

A photograph of an industrial facility at night, showing a complex of pipes, walkways, and a large cylindrical tank. A plume of white steam or smoke rises from a stack on the right side of the structure. The scene is illuminated by several bright lights, creating a high-contrast image against the dark blue night sky.

2014 PJM CONE REVIEW

Analysis of New Build Financial
Assumptions

July 2014

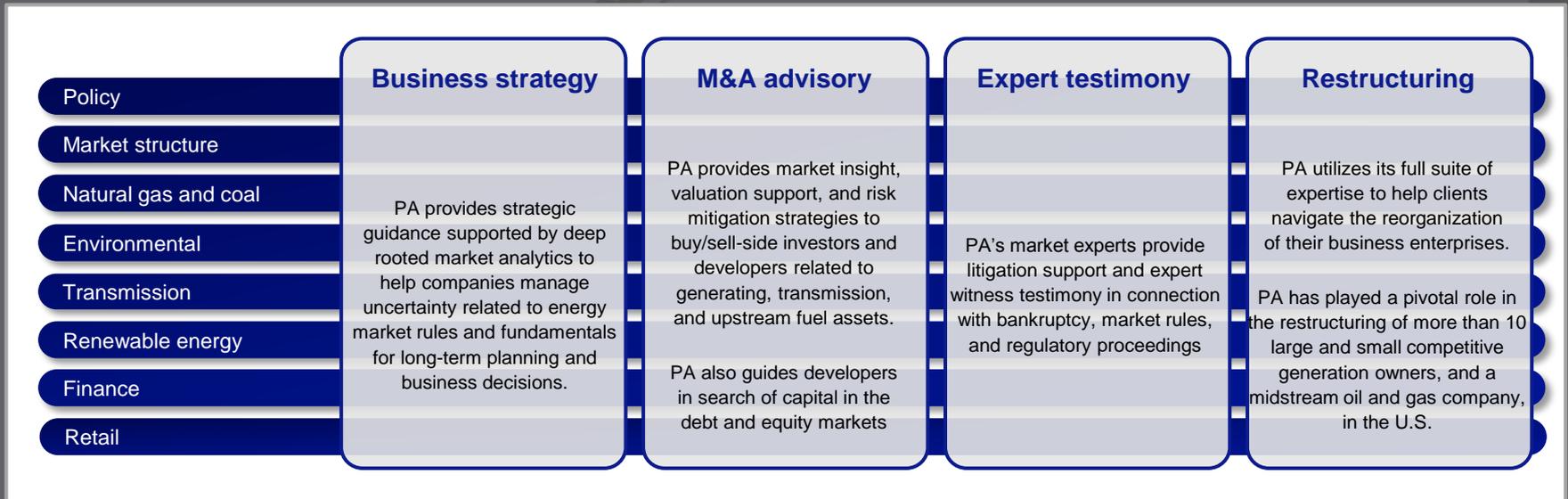
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PA's team of energy economic advisors help clients navigate through uncertainty, make transactions happen, and establish regulatory/legal arguments

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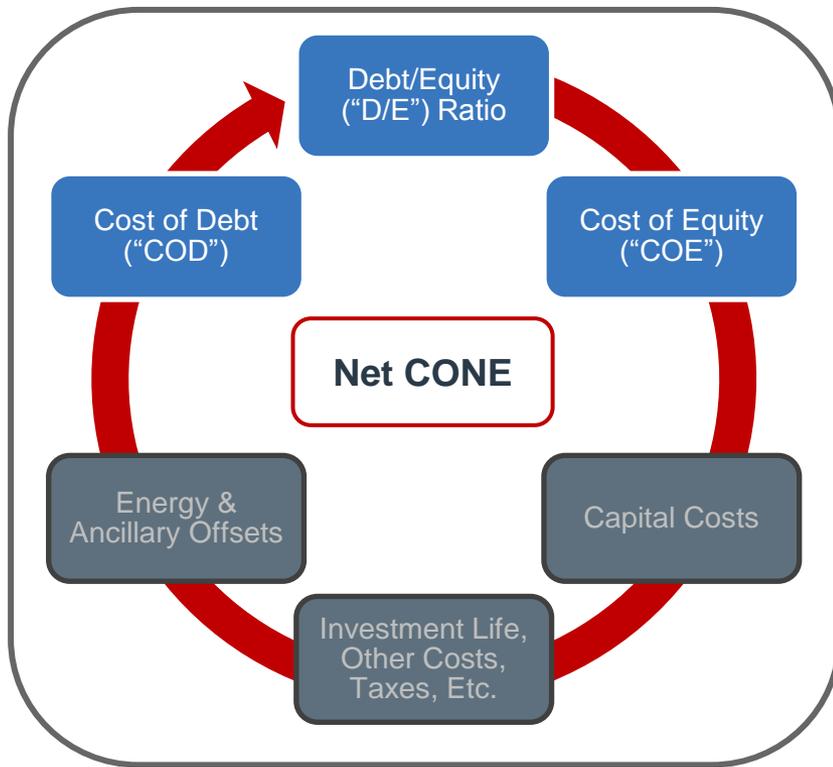
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PA analyzed three components of the Net CONE¹ calculation proposed by The Brattle Group, Inc. (“Brattle”) in its triennial review of the PJM Variable Resource Requirement (“VRR”) curve (the “2014 Brattle Study”²)

