

# US Electric Utilities & IPPs

## Pondering the Future Fuel Mix [Revised]

### Equities

Americas  
Electric Utilities

#### Putting the story together across the fuel stack gas remains the clear winner

We have prepared our initial estimation of the latest fuel mix across coal, gas, and renewables, incorporating both the latest Clean Power Plan parameters in the 2020s as well as more robust renewable deployment. We see coal (and even nuclear) losing out principally to natural gas. Despite meaningful acceleration in renewables, these are 'held back' from the fuel mix through 2030 as a result of lower capacity factors.

#### Gas-fired outlook: Lots more coming with focus on the Eastern US

Gas remains the most attractive alternative in the near to medium term in several markets we analyzed, dominating in terms of both capacity as well as output, given high anticipated capacity factors, particularly in gas-prone regions operating as baseload. The bulk of new eastern gas should be in PJM but expect future compliance under CPP to also focus on incremental ramp of capacity factors rather than just new MWs. We highlight the breakdown of 22GW of incremental cleared supply from the PJM auctions for 2015/16 through 2018/19 as an indicator of new build to occur from 2015-2019. Over the explicit CPP period beginning in 2022, our gas additions are driven by our assumption of 50% emission savings coming from coal to gas switching: this implies 27GW of gas capacity addition over 2022-30; but gas generation is also significantly buoyed by an increase in utilization rates from ~32% by the end of this decade to 39% by 2030 (much higher ramp for CCGT portion of gas units). While rule implementation (and future administrations) could yet moderate the impact, our read is that full implementation of carbon targets could be even more punitive than we model (driving substantially greater reduction in coal, likely from renewables).

#### Our coal-fired outlook: still quite bearish once we run our numbers

We remain still quite bearish on the future of coal output, particularly on Eastern coals in the near-term. In the medium term, we are actually more cautious on demand from PRB/unscrewed Western plants as the 'next' round of EPA rules hit (largely Regional Haze) ahead of CPP in 2022. Our model assumes peak retirements of ~16GW of coal in 2015 and then another ~17GW retirements cumulative over the 2016-20 period. *We emphasize that we could be under-estimating the degree of change if renewables accelerate faster than expected.* Over the explicit CPP period, we expect more declines in dispatch rather than outright retirements given no forcing mechanism (will be increasingly viewed as marginal mid-merit and seasonal peaking capacity, supporting our thesis that more coal-to-gas conversions have yet to take place). In fact our numbers show coal consumed by the power sector will decline by 22% by 2020 (vs. 853mn tons in 2014); and out to 2030, consumption could decline by 49% compared to 2014 levels.

#### What about renewables? Gaining steadily, but still remain modest piece of pie

Solar and wind were the biggest beneficiaries from the CPP. We project renewables penetration will continue post-ITC (albeit with a significant 2017 downtick) and PTC (we assume PTC is extended till ~2018 for wind). We see further potential for 'commence construction' language for solar (implying a two-year extension to 2018) rather than a full extension, largely benefitting utility-scale. We forecast 46 GW of solar additions over the remainder of the decade and another 80GW over 2021-30 (this could well be modest). We estimate solar will contribute ~3% of the generation mix by 2020 (vs. only 0.8% in 2014) and 6.5% by 2030. For wind, we think there is still scope for meaningful additions even beyond 2018 post-PTC as targets scale. We show ~39 GW of additions over the remainder of this decade and another 30 GW additions out to 2030. We estimate wind to be ~11% of the generation mix in 2030 (vs. ~5% in 2014).

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*Revision: This version of the report replaces duplicate paragraphs on the 1<sup>st</sup> page.*

## Summary of our Model Findings

As we attempt to model the US power sector, our analysis is premised on an overall power demand growth assumption of 0.5% per annum out to 2030, and an annual CO<sub>2</sub> emission reduction of 2% per annum over the 2022-30 period. We further assume that 50% of the annual emission savings will be achieved via coal to gas switching. We forecast gas to constitute 35% of the generation mix in 2025, and 39% in 2030 (vs 27% in 2014); whereas we estimate an aggressive decline in coal to 23% in 2025 and 18% by 2030 (vs. 37% in 2014). By the end of the forecast period in 2030 we assume both coal and gas plants will be running on an average utilization of ~39% (coal-fired plants had an average capacity factor of 62% in 2014; gas was at 32%). This is not directly comparable to CPP's ~70% capacity factor target for gas CCGT, but would appear to imply figures that are still lower.

**We don't think the CPP's ~70% capacity factor target for gas can be realistically achieved.**

## Investment Conclusions

If the story on Clean Power Plan is still predominantly fixated on gas, we suspect the sector could yet continue its shift towards more gas-weighted investments, focused on both incremental new CCGT units as well as towards the associated infrastructure to support ever higher output at these units. Meanwhile conversions to gas of existing coal units would appear yet another angle to address emissions, while maintaining peaking capacity.

**Dual-fuel capabilities are a wild card.**

### Gas infrastructure tilt should become more apparent.

To this end we see the sector as increasingly biased to invest in pipes directly, seeing a desire to be both the utility off-taker and ultimate (partial) owner in the projects. Further, we see greater risk tolerance to work back up the investment curve to take exposure in even the G&P space. In particular, we expect **NEE** to trend in this direction as it continues its own tactical shift as the company seeks further growth.

**Look for more utilities to pursue offtake and ownership stakes in gas pipelines.**

### Recent M&A continues to support gas shift too

We see the latest string of gas-oriented reinvestment in the sector as 'the right move'; notably, this thesis appears to be playing out in the M&A context, with both the SO-AGL and TE-EMA deals oriented around gas infrastructure investment.

