in real time hourly markets; thereby threatening the financial viability of existing baseload generation. During periods of significant wind and low demand, wind facilities can profitably operate as long as negative prices are offset by the value of the federal production tax credit
- **Declining Frequency of Negative Prices:** After peaking in the 2009–2010 timeframe, the frequency of negative real time hourly prices declined with changes to market structures and the addition of transmission connecting wind resources and load centers
- **Baseload Generators:** These generators typically sell power through bilateral contracts or day-ahead markets. Consequently, their financial viability is more closely tied to day-ahead hourly prices which rarely go negative; they are subject to real-time hourly prices when output varies from generation commitment. But markets are related; persistent negative real time prices can have a ripple effect on other markets

"Federal incentives for renewable energy… have distorted the competitive wholesale market in ERCOT.…With the federal production tax credit, wind resources can actually bid negative prices into the market and still make a profit. We've seen a number of days with a negative clearing price in the west zone of ERCOT where most of the wind resources are installed….The market distortions caused by renewable energy incentives are one of the primary causes I believe of our current resource adequacy issue… [T]his distortion makes it difficult for other generation types to recover their cost and discourages investment in new generation."

— *Public Utilities Commission of Texas Chairman Donna Nelson testifying before the Texas Senate Natural Resources Subcommittee (Sept. 2012)*





Sources: Ventyx; The NorthBridge Group; ScottMadden research

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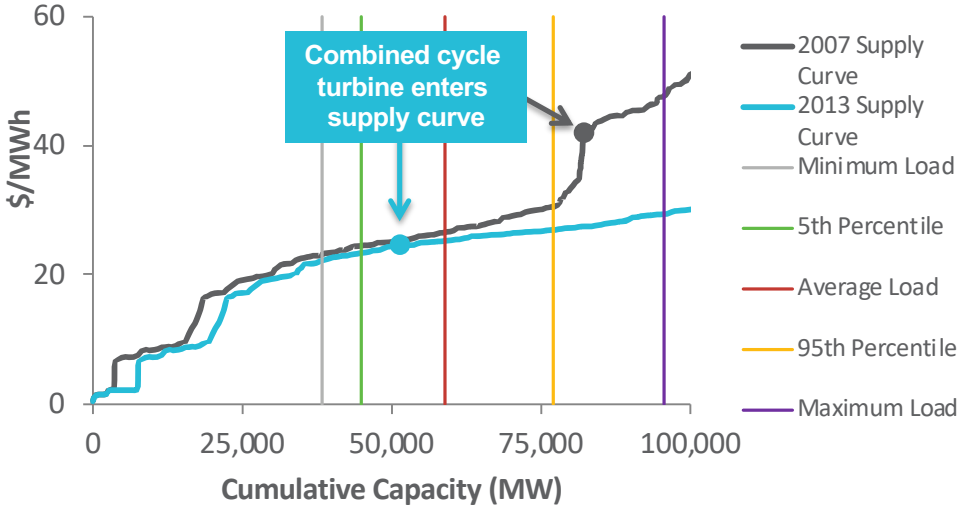
Baseload Generation's Primary Challenges: Wind, Yes; Natural Gas, Definitely

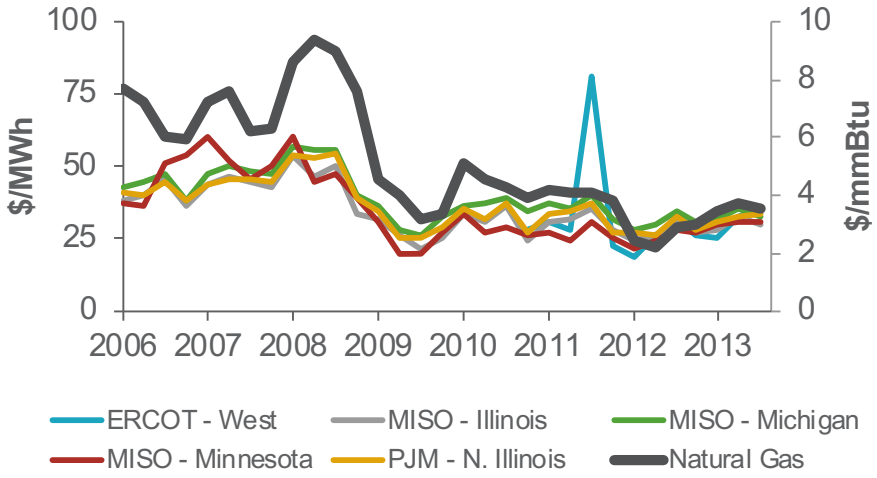
Low Natural Gas Prices Reduce Day Ahead Hourly Prices

