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Meet With Us

The ScottMadden Energy Industry Update

Highlights of Recent Significant Events and Emerging Trends

August 2010

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Executive Summary

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An Uncertain Horizon

The global economy is growing again, in fits and starts, but U.S. unemployment remains stubbornly high. After enduring 2009's soft energy demand and low prices, energy and utility companies are now seeing a modest increase in sales growth and a firming of prices. So, many are beginning to think more about their strategic direction. But headwinds remain, as the pace of economic growth slows, and regulatory and other major uncertainties attend many of the significant investment decisions facing our industry.

Working Out Incentives to Get Infrastructure Built	❑ Regional transmission organizations and federal regulators are looking at improved methods to equitably and adequately allocate costs of improving power flows across the grid. ❑ At the state level, with smart grid stimulus funding now helping utilities to proceed with smart grid projects, regulators are looking to provide rate recovery without overburdening economically challenged ratepayers. In some cases, state regulators are retrenching and scaling back utility smart grid plans. ❑ Resource planning has become more complicated as well, with many more variables around potential options and outcomes. This increases regulatory (and other stakeholder) scrutiny technology type, demand vs. supply side choices, forecasts, and "least cost" determinations.
Environmental Requirements Tightening	❑ Carbon regulation remains a key uncertainty. After the Kerry-Lieberman proposal in the spring, momentum behind comprehensive carbon legislation appears to have waned, at least until mid-term Congressional elections are over. ❑ Near-term, however, tightening environmental emissions and discharge requirements—on air, water, and solids—will force some significant near-term "retrofit vs. retire" decisions for many U.S. coal-fired power plants.
Natural Gas, After the Gulf Oil Spill	❑ Natural gas, according to a recent MIT report, is abundant and will continue to be in high demand for power generation, even with potential carbon constraints. But gas could be upstaged long term by low cost nuclear and renewables, depending upon environmental and energy policy. ❑ BP's Gulf oil spill, other recent mishaps, and increasing environmental scrutiny—especially at the state level—may shine a light on natural gas exploration and production methods in promising shale formations, a key source of that anticipated abundance.
Management Responds	❑ Through the recession and into 2010, utilities engaged in a number of strategies—ranging from cost-cutting to mergers—in order to preserve earnings, shore up balance sheets, and prepare for the next investment cycle. Key industry developments and responses are covered in this *ScottMadden Energy Industry Update*

Energy Industry Stock Prices — Different Time Periods, Different "Winners"

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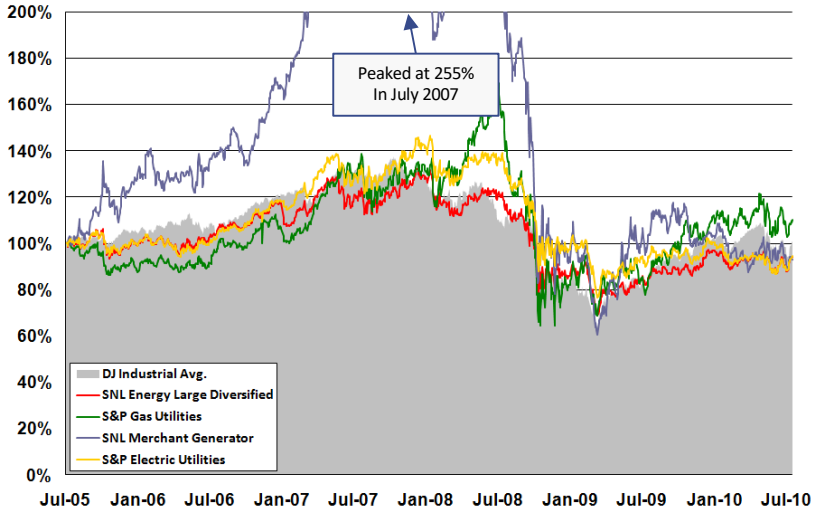
Sector Divergence Through 2009 With Convergence Into 2010

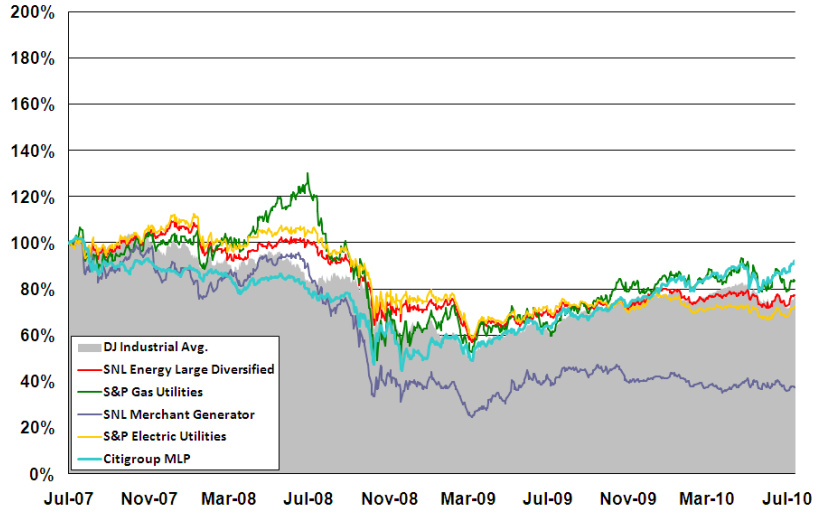
5-Year Sector Performance
Normalized Daily Index Values (July 2005–July 2010)



Ending Index Value (Start of Period = 100%)			
	Since Early 2009	Since Mid-2007	Since Mid-2005
SNL Energy Large Diversified	104%	78%	94%
SNL Energy Small Diversified	113%	94%	103%
S&P Gas Utilities	125%	84%	110%
S&P Electric Utilities	92%	73%	95%
SNL Merchant Generator	90%	37%	93%
Citigroup MLP	167%	93%	*
DJ Industrial Avg.	115%	77%	101%
DJ Utility Index	101%	75%	98%

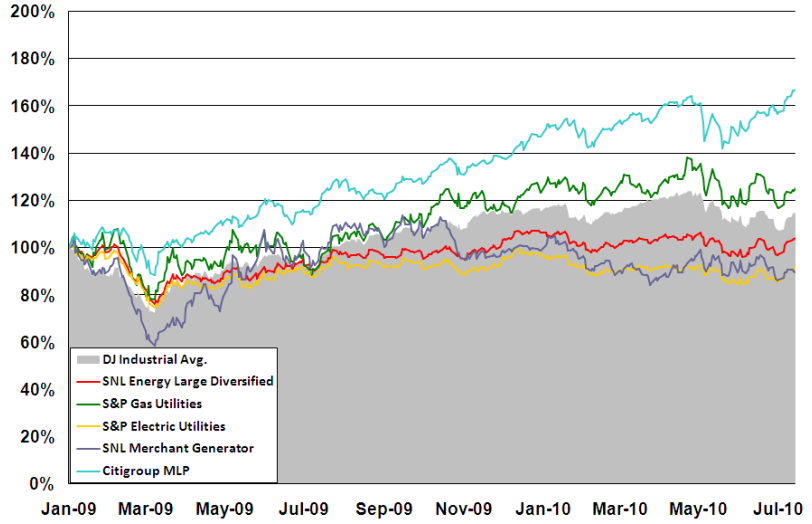
Merchants Hit Hard during the "Great Recession"

3-Year Sector Performance
Normalized Daily Index Values (July 2007–July 2010)



Gas Upstream and LDCs Outpace the Dow Rally, Electrics Trail

18-Month Sector Performance
Normalized Daily Index Values (Jan. 2009–July 2010)



While stock prices for most energy sectors have nearly come back to mid-2005 levels, possible expiration of the 2003 dividend tax rate reduction could weigh on energy stocks in the latter part of 2010.

Note: All index values are 100% at beginning of relevant period. * means not available.
Sources: SNL Financial; ScottMadden analysis

Heard on "The Street" — Views of the Energy and Utilities Sectors

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Continued Challenges for Power Generators 	❑ "Power markets will likely see less liquidity, more volatility, higher transaction fees with [financial reform legislation]." ❑ "Most competitive generators face the expiration of energy hedges….If natural gas prices remain in a $4–$6 band, generators' cash flows will reflect lower prices on their power sales." ❑ "Many generators, especially those that operate coal-fired power generation, face higher costs or lower levels of dispatch from more stringent environmental rules." ❑ "Natural gas [generation] gained market share vs. coal particularly in the East as spot gas stayed close to the $4.60/MMBTU breakeven level between gas and coal."
Improving Demand… But Mixed Opinions of Earnings Sustainability 	❑ "Industrial usage continues to recover, with weather and an improving economy (though mild at this point) contributing to rising power demand." ❑ Eastern markets and West and Texas markets diverge: "In West and Texas, mild weather resulted in flat to lower [power] usage…As a result, western utilities without decoupling mechanisms may face challenging comparisons." ❑ "Investor skepticism about sustainability of power demand trends, robust natural gas supply, and environmental regulation, and potentially hostile regulatory environments persist."
Regulatory Support …and Risk 	❑ "Positive bias toward downstream utilities with supportive regulation and a forward focus on infrastructure development and energy efficiency projects." ❑ "Gas distributors with revenue stabilization riders, bad debt and capital spending trackers, and recent rate hikes should post the better results this period." ❑ "Increased local, state, and federal pressure [on public power utilities] related to rate increases, transfer payments, and environmental compliance."
Natural Gas Prices: A Key Driver for Many Sectors … and a Major Uncertainty 	❑ "We continue to prefer investment grade [master limited partnerships]…which continue to participate in the new infrastructure build around the growing natural gas resource plays." ❑ "[Natural gas] fundamentals now even more bearish than before…with a more bearish end-of-season inventory report….Another bearish fundamental…is the pace of increase in Canadian pipeline exports." ❑ "We believe gas could make a near-term move back towards $5.00/MCF, and there could be a short-term bounce in some gassy E&Ps." ❑ "The E&P stocks are discounting $5.10/MCF….We are somewhat neutral on [upstream gas]…given regulatory uncertainty (particularly in the Gulf of Mexico and Marcellus)." ❑ "For the storage side of the business for natural gas utilities and asset optimization opportunities, this [recent firming of gas prices] is a welcome change."