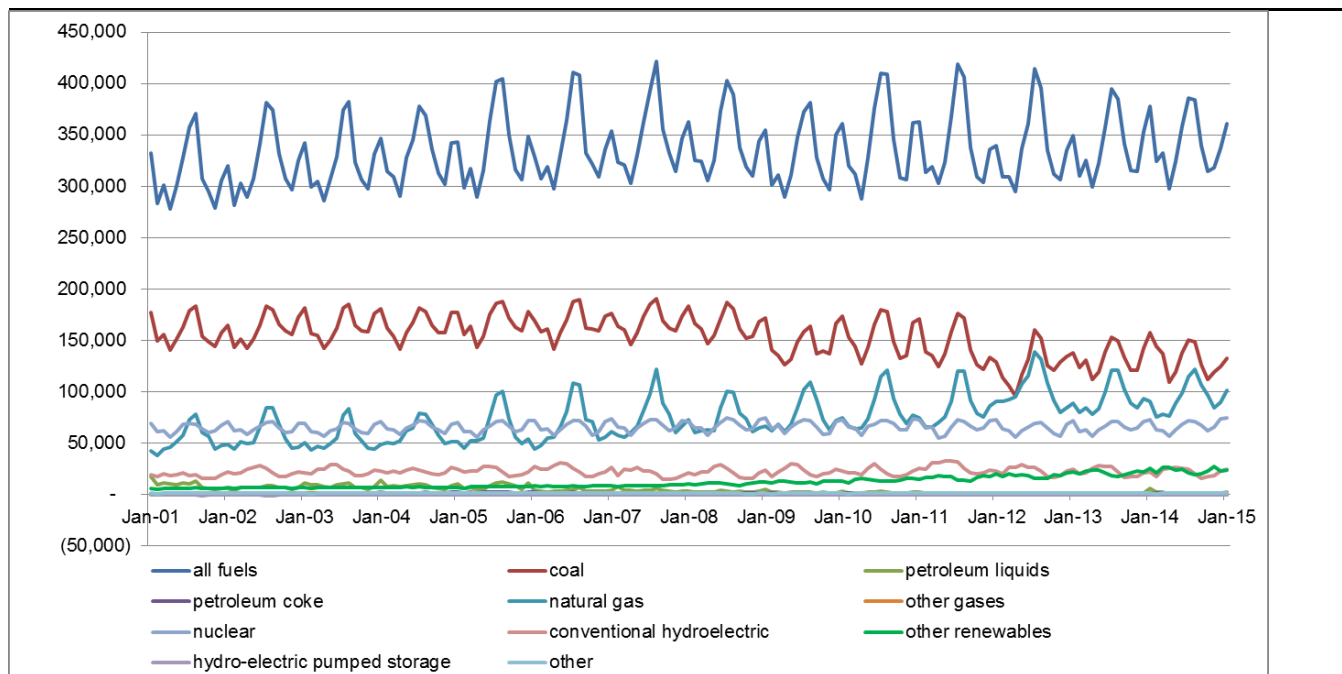
### Renewables remain the mandate – this is the 'plug'

We see a continued meaningful investment in the renewable space with both independent developers and utilities alike investing in the growing 'niche'. We see specifically companies like NEE, SUNE, and others benefitting from the thesis. Demand for the product, both DG and utility-scale remains strong, but suspect the 2017-2018 outlook will remain dominated by resi products, with the longer-dated 2018+ outlook most likely a utility-grade product. We see the CPP mandates as effectively solved with a plug from renewables to arrive at targets, with differing regions needing to rely upon this resource to varying extents.

## How has the generation mix changed over recently?

Before we dive into our projections, we show a comprehensive picture of the changes in the US generation mix that with natural gas benefitting at the expensive of coal primarily.

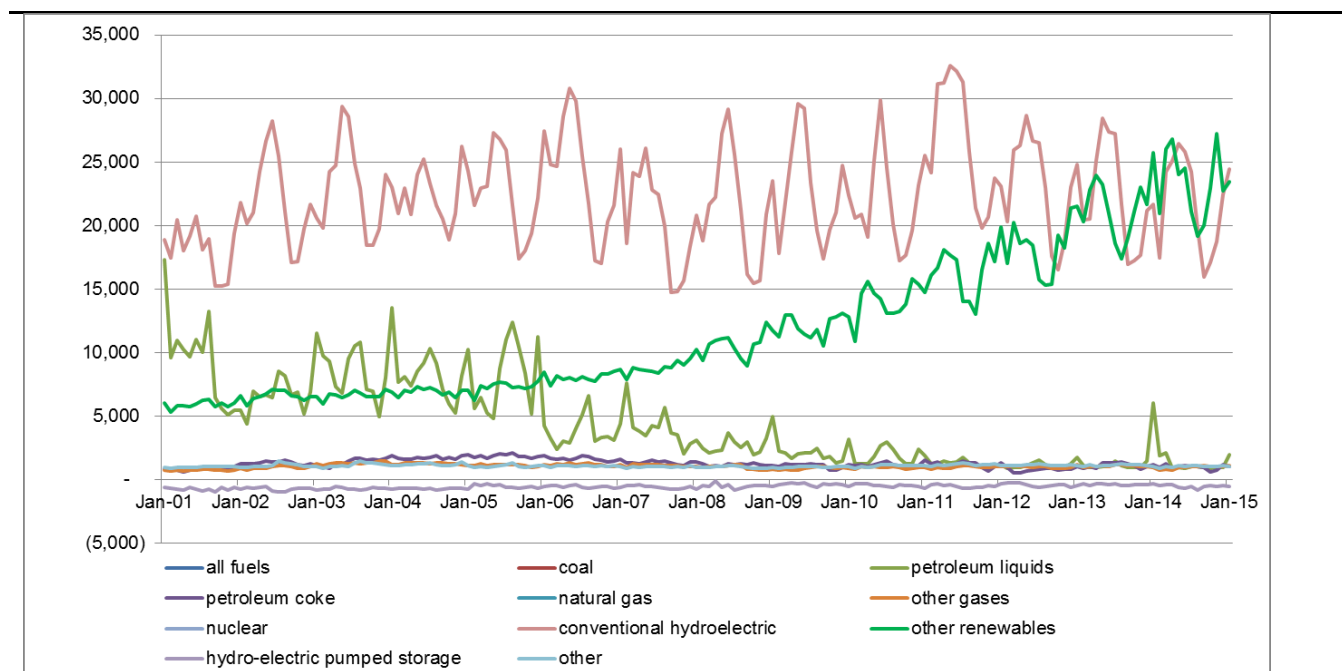
**Figure 1: US Net Electric Generation (GWh): Focus on Renewables**



Source: EIA

The figure below narrows in on the bottom of the fuel mix, showing the rapid growth of wind and solar which have collectively grown from 2% of the mix in 2001 to 7% in 2014.