- Historically, the difference between marginal operating costs of generation technologies produced a step-like supply curve
- The shale gas revolution has decreased the marginal cost of natural gas plants, thereby moving natural gas down the supply curve and eliminating the well-defined step in marginal cost between coal and natural gas plants. The chart below left shows natural gas transitioning from a peaking resource to an intermediate resource in the Midcontinent ISO from 2007 to 2013. The impact is a flattening of the supply curve as the steep transition from coal to natural gas is removed
- The most serious threat to the financial viability of baseload generators is the sharp decline in day-ahead hourly prices as a flatter supply curve reduces the value of peak periods, which were historically highly profitable for baseload generators
- While not the primary driver, the expanding wind fleet places additional downward pressure on baseload generators by further contributing to lower day-ahead hourly prices

Midcontinent ISO 2007 and 2013Supply Curves and 2013 Load at Various Durations



Average Day Ahead Hourly Price by Quarter



Notes: MISO load data reflects 2013 conditions; natural gas data reflects Henry Hub spot prices
Sources: Ventyx;; EIA; ScottMadden research

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Managing the Energy and Utility Enterprise

Long-Term Drivers for Distributed Generation

Long-Term Outlook and Drivers for Distributed Generation (DG)

Driver	2013	2023	Notes
Renewable Portfolio Standards	Favorable	Driver will hinder or slow growth	■ Early compliance and slow growth in retail sales will limit impact of renewable portfolio standards in the future
Financial Incentives	Favorable	Driver will hinder or slow growth	■ Federal investment tax credit (ITC) for solar will decrease from 30% to 10% in 2017; ITC for geothermal, small wind and some other technologies set to expire ■ State and utility incentives are declining as technology costs continue to decline
Installed Costs	Neutral drivers	Favorable drivers	■ Installed costs continue to decline as the solar industry reduces soft costs (e.g., permitting, customer acquisition, etc.)
Net Metering	Favorable	Neutral drivers	■ Net-metering policies are being challenged as concerns over cross-subsidization between customers continue to grow
Interconnection	Favorable	Favorable	■ Interconnection policies are well established and not expected to change dramatically
Retail Electricity Prices	Driver will hinder or slow growth	Favorable drivers	■ Retail electricity prices continue to rise, creating a favorable environment for DG alternatives
Utility Knowledge	Neutral drivers	Favorable drivers	■ Utilities continue to gain operational experience integrating and managing DG resources on the grid
Customer Preference	Neutral drivers	Favorable drivers	■ Customers continue to express interest in programs or options that offer access to renewables at reasonable premiums or discounts to retail electricity rates
Smart Grid/ Microgrids	Driver will hinder or slow growth	Neutral drivers	■ Advancements in distribution automation and a growing interest in microgrids will facilitate the implementation of DG

Favorable drivers Neutral drivers Driver will hinder or slow growth

The U.S. market has experienced strong growth in DG, dominated mostly by solar. The long-term outlook for DG is positive, and the market will likely shift from policy-driven to economics-driven growth, which will lead utilities to consider how to interact with these new resources

- Using net-metered generation as a proxy for the broader DG market, data show that more than 92% of net-metered generation capacity is solar PV
- Distributed solar capacity increased 83% from 2011 to Q2 2013; nearly 75% of total capacity exists in California, New Jersey, Arizona, Massachusetts, and Hawaii
- Solar installed costs have fallen and continue to fall. Additionally, new business models, including third-party sales and emergence of community solar are accelerating the deployment of DG
- RPS, financial incentives, and net metering will likely fall off by 2023 as a future driver, while electricity prices, utility knowledge, customer preferences, and the growth of smart grids and microgrids may spur future development of DG
- The recent spike in DG raises operational, business, and ratemaking challenges for utilities. However, for solar companies, there will be opportunities to partner with utilities as this market continues to grow

Sources: EIA, GTM Research, Database of State Incentives for Renewable Energy, EEI