Sources: Oppenheimer & Co.; Morgan Stanley; Credit Suisse; Hilliard Lyons; J.P. Morgan; Gabelli & Co.; RBC Capital Markets; Société Générale; Brean Murray Carret & Co.; FitchRatings

Chief Executives Comment

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Diversified (E&G) Integrated Utilities	Energy Delivery Utilities	Merchant Generators	Electric-Predominant Integrated Utilities	Gas Utilities
Regulated Investment	**"Smart" Infrastructure and Customers**	**Costs, Margins, and Organic Growth**	**Operations: Current and Transitioning to Green**	**Contrarians and Conservatives**
"Closer now to becoming a more regulated company, with the prospects for more stable streams of revenue" (Dominion)	"World-class service to our customers through three core tenets: efficiency programs, smart capital spending, and environmental responsibility" (ConEdison)	"Maintaining these savings [in controllable expenses] over the long term…not simply 'short-term cost cutting' our way through tough economic times" (Calpine)	"Energy policy initiatives around greenhouse gas emission reductions and energy efficiency, security and reliability create technology deployment and investment opportunity in our utility platform" (AEP)	"Notwithstanding near-term weakness in U.S. natural gas markets, we believe that our best risk-adjusted returns on capital will result from investment in our E&P businesses" (Questar)
"Fundamental market view that natural gas is going to be the fossil fuel of choice in North America for decades to come" (Sempra)	"Investments in our regulated power delivery business unrelated to our MAPP [transmission] and smart grid initiatives will comprise nearly 70 percent of our capital expenditures, providing the primary growth driver" (Pepco Holdings)	"Our [commodity price] hedges contributed $629 million of our total $1.552 billion in realized gross margin" (Mirant)	"Maintained focus on operational excellence, cost control, regulatory compliance and on identifying new ways to grow our business" (DPL)	"Our capital discipline is highlighted by spending plans that reflect today's commodity price environment and outlook" (Energen)
"About 75 percent [of our capital plan] will go toward supporting our California utilities" (Sempra)	"Modest customer growth, coupled with increased recovery of transmission costs and…deployment of our advanced metering system, more than offset the effects of reduced electric demand and higher operating costs" (CenterPoint Energy)	"Focus primarily on organic growth opportunities… upgrading select combined cycle turbines…adding incremental capacity…and geothermal drilling and exploration" (Calpine)	"All major elements of the business—generation, energy delivery and customer usage—are in transition at the same time" (Edison International)	"Our long-standing hedging policy paid off" (Questar)
"Regulatory approval in 2009 for nearly $1.5 billion in green and accelerated infrastructure investments that allow for contemporaneous returns for our shareholders" (PSEG)	"Implemented a new customer organizational model…designed to be market driven and focused on delivering integrated energy solutions to our customers across all lines of business" (National Grid)	"Strive for operating excellence to achieve maximum value from our plants…[with] a flexible, plant-specific approach to how we operate and invest" (RRI)	"Strong commitment to operational excellence, financial strength, financial discipline and being the leading clean energy company of the future" (NextEra, formerly FPL)	"Our [LDC] segment will continue to follow its innovative rate-design strategy involving smaller, more frequent filings that reduce earnings lag and protect margins" (ONEOK)
"Continues to make progress on an aggressive regulatory and business agenda in the face of continuing pressure from the economic downturn" (NiSource)		"Dual strategy: perfecting the current competitive generator model and transforming to a post-hydrocarbon provider of sustainable energy solutions" (NRG Energy)	"Aggressively pursuing implementation of smarter, cleaner, more efficient technologies" (Southern)	"[Utilities] staying focused on controlling discretionary expenses and on improving business processes…[non-utility businesses engaging in] disciplined growth in strategic areas and capitalizing on market opportunities" (AGL Resources)

Sources: Company annual reports, 10-Ks, proxy statements, and shareholder presentations

Corporate M&A Moves Along with Some Megadeals

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Selected Mergers and Acquisitions in the Energy and Utilities Sectors

Theme	Buyer/Seller	Purchase Price ($B)	Industry Segment	Scale	Implicit $ Per	Closing Date	Drivers and Risks
Bigger is better/ market expansion	FirstEnergy/ Allegheny Energy	$9.3		▪ 9,700 MWs ▪ 1.6 million customers	$5,796/ customer	June 2011	▪ Increased balance sheet size, scale to support capex; increased regional presence; adjacent geography ▪ Diversified gen fleet, avenues for growth ▪ O&M, fuel synergies
Market expansion/ earnings stability/ regulatory diversification	PPL Corp./ E.ON U.S.	$7.6		▪ 7,900 MWs ▪ 1.2 million customers	$6,354/ customer	Dec. 2010	▪ Less relative exposure to power markets ▪ Diversification to stable, progressive regulatory environment ▪ "No synergies" assumed
Balance sheet strengthening/ regional diversification	RRI Energy/ Mirant Corp.*	$2.2		▪ 24,700 MWs (combined) ▪ 10,281 MWs (MIR only)	$214/ kW	Dec. 2010	▪ Enhanced scale, scope of operations ▪ Increased financial flexibility ($2.9 billion in combined cash) ▪ Annual cost savings of $150 million (reduction in overhead, A&G) ▪ Strengthened balance sheet
Unconventional gas position	ExxonMobil/ XTO Energy	$41.0		▪ 509,000 boe**/day ▪ 45 TCF reserves (Incl. shale oil)	$910,000 / BCF of reserves	2nd Quarter 2010	▪ Expansion into growing North American unconventional natural gas sector ▪ Some caution by analysts pending clarity on integration of businesses, possible dilution
Market/ geographic expansion	Alpha Natural Resources/ Foundation Coal	$1.9		▪ 1.3 billion tons reserves (proven and probable)	$1.50/ ton of reserves	July 2009	▪ Increased reserves, including met coal ▪ Larger production presence ▪ Solid backlog ▪ Climate change and coal plant impacts?

With an exit from recession, stockpiled cash, and relatively cheap cost of debt, merger and consolidation activity has increased from 2009.

Notes: *merger of equals; **boe = barrels of oil equivalent
Sources: SNL Financial; company reports; industry news; ScottMadden analysis

Economic Outlook — Much Uncertainty, But Expectations for Slower Going Than in Late 2009

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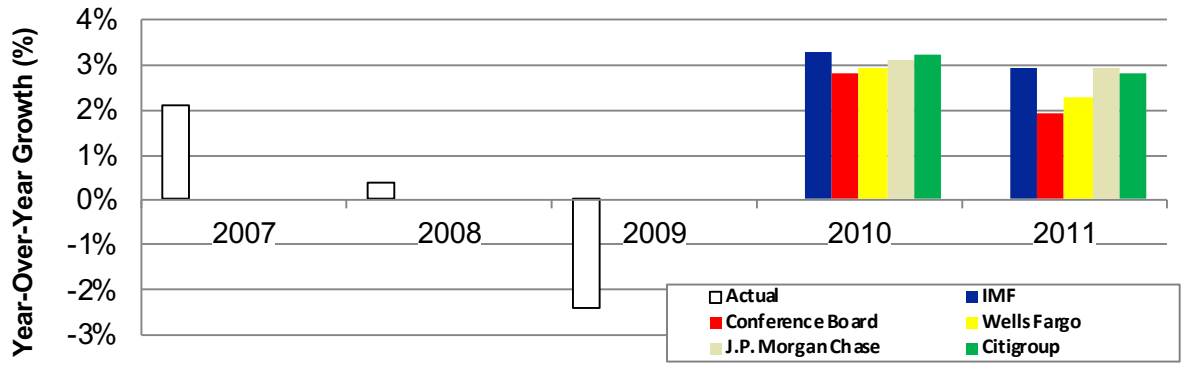
- "Recent turbulence in financial markets—reflecting a drop in confidence about fiscal sustainability, policy responses, and future growth prospects—has cast a cloud over the outlook"
  — *International Monetary Fund*
- "By later this year, persistent excess capacity will probably create actual deflation in the United States and Europe"
  — *American Enterprise Institute*
- "The expansion has thus far closely followed the script written by past cycles….The historical script suggests that the initial acceleration phase following a recession is short lived and that a moderation in overall pace of growth should be expected over coming quarters"
  — *J.P. Morgan Chase*
- "There have been no meaningful signs of a forthcoming drop in broad economic activity as so many now fear. But mountains of evidence point to slower growth, and previously building expectations of upward momentum beyond the "snapback gains" [of the second half of 2009] have been dashed"
  — *Citigroup Global Markets*
- "A multispeed recovery, which is not abnormal after a deep recession, could pose a threat to the desired rebalancing of the global economy. For example, the United States may find it necessary to continue to rely on stimulus measures to keep the economy growing at a sober 3 percent and avoid the slowdown to 2 percent in our current forecast for 2011"
  — *The Conference Board*