**Figure 2: US Net Electric Generation (GWh): Focus on Renewables**

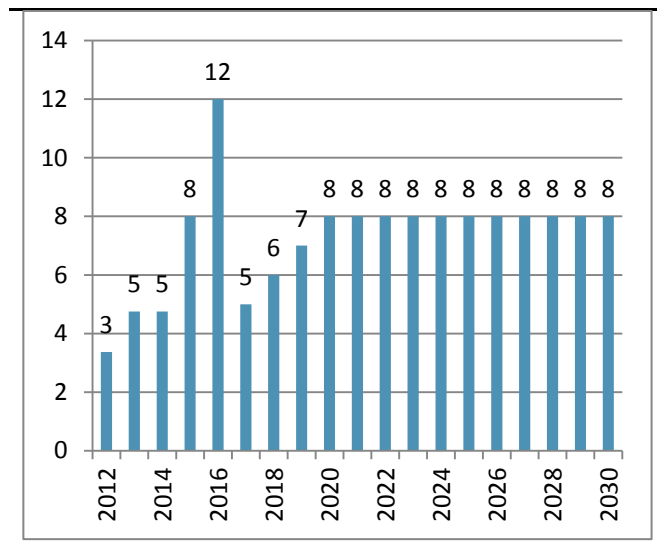


Source: EIA

## Renewables Forecast

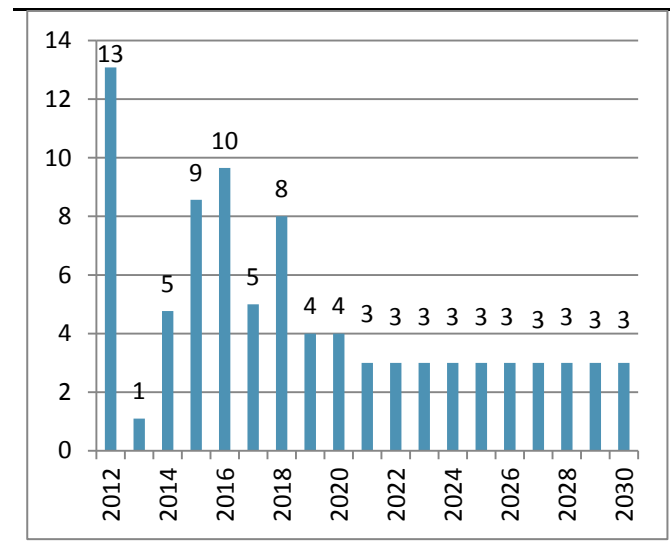
We show our forecast solar and wind additions in the charts below, reflecting SEIA's projections in the near-term (2015-2017). We see our projections, particularly for wind, as potentially under-stating the possibility for accelerated penetration. The question remains to what extent the economics pen-out to build new capacity for utilities, vs. simply ramping up on existing and future gas capacity (to displace coal) to achieve targeted carbon reductions. In the medium-to-long term, we see solid demand for solar driven principally by residential and C&I drivers from continued availability of net metering schemes (rather than being dependent on ITC and PTCs, to which wind remains quite vulnerable).

**Figure 3: Solar Additions (GW)**



Source: EIA, SIEA, UBS estimates

**Figure 4: Wind Additions (GW)**



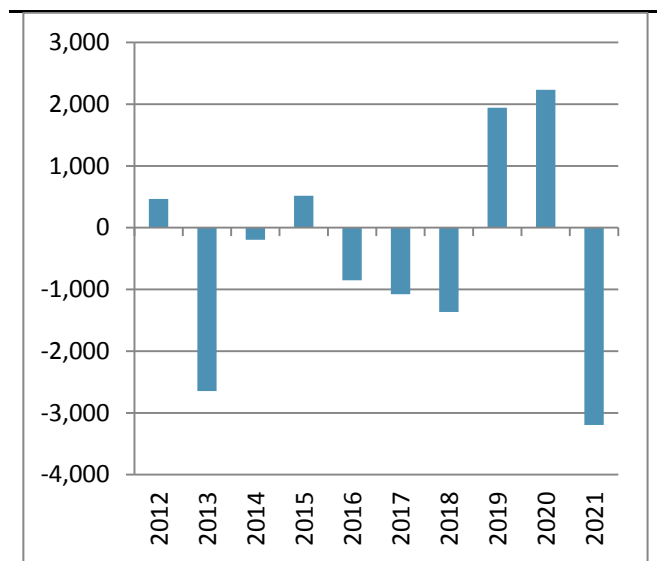
Source: EIA, UBS estimates

## Nuclear: Largely flat over our forecast period

Nuclear's contribution to the generation mix declines slightly over our forecast period from 19.5% in 2014 to ~18% in 2030. Our changes to nuclear capacity are based on explicit UBSe assumptions for units retiring/being added in the near-to -medium term. We assume SCG's Summers Units 2&3 and SO's Vogtle 3&4 come on line over 2019/20 but we also assume that ETR's FitzPatrick retires in 2016, and Palisades in 2021. We also assume retirement for EXC's Clinton, Quad Cities, Ginna and Byron over 2017-21. Overall we estimate 97GW of nukes in 2030 vs. 99GW in 2014. Again our forecast could well underestimate total retirements as the sector addresses wider FCF deficits/future capex requirements to maintain units. We caution on including more plant retirements ahead of potential state-sponsored programs to ensure their continued economic viability.