PA’s analysis focuses on the Debt/Equity, Cost of Debt, and Cost of Equity parameters proposed by Brattle to be used for a three year period, starting with the Reliability Pricing Model’s (“RPM”) 2018/2019 Base Residual Auction (“BRA”).

- Importantly, PA’s analysis does not opine on other parameters proposed by Brattle - including the appropriate reference technology, capital costs, investment life, energy & ancillary (“E&A”) offsets, etc.



Key 2014 Brattle Study Assumptions Analyzed

- D/E Ratio: Brattle proposes a 60/40 D/E Ratio, for both combined cycle (“CC”) and combustion turbine (“CT” or “peaker”) reference technologies:³
- COD: Brattle proposes a pre-tax rate of 7.0%; and
- COE: Brattle proposes 13.8%.

In general, Brattle’s recommendations are based on a range of sources, including (1) the Capital Asset Pricing Model (“CAPM”) approach for publicly-traded Independent Power Producers (“IPP”); (2) previous triennial review process estimates; and (3) fairness and other analyst estimates.

¹ Cost of New Entry.

² *Cost of New Entry Estimates for Combustion Turbine and Combined Cycle Plants in PJM With June 1, 2018 Online Date*, published May 15, 2014.

³ The 2014 Brattle Study proposes to average CC and CT reference technologies to calculate Net CONE and, importantly, to utilize the same financial parameters for both technology types.

The risk profiles of publicly-traded IPPs are incompatible with recent and current merchant project development in PJM, thus making CAPM or, more broadly, corporate-level financials, a largely irrelevant risk metric

The CAPM approach for a basket of publicly-traded IPPs reflects the risk associated with a much more diversified asset base, as compared to a single power generation investment/development in the PJM market.

- Publicly-traded IPPs are regionally, technologically and fuel-diverse portfolios, with relatively stable earnings due to (1) the aforementioned diversification; (2) long-term asset contracts; and (3) corporate-level hedges on portfolio earnings.
 - The universe of publicly-traded U.S. IPPs has shrunk since the 2011 triennial review, with remaining publicly-traded IPPs becoming larger and more diverse – and, all else equal, further widening the disconnect between a CAPM-approach and single power generation investment in the PJM market.
- In addition, even among publicly-traded IPPs, based on PA's experience and market observations, these entities would rarely apply CAPM risk metrics to in-house single asset merchant investment/development being pursued.