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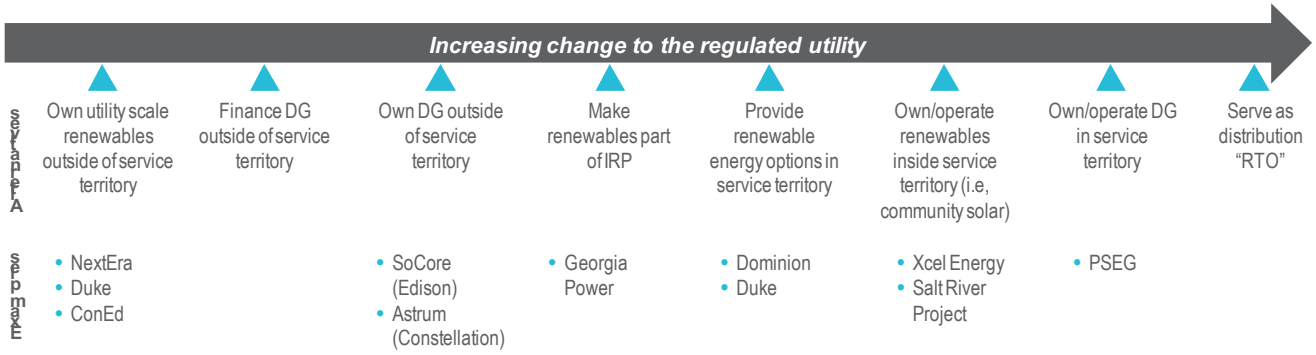
Utility Companies Develop Different Approaches to Changing Environment as Distributed Generation Penetration Increases

Many utilities are beginning to take strategic actions as penetration of distributed generation (DG), especially solar PV, increases. Options may involve adjustments, sometimes significant, in the utility's business model and regulatory construct.



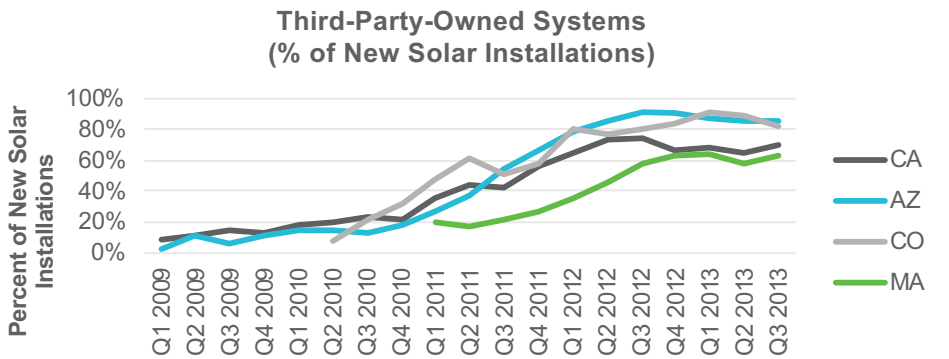
	Financing DG or Renewables	Owning DG or Renewables Outside Territory	Owning DG or Renewables Inside Territory	Providing Renewable Energy Options	Distribution-Level "RTO"
What It Is	❑ Investing in a fund, providing project financing, or securing an equity stake in solar, DG	❑ Development of DG, renewables outside franchise territory to gain knowledge and increase earnings ❑ Ownership or investment in developers	❑ Development of DG, renewables as regulated assets	❑ Utility provides customer choices through mechanisms like green rates and community solar initiatives	❑ T&D utility becomes manager of transactions across broad array of DG, renewable, and efficiency resources ❑ May or may not include providing services or alternative energy resources ❑ Still more conceptual than real at present
Value to Utility	❑ Diversifies earnings ❑ Leverages low cost of capital	❑ Provides more learning than financial investment ❑ Does not set regulatory precedents in territory	❑ Can enhance rate base ❑ Can mitigate issues with net metering ❑ Can help address operational issues of distributed resources connected at distribution voltages	❑ Provides minimal disruption to utility as most installations are utility scale	❑ Garners revenues for increased complexity of neutral analysis of customer demands and resource dispatch when DG penetration is significant

Sources: ScottMadden analysis; industry news

Solar Third-Party Financing Models: Different Strokes for Different Folks, But Some Common Themes

Third-party financing models allow customers to pursue solar without upfront costs. Some deal structures, such as residential third-party ownership, are dependent upon state policies and regulations and are not permitted in all markets. Leading companies employ a variety of models, with a range of services across the development value chain: customer leads, sales, financing, installation, and monitoring.