We summarize our addition/retirement schedule in the chart below:

**Figure 5: Nuclear Additions/Retirement (MW)**



Source: EIA, UBS estimates

**Figure 6: Addition/retirement schedule**

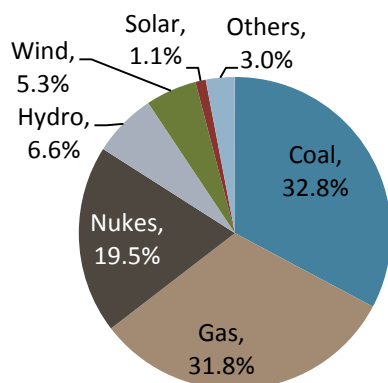
Additions		Retirements
2016		ETR's FitzPatrick (852MW)
2017		EXC's Clinton (1,078MW)
2018		EXC's Quad Cities (1,364MW)
2019	SCG's V.C. Summer Unit 2 (1,117MW) & SO's Vogtle 3 (1,117MW)	EXC's Ginna (292MW)
2020	SCG's V.C. Summer Unit 3 (1,117MW) & SO's Vogtle 4 (1,117MW)	
2021		ETR's Palisades (810MW) & EXC's Byron (2,384MW)

Source: UBS estimates

## Overall generation and capacity mix: What does our model yield?

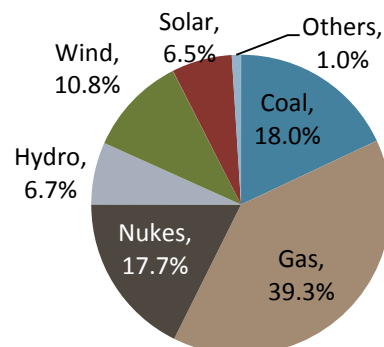
Below we show our forecast generation mix and capacity mix for 2030. We project a continued steady erosion of coal towards gas, wind, and solar.

**Figure 7: Generation Output Mix in 2015 (MWh)**



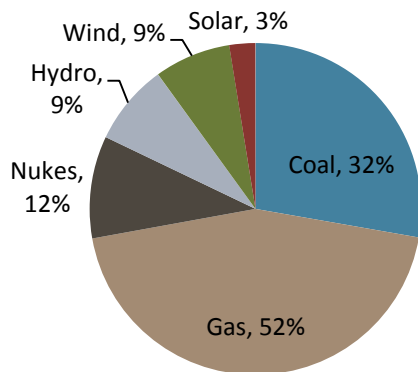
Source: EIA, UBS estimates

**Figure 8: Generation Output Mix in 2030 (MWh)**



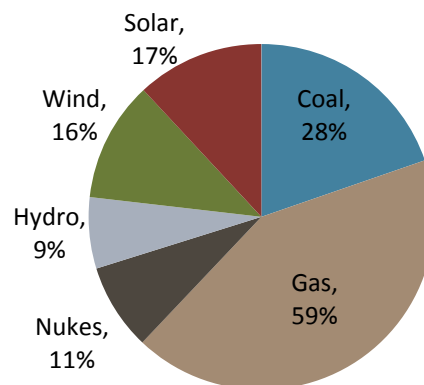
Source: EIA, UBS estimates

**Figure 9: Capacity Mix in 2015 (MWs)**



Source: EIA, UBS estimates

**Figure 10: Capacity Mix in 2030 (MWs)**



Source: EIA, UBS estimates

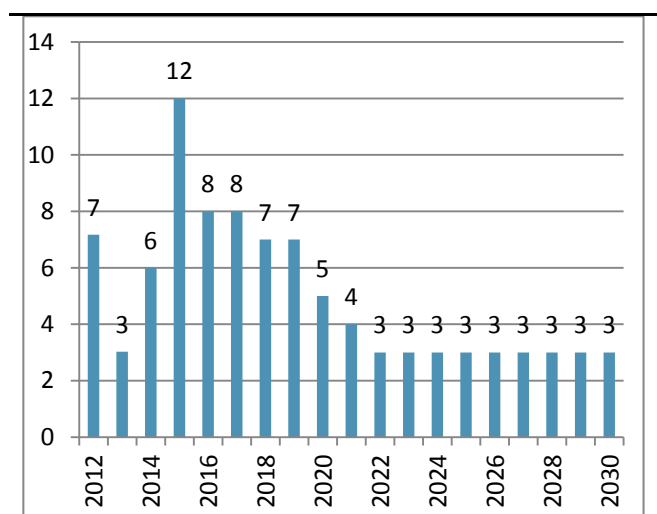
## Coal vs Gas: Aggressive switching

Coal-to-gas switching will be driven by both the relative economics of gas given lower price as well as emission targets. We assume ~50% of the annual -2% reduction in carbon emissions will be achieved from coal-to-gas switching. While we do not think there will be a single-year with substantial coal retirements (on a *capacity* basis), the story for coal will be continued meaningful erosion in output (capacity factor) as targets are achieved.

We flag clear potential for acceleration in coal-to-gas conversions to address potential EPA requirements on emissions, while maintaining leverage to receive capacity payments.

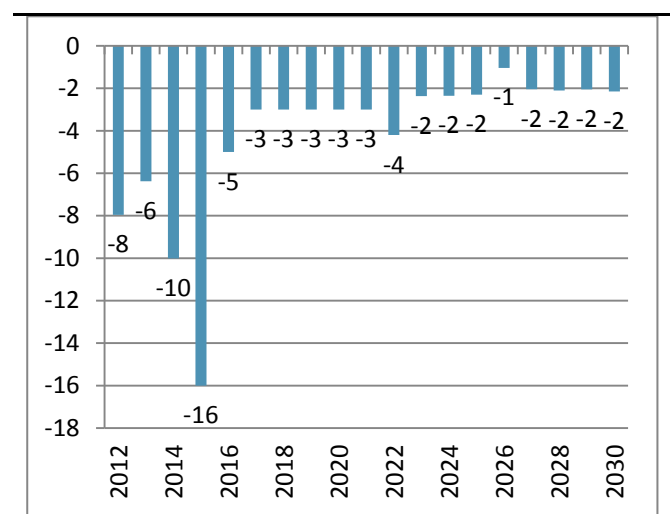
We assume limited incremental generation from gas in subsequent years, as 2015 dispatch could prove a relative high water mark given the extremely depressed regional gas prices driving substantial switching. We assume a modest normalization YoY into 2016.