Expected U.S. GDP Growth Is in the 2% to 3% Range

U.S. Real GDP Growth – Actual and Selected Forecasts



Key Economic Indicators, Why They Matter, and Where They're Headed

Indicator	Why It Matters for Energy and Utility Companies	Current Outlook	Key Things to Watch
GDP Growth	▪ Drives energy sales and revenues, esp. industrial ▪ Increases opportunity to gain from new products, pricing, and rate structures ▪ Strongly influences regulatory rate pressures	▪ Modest growth ▪ Lowered expectations ▪ Slower corporate profit growth	▪ Consumer confidence ▪ Lapse of stimulus spending ▪ End of inventory restocking ▪ Behavior with anticipated 2011 tax increases
Inflation	▪ Affects impact of regulatory lag, frequency of rate requests ▪ Drives timing and cost of major investments	▪ Emerging markets growing but "cooler" ▪ CPI index growth forecast: ~1.5% or less in 2010-11 ▪ Industrial commodity prices up rapidly in Q1 '10, but easing in Q2	▪ Monetary policy, now extremely loose ▪ Demand for goods, services (esp. commodities) from abroad
Cost of Capital	▪ Affects investment and refinancing decisions, timing, and type of financing	▪ Fed funds rate expected to remain 1% or less through 2011 ▪ Forecast 10-year T-note rate of 3.2%–3.5% in 2010, 4% in 2011	▪ Sovereign debt, fiscal balances (including state and municipal exposures) ▪ Federal Reserve target and market price of "risk" ▪ Regulatory requirements for capital adequacy

Sources: IMF; AEI; J.P. Morgan Chase; Citigroup; The Conference Board; ScottMadden analysis

Cost-Cutting Initiatives: A Sampling

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	Staffing	Plants and Offices	Compensation	Capital Expenditures	Other O&M Reductions
					
AEP	▪ Trim workforce by 10% (1,000 to 2,000 employee buyouts)	▪ Idle 10 coal-fired units and cut staff			
Alliant	▪ Pursue layoffs and retirements		▪ Suspend 401(k) match		▪ Conduct one-week furloughs of non-union employees
Ameren	▪ Cut 75 jobs at power plants and support facilities	▪ Possibly cease operations temporarily at least-efficient plants	▪ Examine reduction of benefits costs		▪ Consolidate Illinois operating companies
Duke	▪ Voluntary separation plan for 900 employees	▪ Consolidating corporate offices in Charlotte, NC			
National Grid	▪ Delay filling vacancies	▪ Consolidate buildings	▪ Freeze salaries for top executives; avoid salary increases for non-union workforce	▪ Defer capital projects not needed for safety or reliability (e.g., discretionary IT)	▪ Restrict travel ▪ Other O&M reductions
NB Power	▪ Eliminate three of eight corporate VP positions ▪ Reduce management, admin staff by 20% through early retirement, attrition				▪ Reduce outsourcing activities ▪ Review number of term and casual positions

Many utilities have addressed costs over the past 18 months to keep earnings growing on sluggish revenue growth while addressing regulators' concerns about potential rate increases.

Sources: Industry news reports; company press releases and presentations; SNL Financial

Integrated Resource Plans Reflect Uncertainty and Deferred Actions

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Recent integrated resource plans voice much uncertainty in light of the economic slowdown, regulatory policy, and commodity prices.

Some are betting on easy-to-deploy gas-fired technology options—not necessarily building but retaining options to build—and relying upon purchases and demand reduction in the interim.

Themes emerging in resource plans across North America:

- ❑ Assumed abundance of inexpensive **natural gas**, prompting continued interest in natural gas for generation in lieu of other non-renewable and baseload generation
- ❑ Uncertainty whether **load growth** will return to "normal" or will be slower than pre-recession levels; this is being carefully scrutinized by regulators and other stakeholders
- ❑ Great emphasis on **energy efficiency and demand response**, but some debate over appropriate levels of investment in supply vs. demand-side resources
- ❑ For some utilities, **carbon** is priced into the portfolio rather than a contingent risk; a key question is the price of carbon emissions

Some Themes from Selected Integrated Resource Plans

Utility (IRP Date)	Themes	
Duke Energy Carolinas (Sept. 2009)	❑ Resource needs increase significantly over the 20-year planning horizon, even after incorporating the impact of the current recession on forecasted load ❑ Sufficient time in later IRPs to focus on specific peaking resources for 2015-2020	❑ Inclusion of new nuclear capacity results in lower costs to customers…with commercial operation date of 2021 at lower cost than at 2018; a regional partnership approach would provide customer benefits ❑ "Greatly expanded" portfolio of DSM and energy efficiency programs
Dominion Resources (Sept. 2009)	❑ Plan provides ability to respond to many uncertainties brought on by changes in market conditions and customer demand	❑ Balanced portfolio of new traditional and renewable generation as well as energy efficiency and peak shaving programs
Southwestern Public Service (Xcel Energy) (July 2009)	❑ System would benefit from lower-cost energy produced by a gas-fired combined cycle	❑ Additional modeling included variations of potential carbon taxes of $0 to $40
PacifiCorp (May 2009)	❑ Challenge has been to minimize customer rate impacts in light of substantial capital spending requirement ❑ An additional planning challenge has been to respond to and predict the demand response impacts of the economic recession and financial crisis	❑ The depth of the recession and the pace of recovery are uncertain, complicating the resource requirements picture; seeing a continuation of significant industrial and commercial sector demand destruction ❑ Near-term opportunities to lower power supply costs through market purchases before committing to a large new thermal plant
Delmarva Power (IRP Update, Nov. 2008)	❑ Over time there are wider ranges of possible future average annual costs ❑ Adding 100 MW of gas generation to the portfolio would slightly raise average costs in 2010 and would slightly lower them by 2018	❑ "Recent events make it more difficult to be confident of the expected value of forecasts in general….Risk management goals and policies may now become even more important"

Sources: Utility integrated resource plans; ScottMadden analysis

Abundant Gas and Increasing Usage, Even with GHG Caps: Key Takeaways from MIT Gas Study

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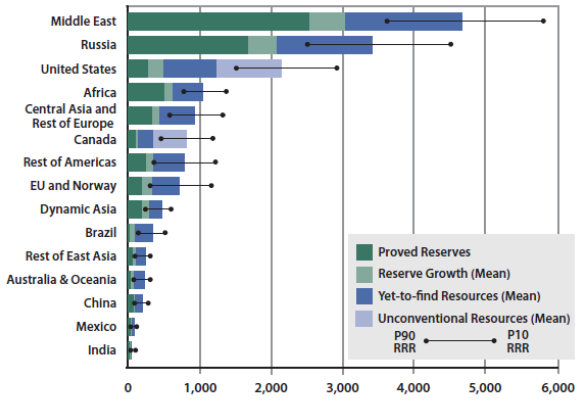
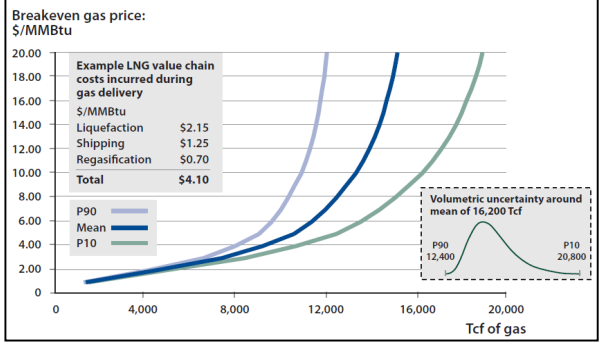
In June, MIT's Energy Initiative released a multidisciplinary study on natural gas as an energy source in the United States, especially under CO_2 emissions constraints. We summarize here key observations and conclusions.