Third-Party-Owned Systems Drive the Majority of New Installations



Sources: DOE; Greentech Media

Financing , Lead Generation, and Monitoring Are Common Elements

	Lead Generation	Sales	Financing	Installation	Monitoring
SolarCity	■	■	■	■	■
Sunrun	■		■		■
Clean Power Finance			■		■
Vivint	■	■	■	■	■
Constellation	■	■	■		
SunPower	■		■		■
Sungevity	■	■	■	■	■

Sources: J.P. Morgan; Greentech Media

Selected Solar Third-Party Financing Models

Company†	Business Overview
SunPower 	■ Exists as a virtually integrated solar company from "upstream" panel production to customer ■ Relies on a network of local dealers across the United States ■ Plans to offer energy management services and storage incorporation by 2015
SolarCity 	■ Leading residential installer in the United States offering full value chain access from customer leads to sales[1] to project financing[2] to installation as well as monitoring/O&M ■ Incorporates additional complementary services like energy audits and EV charging stations ■ Expects to build and finase 30 to 50 commercial solar-battery systems in 2014
Clean Power Finance 	■ Facilitates financing options for solar as well as monitoring services ■ Organizes an online "market" to connect the financial needs of industry professionals with investors ■ Positions itself as possible utility partner ■ Offers in-house solar renewable energy credit trading
Vivint 	■ Originated as a home security business; began vertically integrated solar business in 2011 ■ Quickly emerged as leading residential installer; ranks second behind SolarCity ■ Differentiates by customer acquisition strategy (including "door-to-door") and back-end experience

Notes: †Maps indicate identified geographic areas of concentration.
[1]Recently purchased solar system seller Paramount Solar.
[2]Recently became first to securitize solar DG leases.

Sources: Dept. of Energy; Database of State Incentives for Renewable Energy; Greentech Media; Fitch Ratings; company websites, filings, and presentations

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Rates, Regulation, and Policy

Net Metering, Distributed Resources, and Utility Rates: Seeking a Balance

Approach	Brief Description	Pros and Cons for Utilities
Retail Price Net Metering	❑ As the customer provides power, the meter slows or runs backward, depending on DG output ❑ Customer is billed or credited based on net electricity consumed. Credits often may be carried forward to be applied to future bills ❑ Credits may be in energy or financial units	⇧ Approach is simple, and incentivizes demand resources ⇧ Customers can use a traditional interval meter ⇩ Retail rate is charged to utility, effectively making utility pay, rather than charge, for non-energy fixed costs ⇩ Peak shaving may reduce demand charge (set at system peak) but may not reflect customer's peak demand
Separate Compensation for Net Exports	❑ Fair value rate is established for net monthly electricity provided to the utility (only applies when DG exceeds total electricity consumed) ❑ Payments are sometimes reconciled annually	⇧ Utility has flexibility to set appropriate price ⇩ Net reductions from DG still effectively credited at retail rate
Bidirectional Meters	❑ Approach requires a meter able to measure both total consumption and total production ❑ Customer is billed for utility-supplied energy ❑ Utility deducts a credit for energy supplied by customer at a utility-established price that is intended to represent its fair value	⇧ Pre-established price ensures customer payment of fixed costs of service, including relevant demand charges ⇧ Utility has flexibility to set appropriate price
Buy/Sell Tariffs	❑ DG customers placed on special rates for each of electricity purchases and sales, including demand and standby charges, rather than being billed for total consumption under a standard retail rate	⇧ Special rates ensure customer payment of fixed costs of service, including relevant demand charges ⇧ Utility has flexibility to set appropriate price and customers may be able to select fixed or variable rates
Contract Energy Purchases	❑ Utility treats the customer as a wholesale electricity provider (like a PURPA-qualifying facility) with a sales contract for electricity and sometimes capacity	⇧ Utility has flexibility to set appropriate price, and customers may be able to select fixed or variable rates ⇔ Approach may be limited to larger-scale DG

As distributed resources, particularly solar PV, grow in number of installations and aggregate scale, electric utilities and PUCs are revisiting various approaches to charging and compensating net-metered customers with distributed generation.