**Figure 11: Gas Additions (GW)**



Source: EIA, UBS estimates

**Figure 12: Coal Retirements (GW)**

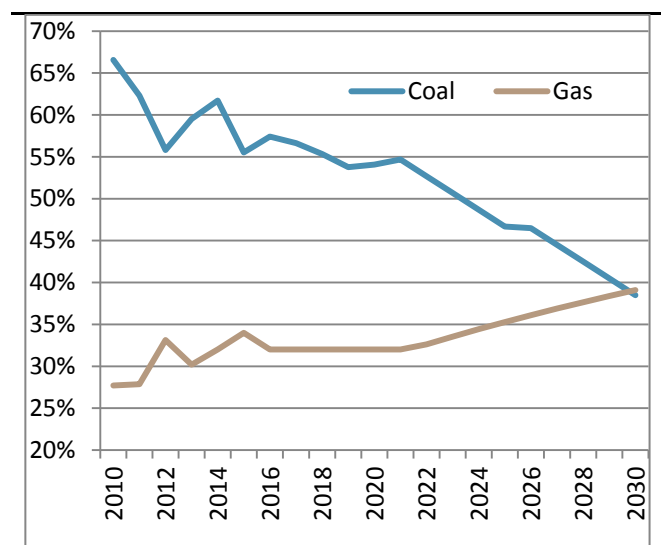


Source: EIA, UBS estimates

Although we do not think that CPP targets of achieving 70% CCGT capacity factors are necessarily realistic, we nonetheless do assume increasing gas utilization

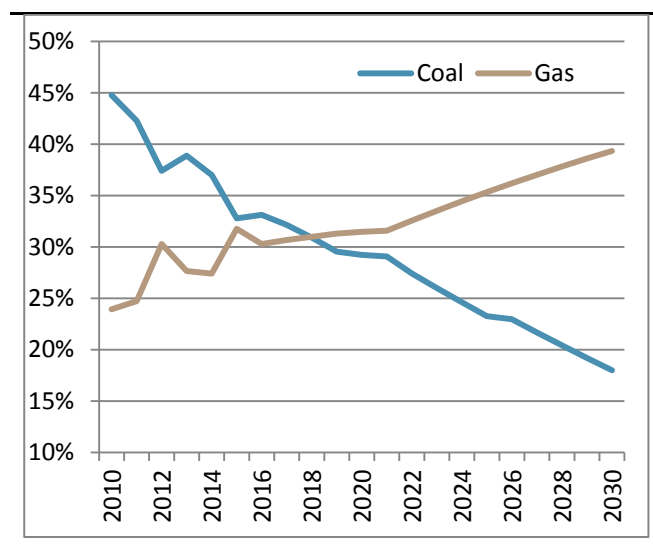
and reducing coal utilization in our model. The charts below summarize our capacity factor assumptions, and the change in contribution of both to the generation mix.

**Figure 13: Capacity factors: Coal vs Gas**



Source: EIA, UBS estimates

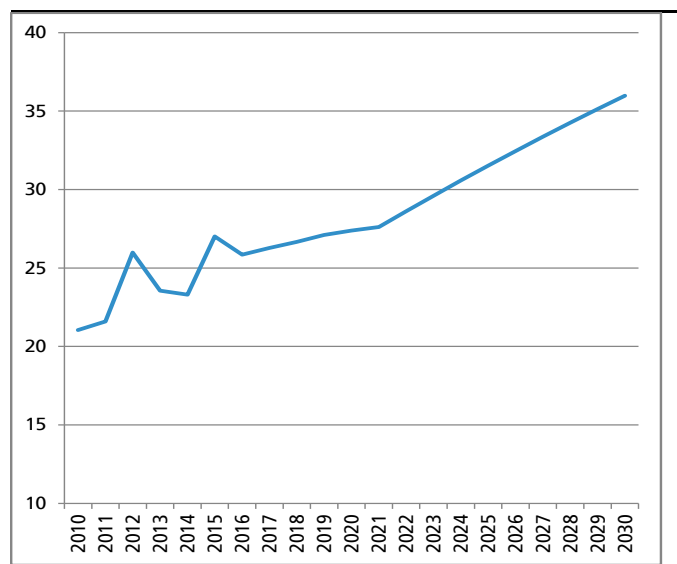
**Figure 14: Share in overall generation mix**



Source: EIA, UBS estimates

Below we show the increase in gas consumption implicit in our model forecasts: a significant 107% increase in volumes consumed by 2030 (36bcf/day in '30 vs. 23bcf/day in '14).

**Figure 15: Implied gas consumption for power sector (Bcf/d)**



Source: UBS estimates

## Refreshing our near term coal to gas switching model

Below tables show the Net Electricity Generation in US from 2008 through June 2015 with corresponding demand in coal and natural gas from Electricity Sector.

**Figure 16: Total Electric Net Generation (GWhs)**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2008	363	325	325	306	325	373	403	389	338	319	310	344	4,119
2009	355	301	311	290	311	348	373	381	327	307	297	351	3,950
2010	361	320	312	288	328	376	410	409	346	308	306	362	4,125
2011	363	313	319	302	324	368	419	407	338	309	304	336	4,100
2012	340	309	309	295	337	361	415	396	335	312	306	335	4,048
2013	348	309	325	298	322	356	394	384	340	315	314	352	4,058
2014	378	324	332	298	324	358	386	384	340	315	318	337	4,093
2015	361	335	324	294	322	362							

Source: EIA

While net generation decreased by 0.8% in 1H15 compared to 1H14, coal consumption in electricity sector decreased by 13.1% with simultaneous increase in gas consumption in electricity sector by 17.3% (refer the table below).