Global Remaining Recoverable Gas Resource by Region (with Uncertainty)



Global Gas Supply Cost Curve (with Uncertainty) (2007 Cost Base)



Supply

- Globally, natural gas is abundant—about 16,200 TCF (150 times 2009 consumption), excluding unconventional resources outside the United States and Canada
- U.S. gas resources have grown 77% since 1990, reflecting the uncertainty of estimates. Much of U.S. resource growth has been in shale gas, estimated to comprise anywhere between 1,250 and 1,850 TCF of gas
- There may be up to 24,000 TCF of unconventional gas in place outside North America (about 6,000 TCF of recoverable reserves)

Production, Use and Trade: Potential Futures

- Absent GHG mitigation and shale gas, U.S. gas production peaks ~2030
- Even with a CO_2 emissions caps, total gas use is projected to increase through 2050
  - GHG policy reduces energy use and flattens electric demand, but substitution of gas as fuel for power generation outweighs the demand reduction effect
  - With a 50% reduction in CO_2 below 2005 levels by 2050, the CO_2 price rises to $240 per ton and comprises half the user price of gas
  - With CO_2 mitigation, the biggest impact on gas use in the electric sector is availability of low-cost nuclear
    - Reduces gas use in the electric sector by nearly 7 TCF per year
    - Overall gas use declines only 5 TCF as lower demand for gas leads to lower price and increased use in other sectors
- With a 25% by 2030 renewable energy standard and policy encouraging phase-out of coal plants, but no carbon pricing:
  - Rapid expansion of renewables tends to squeeze out gas-based electric generation in the early decades
  - Gas use across the economy, however, remains fairly resilient
- Gas-fired generation without CCS is economically untenable at GHG cuts of 80% below 2005 levels
  - Shale gas could be a major contributor, but would not be a panacea in this scenario without better CO_2 reduction technologies

Source: MIT, The Future of Natural Gas (June 2010)

Abundant Gas and Increasing Usage: Key Takeaways from the MIT Study (Cont'd)

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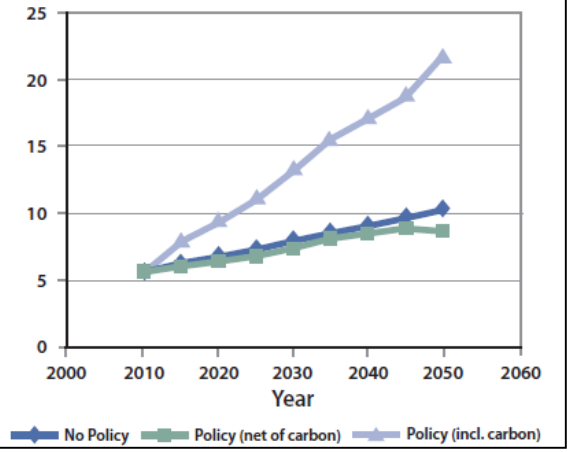
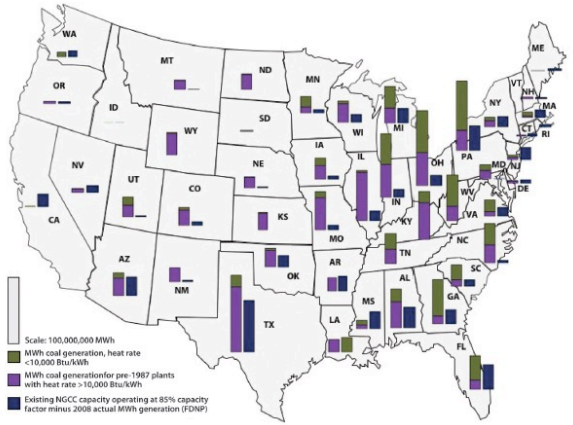
Demand	❑ Intermittent renewables have effects on two time horizons — Short term: Displaces gas-fired generation in most regions, although solar would displace less — Long term: Brings more installed capacity of flexible gas-fired plants, displacing baseload generation ❑ For CO_2 reduction, existing NGCC generation, now at an average 41% capacity factor vs. design cap factor of 85%, could displace coal-fired plants ❑ While gas has 25% fewer GHG emissions than gasoline, natural gas vehicles now offer less opportunity for U.S. demand growth — Unacceptably long payback period under *current* gasoline-CNG fuel price spread, even at $100 per ton GHG costs — Exceptions may be light-duty fleet vehicles (e.g., taxis), urban buses, and delivery trucks ❑ Energy efficiency regulations will lead to 1 to 2 TCF per year residential and commercial demand reduction by 2030
Infra-structure	❑ Between 2005 and 2008, pipeline capacity additions totaled 80+ BCF per day, more than additions during 2001–04 by 100%. These changes have increased flows from west to east vs. historical south-to-north flows ❑ The United States has substantially underutilized (<50% utilization) LNG regasification capacity; operating or under construction North American LNG import capacity is nearly 23 BCF per day ❑ More infrastructure is needed to move Marcellus shale gas to markets; only half of Pennsylvania wells have pipeline access ❑ Displacement of coal-fired generation with gas-fired requires high-deliverability gas storage, which capacity is now limited
Markets	❑ Integration of global gas markets would have complex effects: — Benefits the United States economically, but limits development of domestic resources and increases import dependence — Gives geopolitics a greater role in the gas industry and impacts U.S. foreign policy

Projected U.S. Natural Gas Prices with CO_2 Mitigation Policy (Incl. and Net of Carbon Cost) and without Such Policy (in $/MCF)



Scale and Location of Fully Dispatched NGCC Potential and Coal Generation (MWh, 2008)



Source: MIT, The Future of Natural Gas (June 2010)

Hydraulic Fracturing Debate: Slowing Down Marcellus

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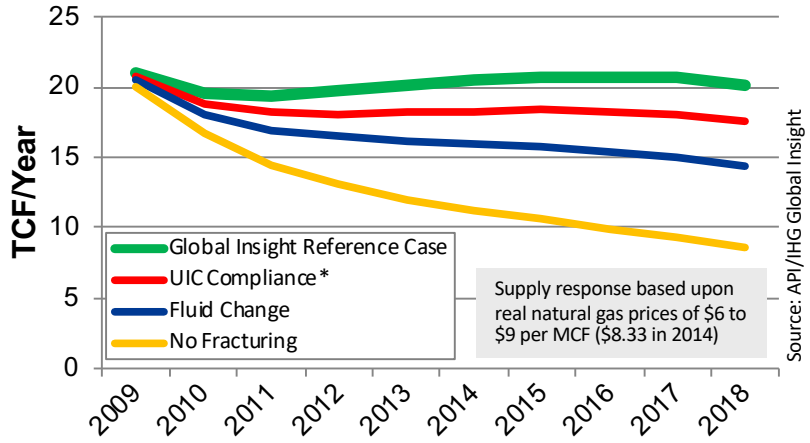
Recent drilling mishaps, a controversial documentary, and an EPA inquiry have sparked an emotionally and politically charged debate over hydraulic fracturing ("fracking"), especially in the Marcellus Shale.

Concerns	❑ **Drinking water:** Despite 60 years of fracking history, some local groups and environmentalists are concerned about potential underground migration of fracking fluids into drinking water supplies ❑ **Waste and wastewater:** While potential subsurface contamination dominates discussion, the use, disposal, and accidental above-ground release of wastewater (flowback) and drilling waste poses a greater environmental hazard. Some developers are being proactive, recycling all water from operations, but these costs may push out smaller players lacking deep pockets
Responses	❑ **Development delayed:** Delays in Marcellus development are beginning to occur or are threatened—both voluntary (Chesapeake in the NYC watershed) and government-driven (PA senate proposal) ❑ **Regulatory primacy being debated:** Debate is ongoing between states and the EPA over regulation of the industry. Some industry players favor states, which have superior knowledge of the local geography and are able to make faster, tailored decisions
Potential Outcomes	❑ **Focus on improved drilling methods likely:** With BP's Macondo spill, drilling methods have been called into question. Gas drillers will face similar questions, since groundwater contamination is possible through the pipe that passes through the aquifer layer ❑ **Industry impacts depend upon constraints:** One estimate shows that at $6 per MCF gas, increase in well costs from $3.5 million to $4 million would reduce Marcellus IRRs from 36% to 29% and would not be a "game changer." However, an outright ban of fracking (although unlikely) would impact both oil and gas industries extensively and could keep gas prices above $10 per MMBTU

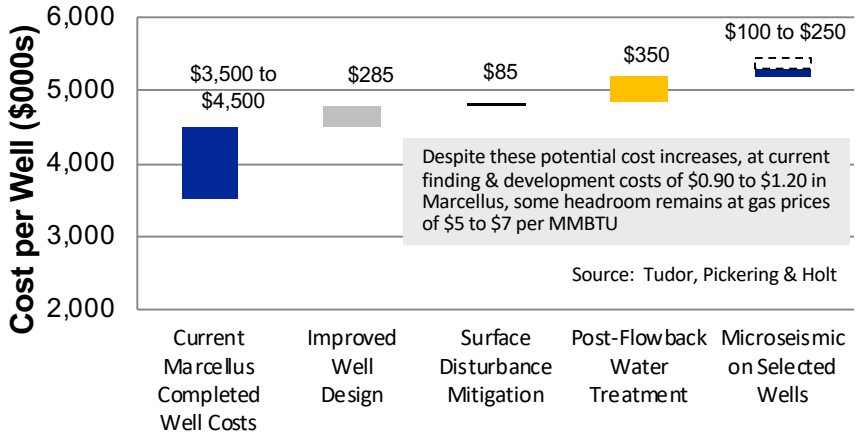
Regulation Could Reduce U.S. Gas Production by 10% to 65%