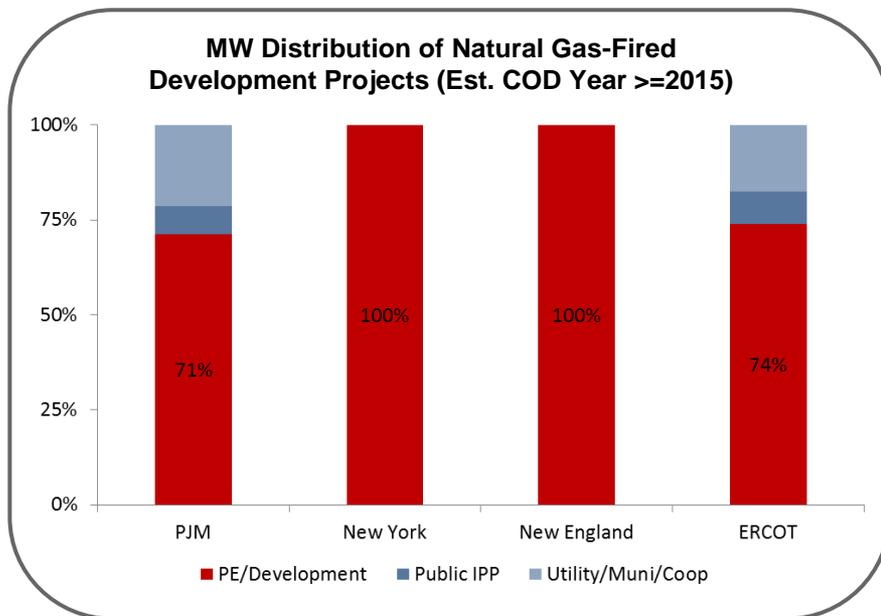
In developing financial parameters, an IPP/CAPM-centric methodology ignores the reality of recent and current project development in PJM.

- *This view effectively ignores the risk profiles associated with the more expansive universe of private equity and development shops that are currently investing and developing in the market.*

A significant portion of new thermal development in PJM, and other wholesale power markets, is being pursued by private equity (“PE”) and development shops – not by publicly-traded IPPs

To determine the appropriate investment return metrics, PA analyzed natural gas-fired thermal projects with a projected commercial online date (“COD”) of 2015 or after (i.e., the period covered by the last triennial CONE review process), and with a high likelihood of moving forward (i.e., capacity is under construction and/or has cleared a formalized capacity market and/or has achieved financing, etc.).

- **Greater than 70%** of the natural gas-fired projects (by capacity) currently under development in the PJM market are being developed by PE/Development shops;
 - Other wholesale power markets have seen similar or greater development levels by these types of entities.
- **Less than 10%** of thermal capacity currently under development in PJM is being pursued by publicly-traded IPPs.



The current project development environment leads to a different capital structure than one implied by a CAPM (or, more broadly, corporate-level/balance sheet) approach.

- PE/Development shops (1) do not tend to be as well-diversified (geographically or technologically) as publicly-traded IPPs; and (2) typically pursue financing on a project-level basis, further altering the investment environment from that which a CAPM-type approach would imply.
- However, while the 2014 Brattle Study primarily relies on three (3) sets of data to derive proposed WACC¹ parameters, all three sets of data are premised on corporate-level (i.e., balance sheet) publicly-traded IPP financial metrics.

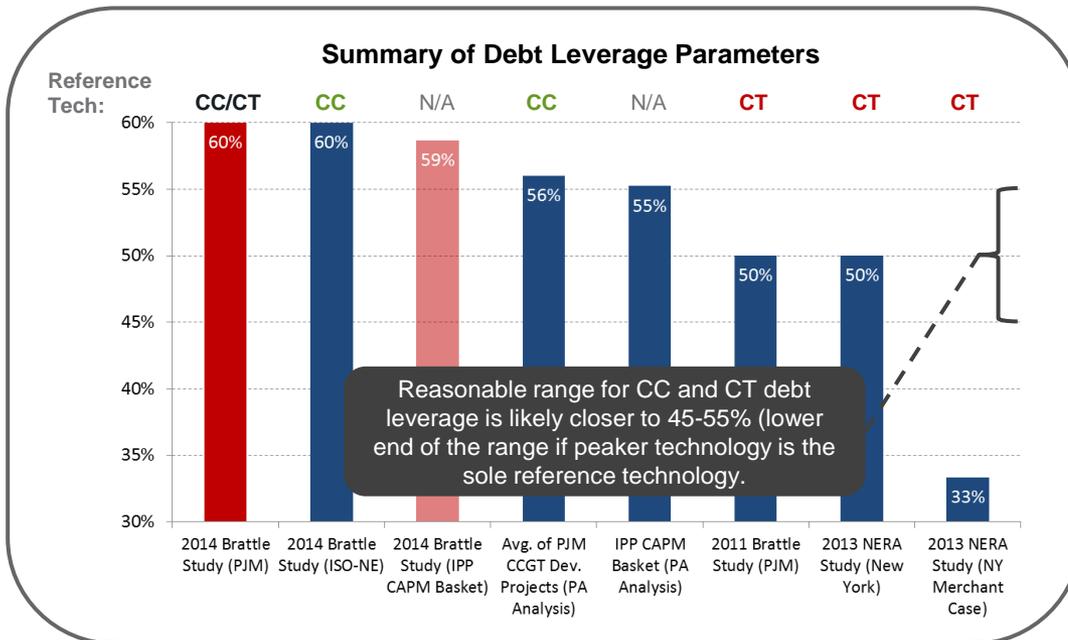
Source: PA Consulting Group analysis.