Sources: Edison Electric Institute, "A Policy Framework for Designing Distributed Generation Tariffs" (Aug. 2013); Database of State Incentives for Renewable Energy; ScottMadden research

Net Metering, Distributed Resources, and Utility Rates: Seeking a Balance (Cont'd)

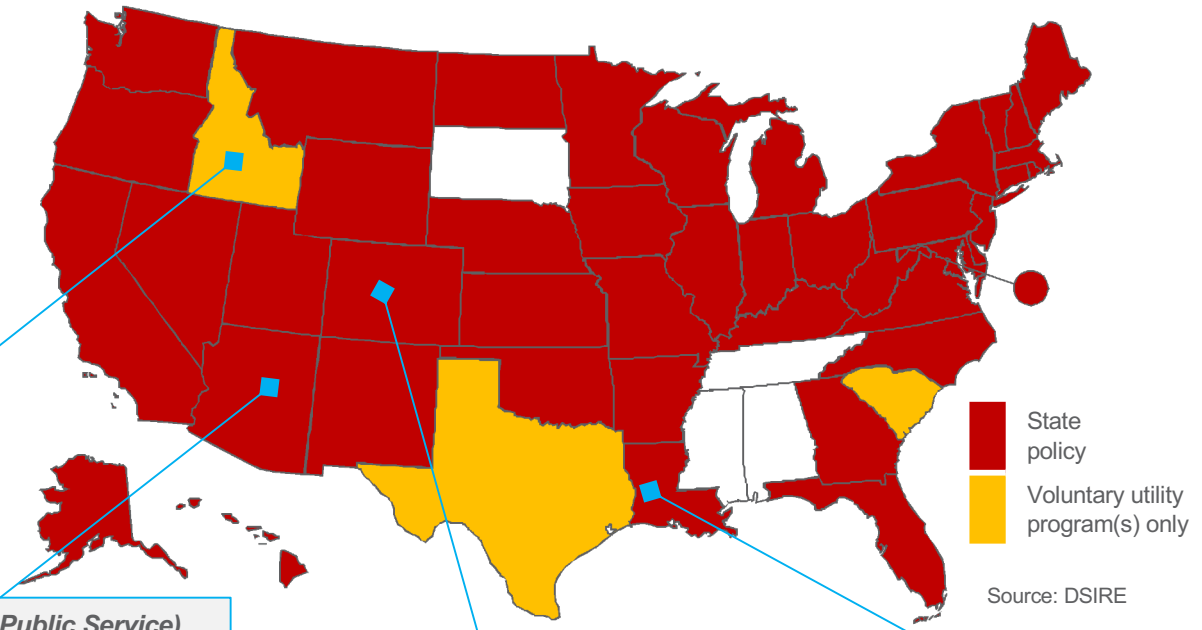
Approaching the Tipping Point:

"Forecasting a future in which net metering and distributed solar power generation 'grow substantially,' utilities should enact policies that credit customers for excess power, rather than compensate them with cash payments, place caps on total net-metering production, and increase demand charges to ensure stable power markets."

—Fitch Ratings

Selected Developments in DG Compensation and Charges – State PUCs and Utilities Deal with Growing Net-Metered Resources

States with Net-Metering Policies (43 States and D.C.) (as of July 2013)



Source: DSIRE

Idaho (Idaho Power)

- Idaho's PUC approved Idaho Power's switch from cash payment to bill credit, noting that cash could incent customer overbuild
- However, it rejected a proposed doubling of its cap on DG because it could "disrupt and have a chilling effect" on net metering
- The PUC held open possible increases in solar customers' monthly service charges, but said further hearings were needed to determine the "correct" amount

Arizona (Arizona Public Service)

- In the face of an estimated loss of 0.5% in annual sales growth, APS estimated fixed cost shifting of ~$67/month to non-solar customers and sought a surcharge to recover those costs
- The Arizona Corporation Comm'n granted an average surcharge of $4.80/ month, which will likely have little impact on solar installations
- The issue is expected to be raised again in a general rate case in 2015

Colorado (Xcel Energy)

- Xcel Energy has asked regulators to evaluate and lower the amount of credit DG customers get on their bill
- Xcel Energy believes there is a 5.9¢/kWh gap between the retail rate and utility "benefit"

Louisiana (Entergy)