Projected U.S. Natural Gas Production Impact from Various Restrictions on Hydraulic Fracturing



Regulation Could Add About $500 Million to Per Well Costs

Estimated Cost per Well in Marcellus Assuming Regulation-Induced Increased Costs (in $000s)



Note: *UIC means underground injection control, an EPA standard (from which O&G fracking operations are currently exempt) that requires narrower pipe and higher pumping pressures

Sources: American Petroleum Institute; *Oil & Gas Financial Journal*; SNL Financial; *Natural Gas Week*; Range Resources Corp.; Chesapeake Corp.; Presentation by Bob Anthony, Chairman of the Oklahoma Corporation Comm'n, at 2010 New England Conference of Public Utilities Commissioners Symposium (May 18, 2010); Tudor, Pickering & Holt; ALL Consulting

Wind Remains the Renewables King, But Money Remains Tight

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Pick Up in Installations and Interest

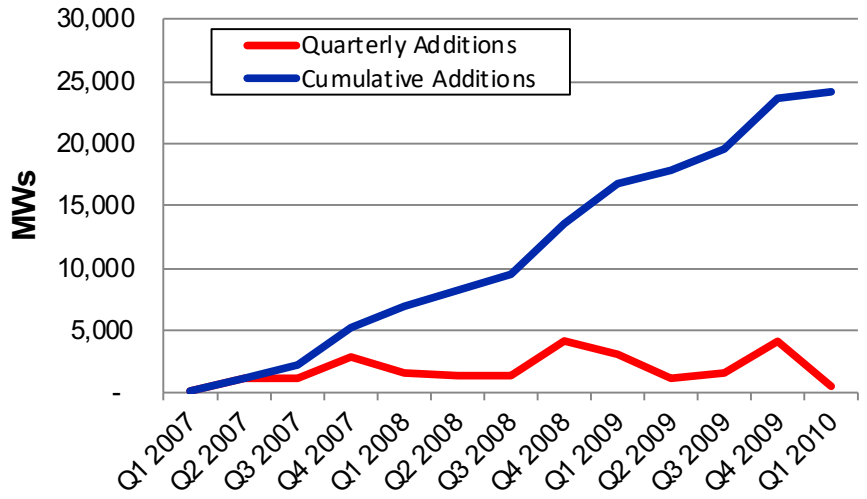
- Nearly 10,000 MWs of wind capacity was added in the United States in 2009, compared to 8,350 in 2008 and 5,250 in 2007, but this activity tailed off in early 2010.
- Globally, policy support in the form of feed-in tariffs, direct grants, and loan guarantees have helped renewable energy additions. Global stimulus funding targets about $184 billion for clean energy.
- Some new players—e.g., Google—are investing in renewables, including onshore wind.
- European wind installations are expected to be significant—about 10 GWs are expected in 2010, up 13% from 2009, driven by portfolio standards, policy incentives, and carbon caps.

Headwinds for Wind

- Lower power demand along with expectations of an extended period of cheap natural gas has provided some challenges for the wind development pipeline.
- Wind power purchase agreements of $60 to $70 per MWh are harder to come by now that wholesale power prices have fallen to $40 to $50 per MWh from $70 to $80 per MWh just a few years ago.
- Financing of projects under development remains challenging, impeded by tight credit availability and high cost of debt.
  - — Equity investors are aware that developers are cash strapped, driving global prices of projects under development down 30% to €130,000 per MW (about $165/kW*).
- Success in wind expansion has also bred its own problems, making finding new sites increasingly more difficult as developers struggle with:
  - — The right transmission topography or areas with fewer line siting difficulties
  - — Savvy landowners increasingly seeking higher compensation for rights of way
  - — NIMBY opposition

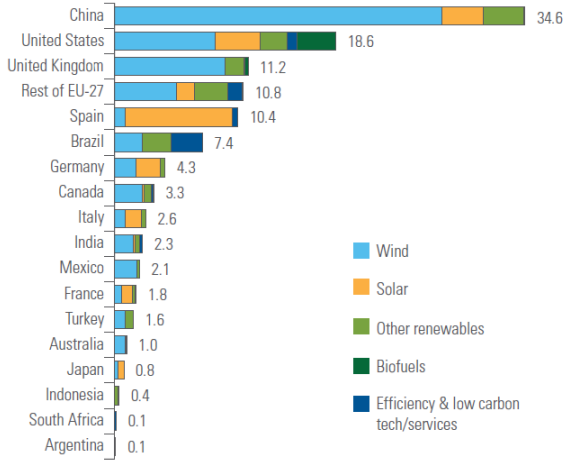
Q1 2010 Wind Installations Trail Those in Q1 2008 and Q1 2009

Quarterly and Cumulative U.S. Wind Capacity Additions (2007–Q1 2010) (in MWs)



China Is Emerging as a Major Wind Energy Player

Global Clean Energy Investment by Sector (in $ Billions)



Notes: *based upon $1.2659 per €1 at July 8

Sources: American Wind Energy Association; European Wind Energy Association; Pew Charitable Trusts; *Bloomberg New Energy Finance*; industry news

Will Solar Cool Down After 2010?

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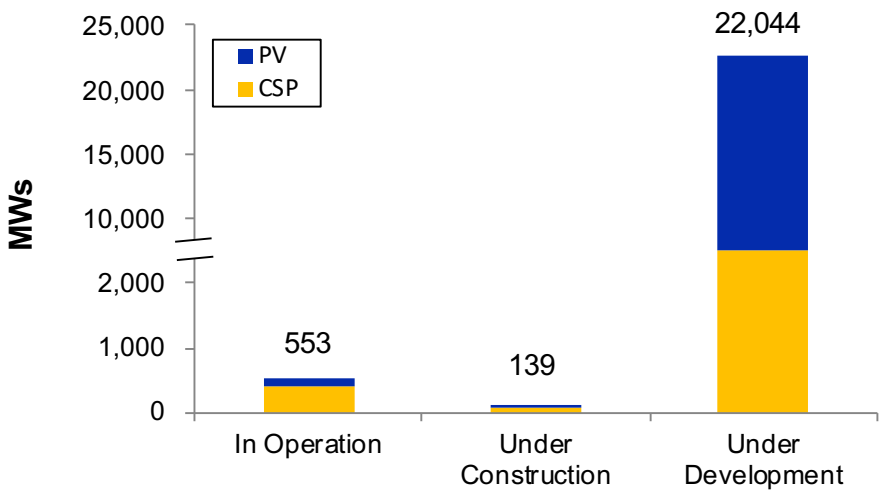
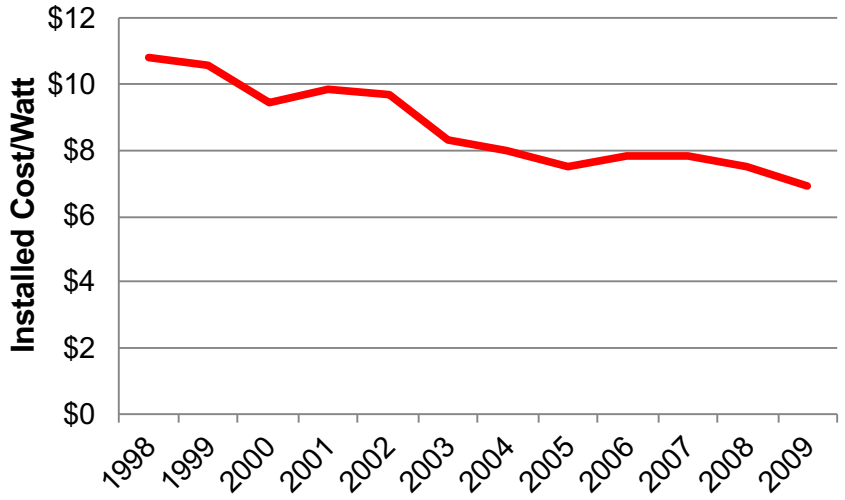
Aspirations for Solar Much Greater than "Iron in the Ground"

Utility-Scale Solar Projects in the United States as of May 28, 2010 (in MWs)



PV Installed Costs Have Declined, but Remain Expensive vs. Alternatives

Capacity-Weighted Average PV Installed Costs in the United States



Activity Robust and Equipment Getting Cheaper

- Despite recession, solar installations increased, aided by both stimulus funding and manufacturing tax incentives. The Treasury Grant program expires at year-end 2010, so most analysts expect continued growth in PV installations in 2010.
- Increasingly, renewable energy standards are including distributed generation and solar carve outs.
- Property-assessed clean energy (PACE) programs, which provide financing of solar energy systems through government-backed bonds, have been enabled by 16 states; however, recent objections by Freddie Mac and Fannie Mae to the ongoing lien before refinancing or transfer may put these programs in jeopardy.