**Figure 17: Electric Sector Demand for Coal (ktons)**

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2008	94,532	86,702	83,373	76,924	81,248	89,532	98,194	95,752	85,545	80,186	80,993	89,353	1,042,335
2009	90,639	74,256	71,990	67,209	70,508	79,071	84,360	86,789	73,705	74,686	73,150	88,320	934,683
2010	90,767	80,209	76,544	67,037	76,061	87,395	94,993	94,786	79,573	70,918	72,756	88,645	979,684
2011	90,208	73,614	72,645	67,128	73,522	84,156	94,304	92,297	76,790	69,605	67,059	73,610	934,938
2012	70,744	62,974	57,468	51,806	62,801	71,656	86,516	82,676	69,478	66,486	69,913	73,217	825,734
2013	74,985	67,141	70,395	60,899	64,737	75,178	83,223	81,984	72,704	66,359	65,902	77,283	860,790
2014	83,600	76,252	72,234	58,151	64,018	74,488	81,580	81,164	69,242	61,323	64,633	67,730	854,415
2015	71,518	67,181	58,445	48,704	57,309	69,299							

Source: EIA

Recent low gas prices (avg 2Q price of \$3.2/MMBtu) boosted the consumption of gas from electricity power sector.

**Figure 18: Electric Sector Demand for Natural Gas (MMcf)**

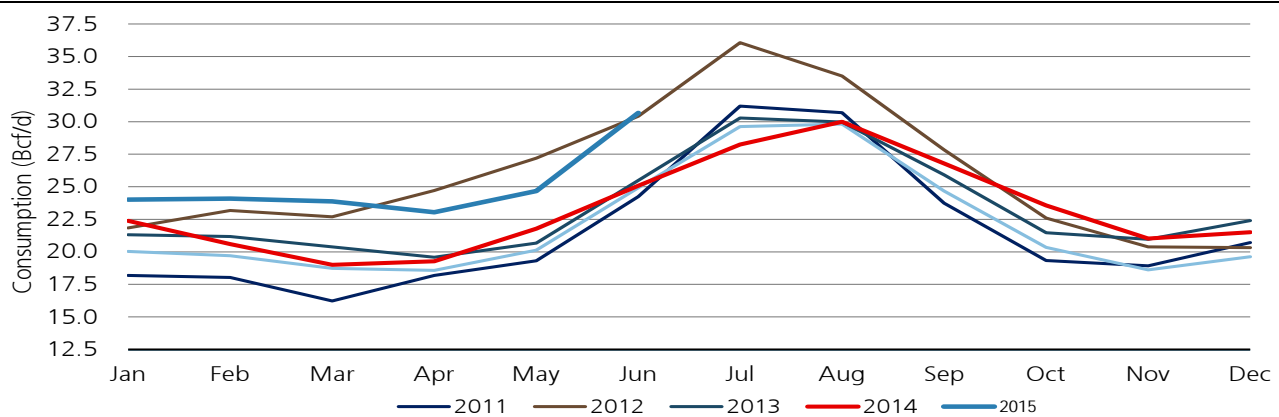
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2008	554,200	458,209	480,183	486,948	495,188	682,184	805,233	786,448	618,108	564,732	472,998	491,412	6,895,843
2009	504,728	470,035	518,595	468,256	533,170	664,674	802,024	864,501	713,414	558,901	478,878	543,893	7,121,069
2010	570,204	501,790	478,851	493,588	582,287	731,357	922,648	971,855	723,230	594,338	519,375	590,663	7,680,185
2011	563,712	505,126	503,090	545,924	598,689	727,189	967,125	951,425	711,980	599,544	568,007	642,055	7,883,865
2012	677,117	672,278	703,533	741,560	843,383	912,469	1,118,369	1,038,691	835,109	700,348	611,680	630,173	9,484,710
2013	660,483	593,069	632,112	587,434	640,799	764,875	938,552	929,275	777,304	665,310	629,045	694,225	8,512,483
2014	693,701	576,829	589,375	578,188	675,243	752,363	875,603	929,599	803,586	730,714	630,894	666,868	8,502,963
2015	744,386	674,793	740,011	691,236	764,989	920,110							

Source: EIA

While PRB coal prices will still remain competitive against gas prices above \$3/MMBtu, elevated production will keep gas prices under pressure, and with gas prices below \$3/MMBtu, it will become competitive against PRB western coals as well.



**Figure 19: Natural Gas Burn in the Power Stack (Bcf/d)**



Source: EIA

The above chart shows the natural gas burn in the power stack on Bcf/d basis. We can infer the consumption of gas in 1H15 is only second to the 2012 level.

**Figure 20: Gas Switching (Bcf/d)**

Natural Gas Burn in the Power Stack (Bcf/d)													
Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2007	15.7	17.7	22.0	26.8	25.4	20.6	18.2	15.3	16.4	16.3	15.7	16.7	18.9
2008	17.9	15.8	15.5	16.2	16.0	22.7	26.0	25.4	20.6	18.2	15.8	15.9	18.8
2009	16.3	16.8	16.7	15.6	17.2	22.2	25.9	27.9	23.8	18.0	16.0	17.5	19.5
2010	18.4	17.9	15.4	16.5	18.8	24.4	29.8	31.4	24.1	19.2	17.3	19.1	21.0
2011	18.2	18.0	16.2	18.2	19.3	24.2	31.2	30.7	23.7	19.3	18.9	20.7	21.6
2012	21.8	23.2	22.7	24.7	27.2	30.4	36.1	33.5	27.8	22.6	20.4	20.3	25.9
2013	21.3	21.2	20.4	19.6	20.7	25.5	30.3	30.0	25.9	21.5	21.0	22.4	23.3
2014	22.4	20.6	19.0	19.3	21.8	25.1	28.2	30.0	26.8	23.6	21.0	21.5	23.3
2015	24.0	24.1	23.9	23.0	24.7	30.7							
YoY Change	1.6	3.5	4.9	3.8	2.9	5.6							