- Louisiana's PSC voted against a proposal to lower utility payments to solar owners from retail rate to the wholesale rate of 3¢ to 4¢ per kWh

Sources: Database of State Incentives for Renewable Energy Edison Electric Institute; Innovation Electricity Efficiency; FitchRatings; SNL Financial; ScottMadden analysis

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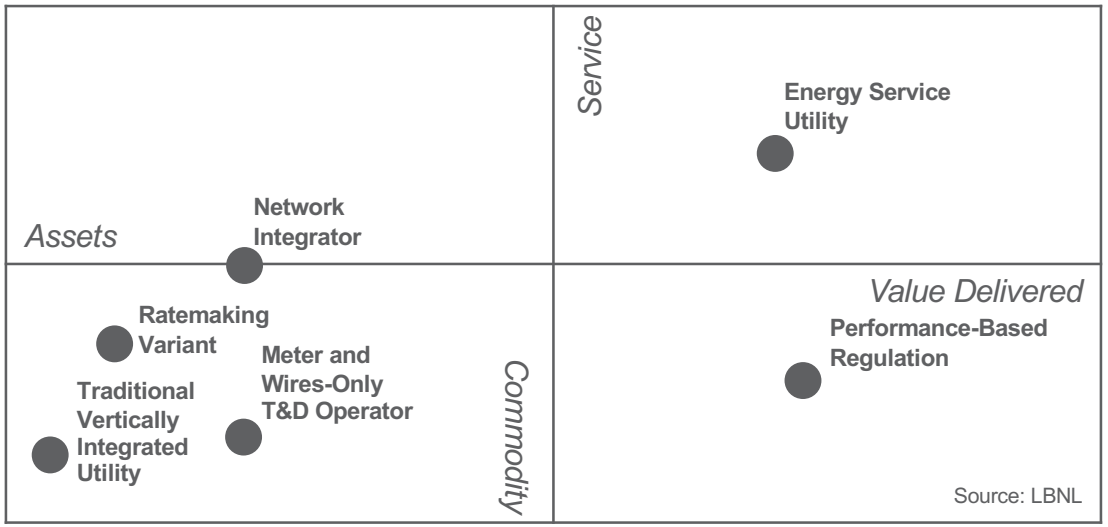
Utility Regulatory Model – What Changes Are Needed as Business Models Evolve?

With advancing technology, declining rates of increase in usage, and interest in customer-sited resources, some industry stakeholders are talking about alternative regulatory paradigms that:

- Reduce incentives for commodity unit sales
- Reduce chronic under-earning and related credit rating weakness (higher borrowing costs)
- Encourage innovation, including service provider roles at various parts of the value chain (generation and delivery system)
- Recognize both costs and benefits of grid services and distributed resources
- Encourage needed investments in the system and resources (both supply and demand)

One View of the Array of Regulatory Options



	Incremental Changes to Cost of Service	Network Owner Operator	Network Integrator	Energy Service Utility
Objective	Lost revenue mechanisms to eliminate throughput incentives	Eliminate utility gen ownership; reduce costs or increase billing determinants	Utility creates infrastructure so third parties can integrate into grid	Utility owns and operates means for all services; services (vs. commodity) incentives
Asset Ownership	T&D (maybe Generation)	T&D only	T&D only	Generation, T&D
Commodity Supplier	Utility	Utility	Others	Utility and others
Energy Services Supplier	Utility	Utility	Utility and others	Utility and others
Network Access	Closed	Closed	Open	Open
Financial Incentive	Rate of return + incentives	Rate of return	Incentives (price of services)	Incentives (price of services)

Sources: OFGEM; DOE Lawrence Berkeley National Laboratory; H. Harvey & S. Aggarwal, America's Power Plan: Rethinking Policy to Deliver a Clean Energy Future (2013), accessed at http://americaspowerplan.com; ScottMadden analysis