Many "Moving Parts" on the Horizon

- Large-scale solar development is facing the same transmission siting difficulties as wind, as well as environmental impact challenges given projects' large footprints.
- Because solar is perceived as a less mature technology, financing of grid-scale development is more difficult because of lender-risk aversion.
- Consolidation in the solar PV market is widely expected, as anticipated continued low PV prices bring revenue decreases that are flowing directly to earnings.
- Further, some expect an increase in solar M&A, as developers approach key milestones for additional equity investment (e.g., Edison Mission selling its entire portfolio of solar projects in development to First Solar).
- In Europe, withdrawal of incentives—particularly reduction in feed-in tariffs—has led to collapse in prices and activity in solar development in Spain and Germany. Sunset of U.S. incentives could produce similar outcomes.

Sources: Solar Energy Industries Association; Lawrence Berkeley National Laboratory; nrel.openpv.gov; *Barron's*; *RenewablesBiz*; industry news

DOE Examines Integration of Significant Amounts of Renewable Resources

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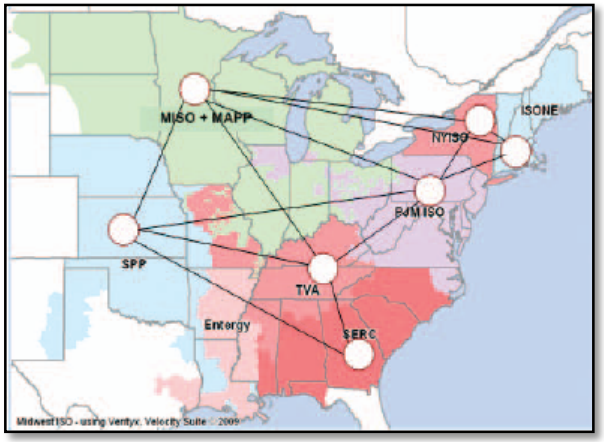
Assumption or Conclusion? Eastern Study Envisions Fewer Balancing Areas

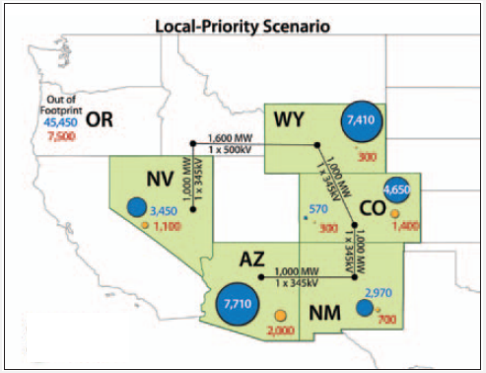


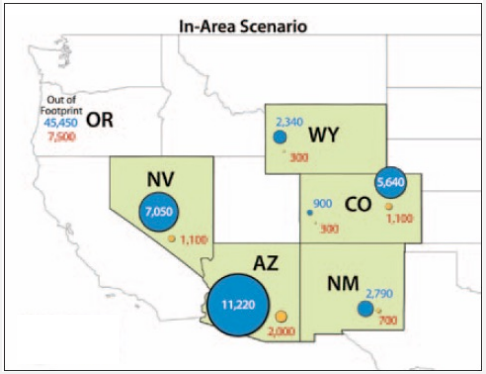
Two Department of Energy studies looked at the expansion of a significant amount of wind and solar resources in the Eastern and portions of the Western Interconnection, respectively.

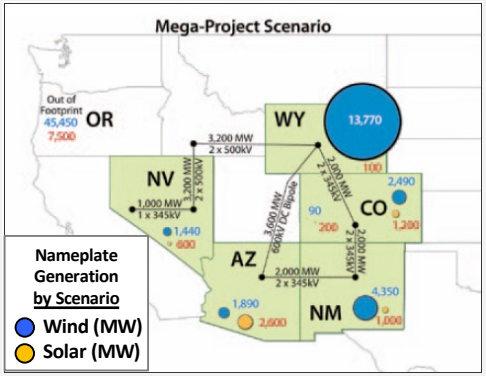
While there are a number of similar conclusions, it was clear that much more transmission is required in the East than in the West to accommodate larger amounts of renewable resources.

Transmission-related capital costs of large-scale integration range from $0 to $11 billion in WestConnect and from $80 to $93 billion in the Eastern Interconnection.

Western Study Reveals Different Transmission Needs Driven by Location and Scale of Renewable Generation







Key Takeaways from Renewables Integration Studies

Transmission	❑ Additional high-voltage and EHV lines are required, depending upon scenario: 0 to 6,900 GW-miles in WestConnect; about 10,000 to 23,000 in the Eastern Interconnection
Balancing Areas	❑ Significant balancing area cooperation is required ❑ Wider area of coordination is beneficial, yielding diversity benefits ❑ The Eastern markets would require significant market, tariff, and operational changes; in fact, the Eastern study assumes significant consolidation of balancing areas
Sub-hourly Markets	❑ Hourly scheduling uses most of the regulation reserves for Area Control Error ❑ Therefore, sub-hourly scheduling is required to operate at high penetration levels to reduce the maneuvering duty of load following units
Forecasting	❑ Wind and solar forecast error has a huge impact on the system ❑ State-of-the-art forecasting is required, esp. in the West, saving $12 to $20 per renewable MWh
Reserves	❑ Additional contingency reserves are required, although extra spinning and regulation reserves can be very expensive; the Western study recommended using demand response programs as a less-expensive alternative (saves up to $510 million/year) ❑ April is the most challenging month in the West, especially with high renewables penetration
Curtailment	❑ Down reserves can be handled through wind curtailment ❑ The East would see significant wind curtailment without transmission enhancements
System Flexibility	❑ Decreased flexibility of hydro and coal units increases the costs of integration in the West; and western coal units are assumed to be able to operate down to minimum levels (40%) ❑ In the East, combined cycle units become the preferred tool to manage variability

Note: DOE Western study limited to WestConnect footprint
Sources: DOE National Renewable Energy Laboratory; ScottMadden analysis

Transmission Cost Allocation — Seeking Approaches That Encourage Investment

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A Comparison of Transmission Cost Allocation Approaches and ISOs/RTOs Where Used

Method	Description	Used by	Comments	Challenges
MWh energy consumed	Allocates costs by MWhs of consumption or generation regardless of peak usage ▪ Could be system wide or locational ▪ Form of socialization of transmission costs	▪ CAISO (>200kV) ▪ NYISO*	▪ May favor incumbent utilities and transcos ▪ Straightforward allocation of cost based on the usage of the system at peak ▪ Provides incentives for energy efficiency	▪ Not necessarily aligned with capacity impacts, cost causation ▪ May not provide price signals for peak load reduction
Peak MW usage	Allocates costs over peak MW use—either coincidental or non-coincidental to system peak regardless of location or overall usage ▪ Form of socialization of transmission costs	▪ CAISO ▪ ERCOT ▪ ISO-NE ▪ MISO*** ▪ NYISO** ▪ PJM*** ▪ SPP***	▪ May favor incumbent utilities and transcos ▪ Straightforward allocation of cost based on the usage of the system at peak ▪ Provides incentives for energy efficiency only to reduce monthly peak	▪ May not encourage comprehensive energy efficiency
Flow-based (based on current congestion or post-project benefit)	Allocates costs based on the relative impact that parties have on transmission facilities ▪ Derived from power flow models or based on location ▪ Form of "beneficiary pays" approach	▪ Many use locational methods ▪ Usu. based on system peak flows	▪ May favor merchant or non-incumbent transmission development	▪ Flows in models may change based on myriad factors, not just the new project—can be difficult to isolate a single project's impact ▪ "Black box" methodology
Monetary metrics	Allocates costs to parties who are expecting to receive a monetary gain (e.g., congestion revenue) ▪ Based on market simulations before and after the proposed project goes into service ▪ Form of "beneficiary pays"	▪ Several use benefit/cost tests to determine allocation ▪ Economic upgrades only	▪ May favor merchant or non-incumbent transmission development	▪ Flows in models may change based on myriad factors, not just the new project—can be difficult to isolate a single project's impact ▪ "Black box" methodology

FERC has initiated a rulemaking on transmission cost allocation, which continues a debate over the best method of aligning costs and benefits of transmission that has its origins with the unbundling of its Order 888. Most regional transmission organizations in the United States use a hybrid of the approaches described above.