¹ Weighted Average Cost of Capital.

D/E ratios proposed in the 2014 Brattle Study indicate higher leverage than what may actually be achievable in the PJM market for single asset investment/development

The 2014 Brattle Study proposes a D/E ratio of 60% debt and 40% equity; parameters that appear to be based off the average D/E ratio of the 2014 IPP basket (i.e., Calpine, Dynegy and NRG).

- Brattle’s proposed D/E ratio is 10 percentage points higher than that proposed during the 2011 triennial review process,¹ and 10 percentage points higher than recent parameters adopted in New York.²
- Brattle’s proposed D/E ratio is also higher than the average leverage achieved by recent combined cycle development projects in the PJM footprint, which have averaged closer to a 55%/45% D/E ratio.³



In addition to the aforementioned observations, there are three (3) critical considerations that could lower the observed debt leverage range:

- It is unclear if peakers could achieve the same level of leverage that a combined cycle could achieve – this is an important consideration given Brattle’s proposal to use an average of CC and CT reference technologies;
- Most developers are currently using cash sweeps for Term B loans, and de-levering after the initial debt term (potentially as low as 30% leverage); and
- Most recent and current financings (and achievable leverage) in the market rely upon a companion hedge; all else equal, an unhedged financing would likely decrease debt leverage.⁴

¹ *Second Performance Assessment of PJM’s Reliability Pricing Model*, published August 26, 2011 by The Brattle Group.

² *Independent Study to Establish Parameters of the ICAP Demand Curve for the New York Independent System Operator Final Report*, published August 2, 2013 by NERA Economic Consulting (“2013 NERA Study”).

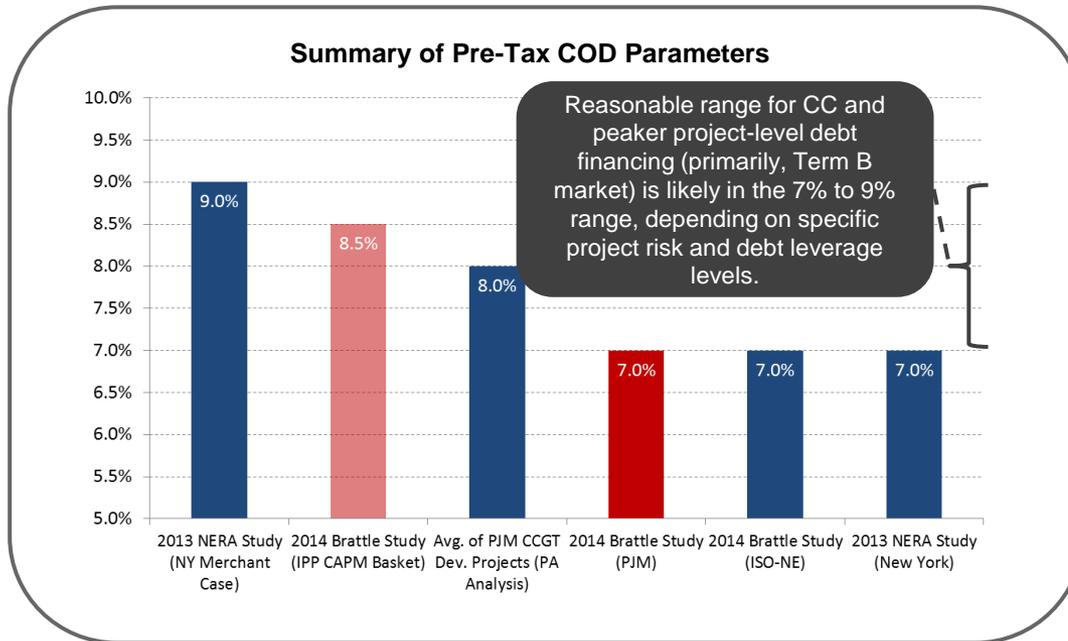
³ Based on an analysis of the combined cycles that have achieved financing since 2012.