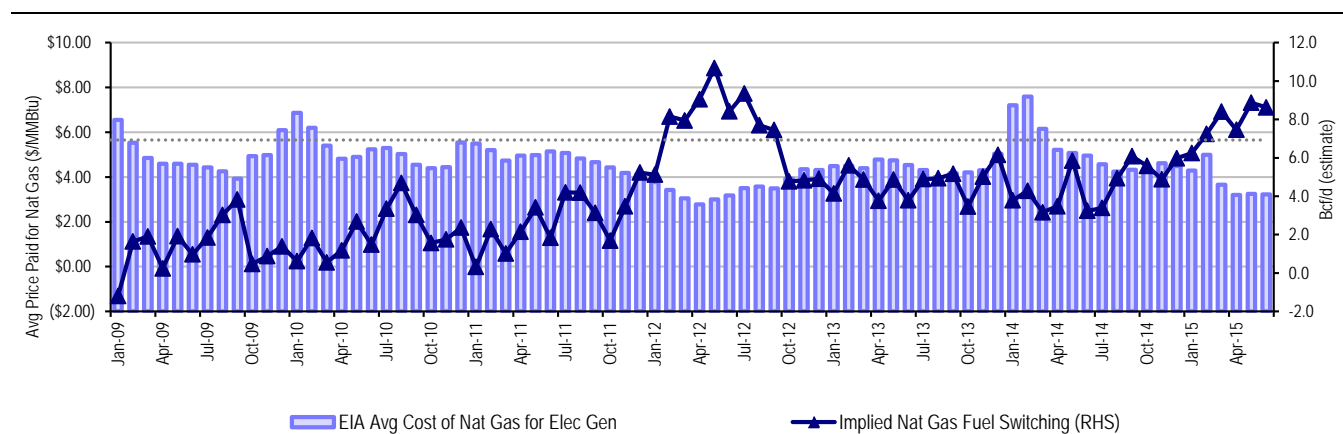
  

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Total
2008	-	-	-	-	-	-	-	-	-	-	-	-	-
2009	(1.2)	1.6	1.9	0.2	1.9	1.0	1.9	3.0	3.8	0.5	0.9	1.4	1.4
2010	0.6	1.8	0.6	1.2	2.7	1.5	3.3	4.7	3.0	1.6	1.8	2.4	2.1
2011	0.3	2.3	1.0	2.1	3.4	1.8	4.2	4.2	3.1	1.7	3.5	5.2	2.8
2012	5.1	8.1	7.9	9.1	10.7	8.4	9.3	7.7	7.4	4.8	4.8	4.9	7.4
2013	4.1	5.6	4.9	3.8	4.9	3.8	4.9	4.9	5.2	3.5	5.0	6.2	4.7
2014	3.8	4.3	3.2	3.5	5.9	3.2	3.4	4.9	6.1	5.6	4.9	6.0	4.5
2015	6.2	7.2	8.4	7.5	8.9	8.6							

Source: EIA, Switching calculations are relative to 2008

Given the declines in gas prices with gas switching surging from an average of 2.1Bcf/d from 2009-2011 to 7.8Bcf/d in 1H15 (relative to a 2008 reference year)

**Figure 21: Implied natural gas switching vis-à-vis avg cost of natural gas**



Source: EIA and UBS estimates;

Note: \$5.07/MMBtu line represents the average EIA cost of nat gas for elec generation from January 2009 - August 2011; highlighted to showcase the jump in switching following the 2H11 natgasprice collapse.

## Comparing the Cost of New Entry

We project several examples of New Entry in the Figures below – our approach to the concept is based on looking at what the revenue streams are for the project, and assume that the average revenue per output (\$/MWh) for a particular IRR target should intuitively be equivalent to the marginal cost of production.

The key here is that the LCOE for all technologies are very region/market specific. We consider this analysis for the three technologies that we think are realistically an option for new build: solar, wind and CCGT. We expect new gas will remain the focus in the Eastern US through the medium term as economics remain attractive and as part of a wider effort to meet CPP targets. In contrast, wind will remain the fuel of choice for most of the Midwest, whereas solar will remain more squarely focused in the West, as well as increasing bulk of the Southern US (including Texas/Southeast).

Residential solar: Will continue to expand to other regions as prices continue to decline as long as existing net metering subsidies and variable tariff design remain in place. We expect limited new markets to open up through 2017 given pending expiration of ITCs.

What does it mean to take away the tax credits? We emphasize the PTCs are worth a pre-tax figure of closer to \$30/MWh (rather than their after-tax value of \$23/MWh). This would drive PPA prices up to the 5-6¢/KWh range. In contrast, pricing for solar without the tax credits would also appear worth 2-3¢/KWh. The key question is how much of a further cost reduction is possible.

**Figure 22: What's it cost for utility scale wind? 2-3¢/KWh of late.**

General		Operational		Financing (Initial)		Final Cap Structure	
Total Capacity (MW)	150	PPA Price (¢/KWh)	\$0.027	Debt	65%	Debt	\$133
Generation (GWh)	591	PPA Inflator	0%	Equity	35%	Grant	\$0.00
Investor IRR	12.3%	Opex /kWh	\$0.010	Debt (\$M)	\$133.00	Net Debt	\$133
Construction Cost (\$M)	\$205	Capacity Factor	45.0%	Equity (\$M)	\$72	Equity	\$72
Implied Cost (\$/kW)	\$1,364	Degradation factor	1%	Cost of Debt	6.0%	Grant	\$0
Effective Tax (Federal + State)	41%	PTC / kWh	\$0.023	Debt Tenor	20	Net Equity	\$72
EV/EBITDA	8.6x	PTC Inflator	2%	FCF Cash Sweep to Debt	20%	Equity / Cap	35%
						Debt / Cap	65%
<b>Returns</b>		Base Case:		Difference vs. Base:			
Pre-tax IRR	9.0%	7.8% Pre-tax IRR		1.2% Pre-tax IRR			
After-tax levered IRR	12.6%	11.6% After-tax levered IRR		1.0% After-tax levered IRR			

Source: UBS estimates, Platts, SNL Energy

Figure 23: What's it cost for utility scale solar ? 5c/KWh of late.