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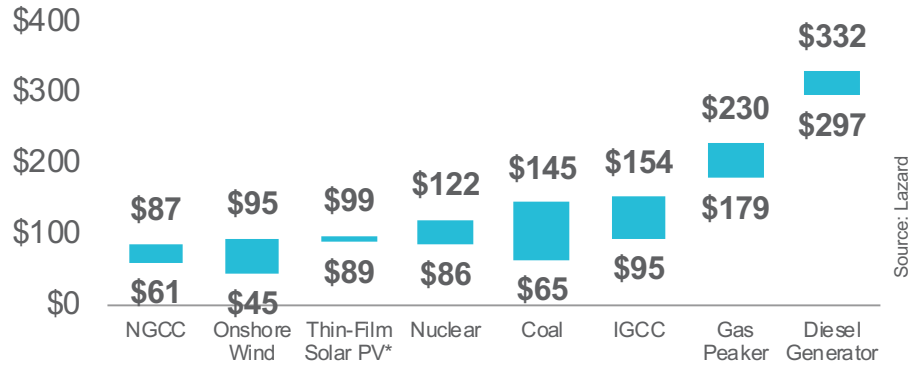
Utility Regulatory Model – What Changes Are Needed as Business Models Evolve? (Cont'd)

Some Key Issues With Adjustment of Regulatory Paradigms from Cost-Based Regulation to Other Models	
Behavioral Shifts and Customer Acceptance	❑ While regulatory and financial incentives can play a significant role in behavior, conservation and efficiency require longer-term shifts in those incentives ❑ Incentives must be transparent and linked temporarily and directly to desired actions ❑ Customers may have difficulty with paying as much or more on their utility bill while consuming less ❑ Customers' stated preferences (e.g., efficiency) may be belied by actual responses
Stranded Investment	❑ Switching regulatory models will undoubtedly lead to some stranded investment, which will require debate over what losses should be compensable, how much should be awarded, and how to recover those costs
Time Horizon	❑ Current system and regulatory framework were developed over decades; unwinding or transitioning will likewise take time
Proving the Counterfactual	❑ Performance-based regulation (PBR) frequently involves judging utility performance versus what it would have been without PBR, which invites contentious interpretations if costs are not what advocates believe they "should" be
Leakage	❑ In isolation, one could have some incentives under a new model, while possibly leaning on adjacent systems still under the traditional model for reliability, supply adequacy, and cost containment—this will be more difficult if widespread regulatory changes occur
Accountability	❑ Unclear whether and how common concepts applicable to regulated utilities—obligation to serve, used and useful, just and reasonable rates, prudence, etc.—translate equitably to all players in some new regulatory models
Level Playing Field	❑ Depending upon the regulatory model (i.e., degree of third party vs. utility service competition) utility may have incumbency, affiliate, and brand advantages that need to be accounted for