⁴ The current E&A offsets methodology utilizes an “unhedged” approach.

In addition, the majority of recent and current financings in the PJM market for single asset investment/development have been done on a project-level basis, and have exhibited pre-tax CODs higher than those indicated in the 2014 Brattle Study

The 2014 Brattle Study proposes a pre-tax COD of 7.0%, which is approximately 1.5 percentage points lower than the COD implied by Brattle's IPP CAPM analysis (i.e., balance sheet financing) and 1 percentage point lower than CODs observed in recent financings of combined cycle development projects in PJM¹.

- Based on PA's experience working with project developers and discussions with industry contacts, CODs of 7% may be achievable, but typically at lower D/E ratios than the 60/40 ratio proposed in the 2014 Brattle Study; for example, these COD-levels *may* be achievable at a 45/55 or 50/50 D/E ratio.
- Based on these same discussions, higher debt leverage ratios (i.e., $\geq 60\%$) carry a higher interest rate (either in the Term B market or through the need to access higher cost mezzanine level debt).



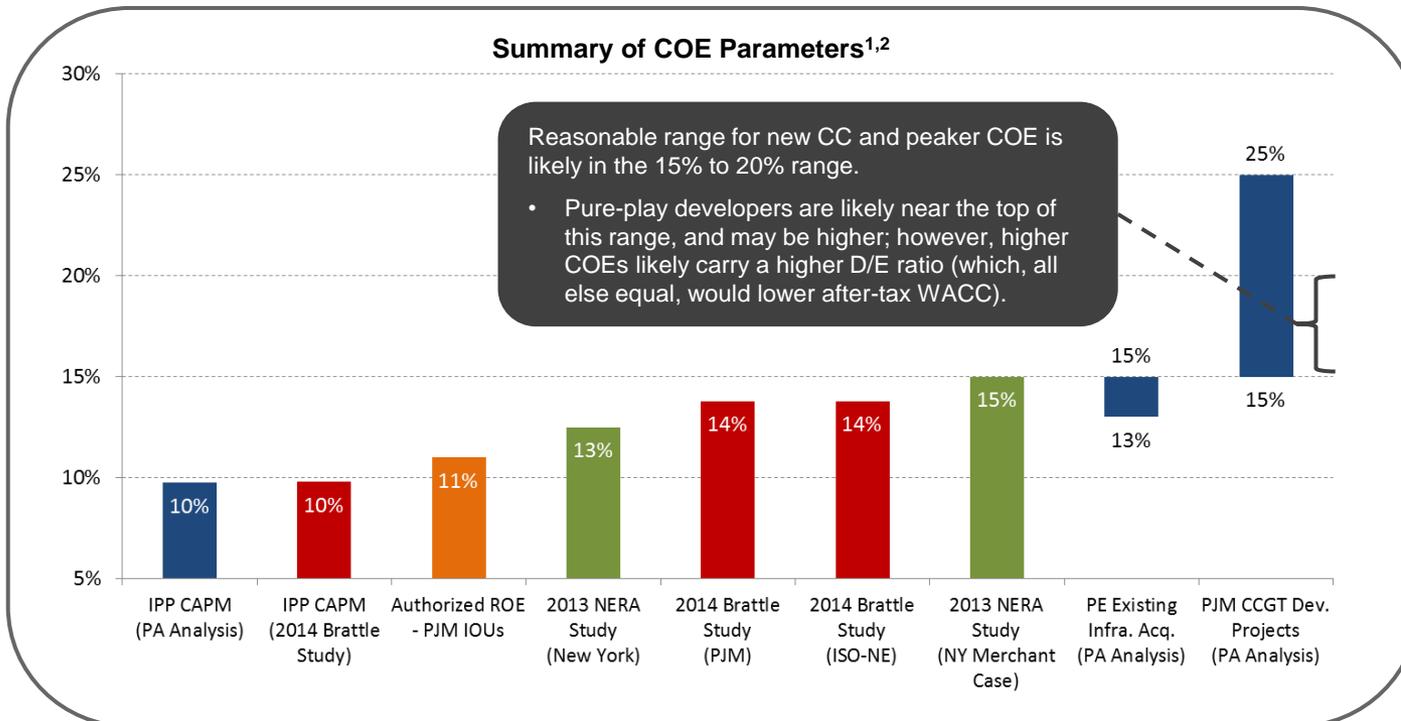
Recent project-level financing in the PJM market, which has averaged a ~55/45 D/E ratio (see previous slide), has seen debt rates average ~8%.¹

¹ Based on an analysis of the combined cycles that have achieved financing since 2012, and with publicly available COD information.