Notes: *current transmission customers, new projects based on peak load and location; **for reliability upgrades, by zone; ***based on zonal peak; also flow based

Sources: PJM Interconnection, A Survey of Transmission Cost Allocations Issues, Methods and Practices (Mar. 10, 2010)

Transmission Cost Allocation (Cont'd)

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Some Recent Regional and Federal Activity in Cost Allocation

	MISO Proposed Cost Allocation Methodology	SPP's Highway/Byway Cost Allocation Methodology	FERC's Proposed Transmission Allocation Order
Proposal	❑ Establishes concept of multi-value projects (MVPs), which receive 100% regional cost allocation ❑ Defines MVPs: — Developed through planning process and support government policy mandates and/or — Provide multiple types of economic value across multiple pricing zones and/or — Address reliability issue and one economic-based transmission issue ❑ Establishes requirements for MVPs: — >$20 million (or 5% of net plant) — >100 kV ❑ Places special restrictions on HVDC and underground or underwater projects getting MVP treatment ❑ Current mechanisms for reliability and market congestion projects remain	❑ Modifies concept of Base Plan Upgrades and allocates costs based upon voltage of upgrade rather than MW-mile benefit basis ❑ Allocates costs of Base Plan as follows: — 300 kV or greater: 100% across region on a postage-stamp basis — 100 kV to 300 kV: 1/3 on regional postage stamp basis, 2/3 in zone where facilities are located — Below 100 kV: 100% to zone where facilities are located on postage-stamp basis ❑ Defines Base Plan Upgrades to include high-priority upgrades, such as EHV (>300 kV) "priority projects" approved by the SPP directors ❑ Provides special rules for wind generation "designated resources:" — Delivered in zone: 100% to zone — 300 kV or above delivered out of zone: 100% to region — Less than 300 kV and delivered out of zone: 67% regionally; 33% to transmission customer	❑ Distinguishes between interregional and intraregional planning and cost allocation ❑ Requires participation in a regional planning process that: — Produces a regional transmission plan — Considers public policy requirements like RPS/RES ❑ States that cost allocation should be more closely aligned with the transmission planning process ❑ Does not propose a single cost allocation methodology ❑ States that transmission costs should not be allocated to those not receiving benefits (i.e., makes a case for "beneficiary pays" concept) ❑ Eliminates any right of first refusal of incumbent utilities or transmission owners to build transmission (implicit nod to merchant development, in accordance with recent rulings) ❑ Expects participation of non-utilities in RTOs and non-RTO transmission providers in planning process
Status	**Submitted to FERC on July 15, 2010 for approval**	**Approved by FERC and in effect in June 2010**	**NOPR issued June 17, 2010**

Sources: FERC; Midwest ISO; Bruder, Gentile & Marcoux; Troutman Sanders; PJM; RenewableEnergyWorld.com

Smart Grid Investments: Regulators Opt for Incremental, Demonstrable Benefits

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Award of smart grid stimulus grants and recent regulatory activity has reignited debate over how utilities can best position themselves for adequate, timely, and equitable recovery of smart grid investments. Some recent events:

- ❑ **FERC:** Approves $50 million cost recovery for Pacific Gas & Electric's upgrade of 25 synchrophasors under smart grid rate recovery standards established in July 2009
- ❑ **Maryland:** Rejects Baltimore Gas & Electric's proposed surcharge for universal deployment of smart meters and mandatory time-of-use rates; BG&E submits revised proposal without mandatory time-of-use rates, but with hybrid recovery (75% base rate-25% tracker), voluntary peak time rebates, and beefed-up customer education
- ❑ **Indiana:** Rejects Duke Energy's request for $445 million for installation of more than 800,000 meters; Duke intends to scale back proposal to a 22,000-meter demonstration outside of Indianapolis
- ❑ **Oklahoma:** Approves $366 million for smart grid equipment across Oklahoma Gas & Electric's territory, but requires guaranteed O&M cost reductions of at least $22.5 million

Regulatory Complications for Smart Grid Rate Recovery

Concept	Smart Grid Complication
Prudency	▪ Pace of innovation and obsolescence ▪ Absence of comprehensive, definitive standards ▪ Pilot vs. implementation "at scale" ▪ Business case adequacy and assumptions
Used and useful	▪ Minimum required functionality vs. more expansive solution: what is "smart grid?" ▪ Recovery of costs during construction
Equity in allocation of costs and risks (cost causality)	▪ Stream of costs and benefits vs. traditional T&D investment ▪ Allocation to retail choice customers ▪ Rate structures and allocation across classes ▪ Perceived value to customers
Regulatory lag	▪ Manner of recovery: base rates, trackers, riders, or other methods

A Non-Comprehensive Sampling of Approved Smart Grid Cost Recovery Approaches

	CA	DE	ID	IL	IN	MD	MA	NY	OH	OK	OR	TX
Tariff riders with periodic true-ups				◆					◆	◆	◆	
Customer surcharge mechanisms						◆		◆				◆
(Opportunity for) base rate recovery	◆				◆*							◆
Deferred cost recovery		◆	◆									
Reconcilable balancing accounts	◆											
Rate-basing of some capital costs	◆						◆				◆	

Source: Edison Electric Institute (as of Oct. 2009)

Notes: *operating costs only; capital costs under consideration

Sources: NARUC; SNL Financial; Michigan PSC; Center for Business and Regulation, Univ. of Illinois—Springfield; King & Spalding; Winstead; FERC; Edison Electric Institute

Fossil-Fired Generation:
An Expensive, Murky Environmental Alphabet Soup

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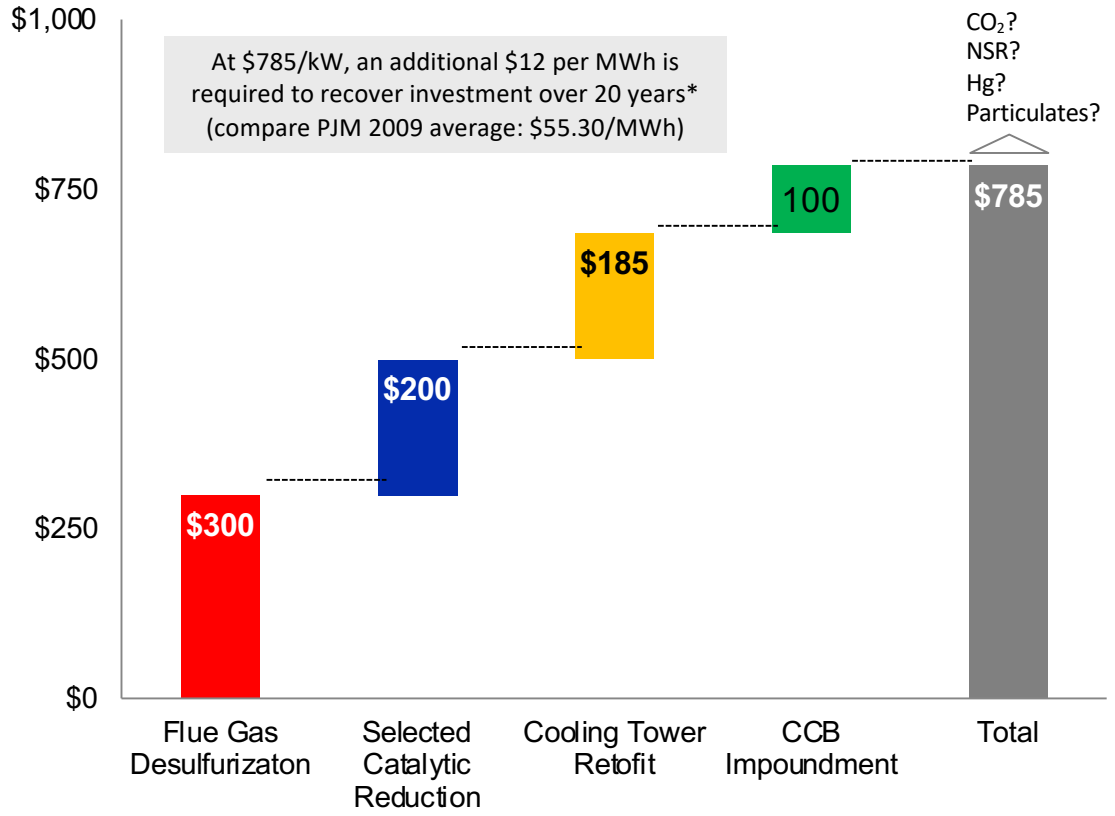
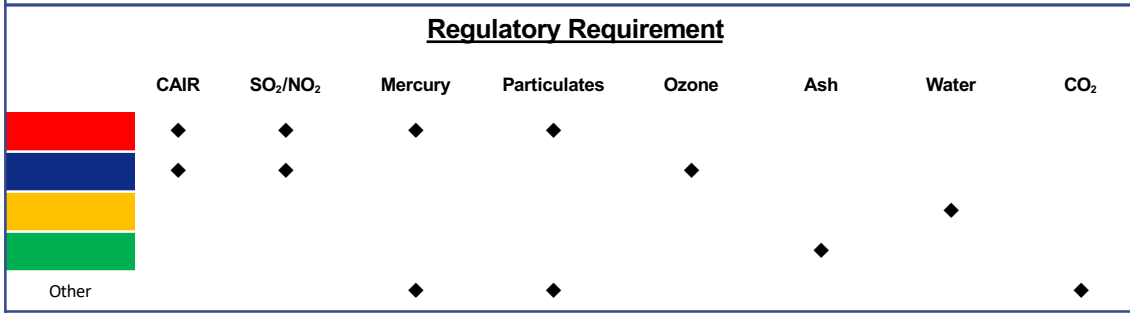
Many Moving Parts: New Rules under Development	
Clean Air Interstate Rule	▪ Uncertain CAIR replacement rule timeline ▪ Phase II SO_2 and NOx by 2015
SO_2/NO_2	▪ One-hour primary National Ambient Air Quality Standards (NAAQS) of 75 parts per billion (PPB) in June 2010, reduced from 140 PPB
Mercury	▪ Mercury and hazardous air pollutants (HAPs) clampdown ▪ Maximum available control technology (MACT) required ▪ Information collection on air toxics
Particulate Matter	▪ Fine PM (≤2.5 microns diameter) NAAQS
Ozone	▪ Eight-hour ozone NAAQS
Ash	▪ Coal combustion by-product (dry ash) (CCB) containment, disposal, and lining requirements
Water (Clean Water Act)	▪ §316(b) Phase II (power plant cooling water intake rule delayed—fine screens/cooling towers) ▪ Possible closed-loop cooling system requirements
CO_2	▪ Kerry-Lieberman proposed, but its future uncertain ▪ EPA endangerment finding triggering rulemaking