Construction Cost \$M		Operational		Financing (Initial)		Final Cap Structure	
Total Capacity (MW)	150	PPA Price (¢/KWh)	\$0.050	Debt	65%	Debt	\$156
Generation (GWh)	368	PPA Inflator	0%	Equity	35%	Grant	\$60
Investor IRR	8.5%	O&M (\$/kW-yr)	\$10	Debt \$ Mn	\$156	Net Debt	\$96
Construction Cost \$M	\$240	Capacity Factor	28%	Equity \$ Mn	\$84	Equity	\$84
Implied Cost (\$/kW)	\$1,600	Degradation factor	0.5%	Cost of Debt	6%	Grant	\$7
Inverter Replacement (\$/kW)	\$160			Debt Tenor	20	Net Equity	\$77
Equipment Cost (\$M)	\$210			Cash Grant (\$ Mn)	\$67	Equity / Cap	45%
Effective Tax (Federal + State)	41%			FCF Cash Sweep to Debt	20%	Debt / Cap	55%
EV/EBITDA	10.2x			Cash Grant to Debt	90%		
Returns				Base Case:		Difference vs. Base:	
Pre-tax IRR	7.4%			8.1% Pre-tax IRR		-0.7% Pre-tax IRR	
After-tax levered IRR	8.5%			9.1% After-tax levered IRR		-0.6% After-tax levered IRR	
LCOE (\$/MWh)	50.0						

Source: UBS estimates

Figure 24: Resi Solar: Average revenue is ~14-15/KWh

General		Operational		Financing (Initial)		Final Cap Structure	
Total Capacity (kW)	5	PPA Price (¢/KWh)	\$0.130	Debt	85%	Debt	\$12
Generation (MWh)	8	PPA Inflator	1%	Equity	15%	Grant	\$6
Investor IRR	12.8%	O&M (\$/kW-yr)	\$20	Debt \$ Mn	\$12	Net Debt	\$6
Construction Cost \$K	\$14.3	Capacity Factor	17%	Equity \$ Mn	\$2	Equity	\$2
Implied Cost (\$/W)	\$2.86	Degradation factor	0.5%	Cost of Debt	5%	Grant	\$1
FMV	\$4.50			Debt Tenor	20	Net Equity	\$2
Inverter Replacement (\$/W)	\$0.29			Cash Grant (\$ Mn)	\$6	Equity / Cap	19%
Equipment Cost (\$K)	\$7			FCF Cash Sweep to Debt	20%	Debt / Cap	81%
Effective Tax (Federal + State)	41%			Cash Grant to Debt	90%		
EV/EBITDA	9.0x						
<b>Returns</b>							
Pre-tax IRR	16.9%						
After-tax levered IRR	12.8%						
LCOE (\$/MWh)		146.5					

Source: UBS estimates, Platts, SNL Energy

### Gas plants are still quite competitive.

We include our latest assumptions for a gas plant in the PJM footprint, where we estimate all-in average revenues are ~\$50/MWh predicated on a gas strip that is sub-\$3/MMBtu. We see the PJM market as among the only markets in the US where gas is sufficiently economic to build on a merchant basis; New York is likely to continue to see entry, whereas New England could see an additional unit (albeit we suspect the bulk has already cleared).

Meanwhile, the ERCOT cycle has seemingly fully turned, with limited new gas capacity economic to add (we suspect this is likely the case for quite some time given new entry economics for both solar and wind will likely prove 'incremental')

sources of capacity). We suspect 'merchant solar' could well be a viable future alternative to gas.

**Figure 25: How does this compare to gas? CCGT in PJM West**

<b>Assumptions</b>			
Capacity (MW)	850	Dom-South 2016 (\$/Mmbtu)	2.8
O&M (\$/kw -year)	20.00	PJM West ATC 2016 (\$/MWh) + 3% Premium	<u>41.5</u>
Interest Rate	5.5%	Spark Spread	22.7
Tax Rate	37.5%	Capacity Factor (%)	80%
Construction Cost (\$/kw)	1,100	Output (TWh)	5.96
Debt/Cap	60%	Debt Amortization (Annually)	1%
Equity/Cap	40%	Long Term Capacity Price (\$/MW-day)	120
Property Tax Rate	1%		
Maintenance Capex (\$/kw -year)	10	WACC	9.6%
Variable O&M (\$/MWh)	0.50	IRR (unlevered)	10.8%
Useful Life (Years)	30	IRR (equity)	18.9%
<b>Average Revenue (\$/MWh)</b>	<b>48</b>		

Source: UBS estimates, Platts, SNL Energy

## Statement of Risk

Risks for Utilities and Independent Power Producers (IPPs) primarily relate to volatile commodity prices for power, natural gas, and coal. Risks to IPPs also stem from load variability, and operational risk in running these facilities. Rising coal and, to a certain extent, uranium prices could pressure margins as the fuel hedges roll off Competitive Integrators. Further, IPPs face declining revenues as in the money power and gas hedges roll off. Other non-regulated risks include weather and for some, foreign currency risk, which again must be diligently accounted in the company's risk management operations. Major external factors, which affect our valuation, are environmental risks. Environmental capex could escalate if stricter emission standards are implemented. We believe a nuclear accident or a change in the Nuclear Regulatory Commission/Environment Protection Agency regulations could have a negative impact on our estimates. Risks for regulated utilities include the uncertainty around the composition of state regulatory Commissions, adverse regulatory changes, unfavorable weather conditions, variance from normal population growth, and changes in customer mix. Changes in macroeconomic factors will affect customer additions/subtractions and usage patterns.

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Neutral	FSR is between -6% and 6% of the MRA.	42%	32%
Sell	FSR is > 6% below the MRA.	13%	20%
Short-Term Rating	Definition	Coverage <sup>3</sup>	IB Services <sup>4</sup>
Buy	Stock price expected to rise within three months from the time the rating was assigned because of a specific catalyst or event.	less than 1%	less than 1%
Sell	Stock price expected to fall within three months from the time the rating was assigned because of a specific catalyst or event.	less than 1%	less than 1%

Source: UBS. Rating allocations are as of 30 June 2015.

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