Similarly, observed equity returns (i.e., COEs) among actual developers and acquirers of capacity in PJM are likely higher than those proposed in the 2014 Brattle Study

The 2014 Brattle Study proposes a COE parameter of 13.8%, which, when compared to implied COEs in an IPP CAPM approach, appear to acknowledge some of the incremental risk borne by developers of merchant capacity in the PJM market.

- However, based on PA’s discussions with industry contacts and experience working with project developers, this proposed COE may be at the low end of the range, especially among PE/Development shops.



Among developers seeking project financing, some COEs may be lower than the indicated range, however, these lower COE levels often reflect a discount due to hedge requirements.³

³ The current E&A offsets methodology utilizes an “unhedged” approach. See D/E ratio slide for a similar discussion.

¹ Authorized Return on Equity (“ROE”) – PJM Investor-Owned Utilities (“IOU”) include Virginia Electric and Power Company, Appalachian Power Company and Monongahela Power Company.

² ‘PE Existing Infrastructure Acquisition’ and ‘PJM CCGT Development Projects’ COE ranges developed based on PA’s experience in supporting actual acquisitions and development projects and discussions with active power generation investors in the marketplace.

Based on PA's analysis, the 2014 Brattle Study may be underestimating the proposed after-tax WACC by 1 to 5.5 percentage points - when adjusting for appropriate D/E ratio, COD, and COE parameters

Based on the observations and parameter ranges outlined on the previous slides, PA recalculated the after-tax WACC, assuming a 40% corporate tax rate in all cases.

- The lower end of PA's range results in an after-tax WACC of approximately 9% (~1 percentage point higher than the 2014 Brattle Study);
- The higher end of PA's range results in an after-tax WACC of approximately 13.5% (~5.5 percentage points higher than the 2014 Brattle Study).

	Brattle	PA (Lower)	PA (Higher)
D/E Ratio	60% / 40%	55% / 45%	45% / 55%
Pre-Tax COD	7.0%	7.0%	9.0%
<u>COE</u>	<u>13.8%</u>	<u>15.0%</u>	<u>20.0%</u>
After-Tax WACC	8%	9%	13.5%

Conclusions

- Relying on corporate-level (i.e., balance sheet) financial metrics to derive WACC parameters is inappropriate as it ignores the reality of current and on-going thermal project development in the PJM footprint.
 - The vast majority of projects under development in the PJM footprint are being pursued by PE and development shops, and the developers of these projects rely almost exclusively on project-level finance; moreover, the universe of publicly-traded U.S. IPPs has shrunk considerably since the 2011 triennial review, with remaining publicly-traded IPPs becoming larger and more diverse (further widening the disconnect between a CAPM-type approach and single power generation investment in the PJM market).
- A reasonable range for CC and CT debt leverage is 45-55%, with CT technology likely coming at the lower end of the range.
 - Brattle's proposed D/E ratio is (1) higher than the average leverage achieved by recent combined cycle development projects in the PJM footprint, which have averaged closer to a 55%/45% D/E ratio; (2) 10 percentage points higher than that proposed during the 2011 triennial review process; and (3) 10 percentage points higher than recent parameters adopted in New York.
- A reasonable range for CC and CT project-level debt financing is 7-9%, with the range depending on specific project risk and debt leverage levels.
 - Recent project-level financing in the PJM market, which has averaged a ~55%/45% D/E ratio, has seen debt rates average ~8%.
- A reasonable range for new CC and CT COE is 15-20%, with pure-play developers near the top of this range (or higher).
 - Among developers seeking project financing in PJM, some COEs may be somewhat lower than the indicated range, however, these lower COE levels often reflect a discount due to hedge requirements – something that PJM's E&A offsets methodology does not consider.



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