Illustrative Incremental Environmental Costs for a 500 MW Coal Plant ($/kW)





Note: *Capital cost only; excludes incremental O&M. Assumes monthly amortization; 55%-45% debt-equity ratio; 12% required ROE, 7% cost of debt (9.25% WACC); 80% capacity factor; estimated $50 million per facility for impoundment enclosures

Sources: EEI Environment Executive Advisory Committee; U.S. EPA; PJM

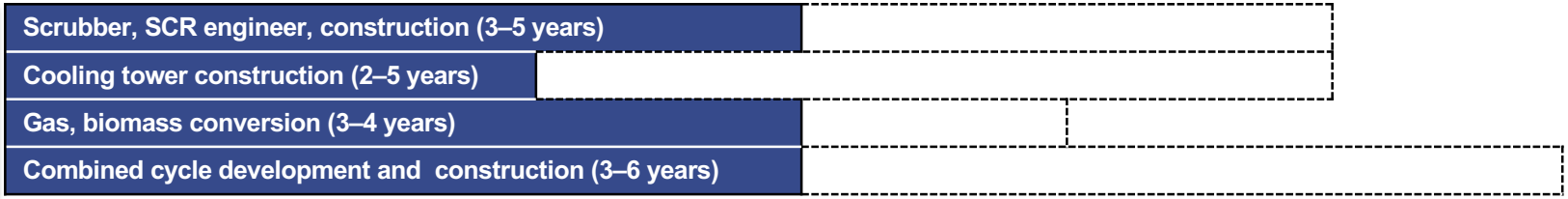
Fossil-Fired Generation: An Aggressive Timeline for Environmental Compliance

SCOTTMADDEN Management Consultants

Expected Environmental Regulatory Changes and Compliance Deadlines for Fossil-Fired Generation

	2010	2011	2012	2013	2014	2015
	Proposal phase		Rule finalization, standards, & compliance		Compliance phase	
Clean Air Interstate Rule	▪ Phase I Annual SO_2 Cap ▪ CAIR replacement rule					
SO_2/NO_2	▪ SO_2, NO_2 primary NAAQS	▪ SO_2 primary NAAQS	▪ Secondary SO_2, NO_2 NAAQS			
Mercury		▪ HAPs MACT proposed rule	▪ HAPs MACT final rule			▪ HAPs MACT compliance
Particulate Matter		▪ Next PM-2.5 NAAQS revision	▪ PM-2.5 SIPs due	▪ New PM-2.5 NAAQS designations		
Ozone		▪ Final nonattainment designation			▪ Next ozone NAAQS revision	
Ash	▪ Proposed CCB rule	▪ Final CCB rule		▪ Final CCB rule compliance		
Water	▪ 316(b) proposed rule	▪ Proposed effluent guidelines	▪ 316(b) final rule	▪ Effluent guidelines final rule		▪ 316(b) compliance ▪ Effluent guidelines compliance
CO_2	▪ CO_2 regulation?					

A Short Window to Decide and Pursue Alternatives to Coal



Source: EEI Environment Executive Advisory Committee

Advanced Nuclear: Smaller and Modular "Large Batteries"

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Description and Configuration	❑ Small reactors (<350 MW) with small footprint ❑ Modular construction at production facility, with barge, truck, or rail transport to installation site ❑ Potential multiple-unit installation ❑ Underground location of reactor in most cases
Cost	❑ Costs are key unknown—unclear, divergent, sometimes not disclosed, and may not reflect development costs: — Hyperion HPM unit: $50 million (~$2,000/kW) — Toshiba 2003 estimate for 4S: $2,500/kW — mPower estimate: $5,000/kW ❑ "Economy of multiples" in lieu of scale
Anticipated Benefits	❑ Reduced construction times, costs ❑ Simpler infrastructure than large nuclear plants expected to lower O&M costs ❑ Potential piecewise addition of capacity ❑ Lower refueling costs with longer time intervals ❑ Passive security (located underground) ❑ Smaller investment lowers risk of rate shock
Key Challenges	❑ Nuclear NIMBY, including waste ❑ No track record; some utility skepticism ❑ DOE interested, but only $39 million budgeted ❑ Not yet certified or licensed in the United States ❑ First units likely not online until 2016 or later, with NRC approval taking 3 to 5 years
Applications	❑ Remote or grid-independent power (military bases, oil recovery, remote towns) ❑ Repowering at existing brownfield sites, e.g., replacement of aging coal generation ❑ Process heat, desalinization, and hydrogen production as well as power ❑ International market may be bigger than U.S.
Some Recent Developments	❑ Utility consortium to advance mPower ❑ Babcock/Bechtel commercialization alliance ❑ Hyperion/AEHI deal for Chinese manufacturing ❑ Toshiba seeking test of 4S in Galena, Alaska

Model	Manufacturer	Coolant	Refueling Period	Electrical Output (MWe)
International Reactor Innovative and Secure (IRIS)	Westinghouse	Light water	3 to 3.5 years	335
Power Reactor Innovative Small Module (PRISM)	GE Hitachi Nuclear Energy	Liquid metal (sodium)	1 to 2 years	311
Pebble Bed Modular Reactor (PBMR)	PMBR, Ltd.	Helium	Online	165
mPower	Babcock & Wilcox	Light water	Proprietary	125
NuScale	NuScale Power	Light water	2 years	45
Hyperion Power Module (HPM)*	Hyperion Power Generation	Lead-bismuth eutectic	7 to 10 years (module replaced)	25
Super-Safe, Small and Simple (4S)	Toshiba	Liquid metal (sodium)	30 years	10

Expected NRC Design Certification Submittal* (source: NRC)				
Q1 '12	**Q2 '12**	**Q3 '12**	**Q4 '12**	**2013**
PRISM	**NuScale; 4S**	**IRIS**	**mPower**	**PBMR**

Note: *Filing date and type—design cert. vs. construct-operate license—undecided for HPM

Sources: *The Wall Street Journal*; Bloomberg.com; NRC; DOE; ABA Special Committee on Nuclear Power; Nuclear Energy Institute; World Nuclear Association; company, news media websites

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Energy industry landscape: sharpening contrasts and accelerating change

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Transmission	***NERC Compliance and Organization Structure***, by C. Lyons, http://www.scottmadden.com/insight/399/NERC-Compliance-and-Organization-Structure.html
Stimulus, Program Management	***Earned Value Management***, by J. Jacobi & C. Lyons, http://www.scottmadden.com/insight/398/Earned-Value-Management.html
Smart Grid, Stimulus	***Stimulus Grant Assistance***, by J. Jacobi & C. Lyons, http://www.scottmadden.com/insight/397/Stimulus-Grant-Assistance.html
Nuclear	***Fleet Standardization—A Maintenance Success Story***, published in *Nuclear Power International* magazine, by S. Lawrie, http://www.scottmadden.com/insight/395/Fleet-Standardization-A-Maintenance-Success-Story.html
Renewables, Cleantech	***Energy from Algae***, by J. Jacobi, http://www.scottmadden.com/insight/394/Energy-from-Algae.html
Transmission	***A Discussion on NERC Compliance***, published in *Electric Light & Power* magazine, by C. Lyons, http://www.scottmadden.com/insight/396/A-Discussion-on-NERC-Compliance.html
Supply Chain	***Inventory Optimization in the Electric & Gas Utility Industry***, by J. Sequeira, http://www.scottmadden.com/insight/378/Inventory-Optimization-in-the-Electric-Gas-Utility-Industry.html
Smart Grid, Stimulus	***Stimulus Bill Grant Governance, Project Controls and Reporting Protocols***, by J. Jacobi & S. Pearman, http://www.scottmadden.com/insight/377/Stimulus-Bill-Grants-Audit-Requirements.html
Rates and Regulation	***Establishing an Ongoing Compliance Process***, by R. Starkweather, http://www.scottmadden.com/insight/376/Establishing-an-Ongoing-Compliance-Process.html
Sustainability	***Sustainability as a Shared Service***, by S. Poston, http://www.scottmadden.com/insight/379/Sustainability-as-a-Shared-Service.html

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