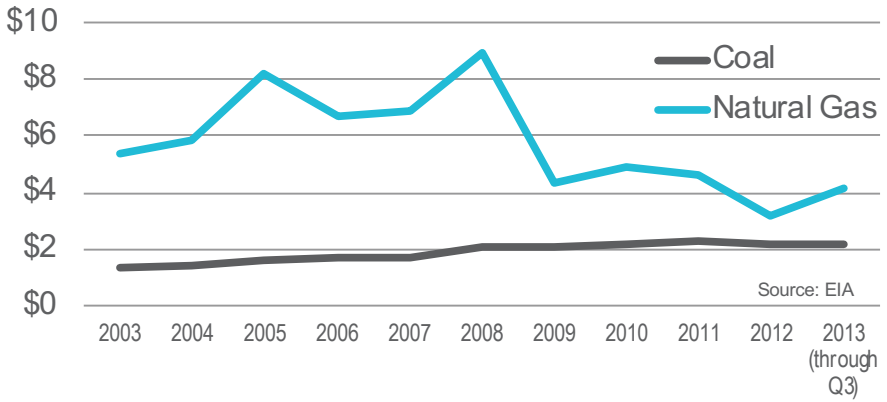
The Energy Industry by the Numbers

The Energy Industry by the Numbers

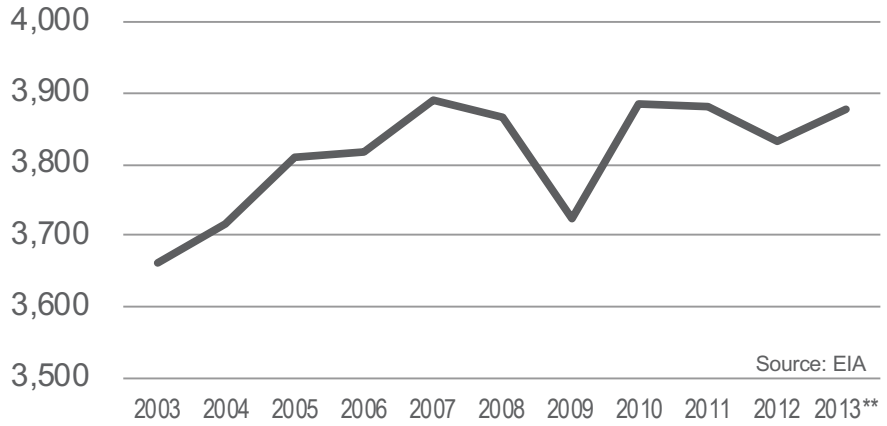
Unsubsidized Levelized Cost of Energy (Estimated Range in $/MWh)



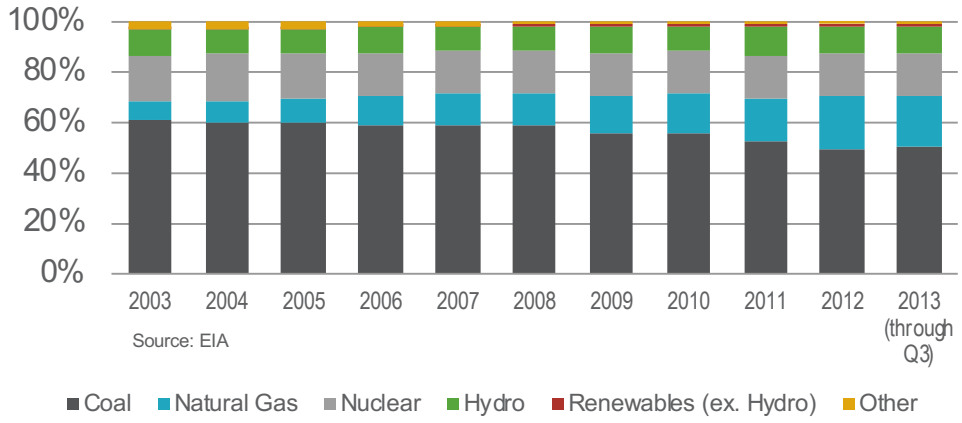
Generation Fuel Cost for U.S. Independent Power Producers ($/MMBTU)



Total U.S. Electricity End Use (Billion kWhs)



Energy Mix (U.S. Electric Utility Generation by Fuel Type) (% of MWhs)



Notes: *Utility scale; NGCC means natural gas combined cycle; IGCC means integrated gasification combined cycle:
**Estimated 2013 by annualizing nine-month actuals
Sources: Lazard (Aug. 2013); Energy Information Administration

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	Transmission Development – Key Issues to Watch, C. Lyons, http://www.scottmadden.com/insight/660/Transmission-Development-Key-Issues-to-Watch.html
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	Significant Impacts Expected from Energy Efficiency and Solar Technologies, C. Vlahoplus and P. Quinlan, http://www.scottmadden.com/insight/646/Significant-Impacts-Expected-from-Energy-Efficiency-and-Solar-Technologies.html
	California Dreaming? State Sets Energy Storage Target for Utilities, C. Vlahoplus and P. Quinlan, http://www.scottmadden.com/insight/666/California-Dreaming-State-Sets-Energy-Storage-Target-for-Utilities.html
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	Light or Heat, T. Williams, S. Sanders, and Q. Watkins, http://www.scottmadden.com/insight/674/Light-or-Heat.html
Natural Gas	***Benchmarking for Natural Gas LDCs***, E. Baker and J. Davis, http://www.scottmadden.com/insight/669/Benchmarking-for-Natural-Gas-LDCs.html
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Utility Supply Chain	***Inventory Carrying Costs in the Electric & Gas Utility Industry,*** A. Flores and J. Sequeira, http://www.scottmadden.com/insight/658/Inventory-Carrying-Costs-in-the-Electric-Gas-Utility-Industry.html
	Electric Utility Inventory Analysis and Optimization, A. Flores, B. Foster, and B. Garber, http://www.scottmadden.com/insight/632/Electric-Utility-Inventory-Analysis-and-Optimization.html
Energy Industry	***The Energy Industry Update,*** http://www.scottmadden.com/insight/651/The-ScottMadden-Energy-Industry-Update.html

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

For more information about our Energy Practice, contact:

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

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