PJM Quadrennial Review: Discount Rate

Presented to PJM

July 27, 2018

Just Energy / Just Experts

Contents

Objective: Assess the proposed after-tax weighted average cost of capital (ATWACC) and recommend appropriate capital and capitalization rates that should be applied to estimate Net CONE

Agenda:

- Background
- Changes since Brattle's Calculations
- Challenges to Brattle's ROE
- Comparison to Utility ROE
- Conclusions

Brattle's ATWACC for merchant generation is too low by 200 – 250 basis points

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BACKGROUND

Individual components of the cost of capital are important to the total

Leverage

ATWACC = Equity % * Equity Rate + Debt % * Debt Rate * (1-tax rate)

ROE | Debt Rate | New tax rate

Equity Rate (CAPM Estimate)

= Risk Free Rate + Asset Beta * Incremental Market Risk

$= R_{T\text{-bond}} + ß * (R_{market} - R_{T\text{-bond}})$

Market Information
Utility Comparison
Increased Regulatory Risk

There are many factors that impact the calculation of an appropriate ATWACC

Background

Proposed changes reflect recent events and FERC precedent

- **Leverage**
  - Reduce debt ratio to reflect recent acquisition of two publicly-traded IPPs by private equity and ongoing restructuring of the third
- **Equity Rate**
  - Remain consistent with recent FERC decisions and the implied asset betas
  - Adjust equity rate to reflect beta consistent with assumed leverage
  - Adjust Brattle's risk free rate by 50 basis points to reflect recent rate increases and projected rates over the next five years
- **Debt Rate**
  - Increase Brattle debt rate by 100 basis points to reflect recent increases in BBB/BB yields
- Tax Rate
  - Maintain Brattle's post-reform tax rate
  - Incorporate into the equity leverage formula

Result: An internally consistent ATWACC reflecting recent events

Recommendation: Add 200 to 250 basis points to reflect recent events

ATWACC = Equity % * Equity Rate + Debt % * Debt Rate * (1-tax rate)

Comparison of Recommendation to Brattle Proposal

Market	ATWACC	Equity %	Equity Rate	Debt %	Debt Rate	Tax Rate
Brattle (2018)	7.5%	35%	12.8%	65%	6.5%	29.25%
Energyzt Recommendation	9.7%	45%	15.0%	55%	7.5%	29.25%

Suggested modifications to maintain consistency with leverage and implied asset betas approved by FERC

* Assumes 21.25% federal tax rate and 8% state rate that is not tax deductible (post-tax reform)
Brattle Presentation, slide 10, incorporates recent changes in tax reform, raising ATWACC from 7.0% to 7.5%

The Energyzt recommendation incorporates recent events and FERC precedent

An alternative approach maintaining Brattle leverage is consistent

ATWACC = Equity % * Equity Rate + Debt % * Debt Rate * (1-tax rate)

Alternative Approach

Market	ATWACC	Equity %	Equity Rate	Debt %	Debt Rate	Tax Rate
Brattle (2018)	7.5%	35%	12.8%	65%	6.5%	29.25%
Energyzt Recommendation	9.7%	45%	15.0%	55%	7.5%	29.25%
Energyzt Alternative	9.6%	35%	17.5%	65%	7.5%	29.25%

If PJM accepts Brattle's proposed leverage of 65% debt, then the equity rate needs to be higher to reflect the higher risk

Key Concern: Inconsistency between the leverage assumption and cost of capital

Background

Goal: Maintain asset betas implied by previous FERC decisions

Capital Structure	PJM (2013)	ISO-NE (2017)	Energyzt Recomm.	Brattle Adjusted to be Consistent with FERC	Brattle Proposal
Return on Equity	13.80%	13.40%	15.00%	14.50%	12.80%
Cost of Debt	7.00%	7.75%	7.50%	6.50%	6.50%
Capital Structure					
Debt Weight	60%	60%	55%	55%	65%
Equity Weight	40%	40%	45%	45%	35%
Assumed Tax Rate	40.50%	40.20%	29.25%	29.25%	29.25%
Assumed Risk-free Rate	3.40%	2.24%	4.00%	3.50%	3.50%
Assumed Market risk Premium	6.50%	7.00%	6.90%	6.90%	6.90%
Implied Beta *	1.60	1.59	1.59	1.59	1.35
Asset Beta **	0.85	0.84	0.85	0.85	0.58
WACC	9.7%	10.0%	10.9%	10.1%	8.7%
ATWACC	8.0%	8.1%	9.7%	9.1%	7.5%

FERC precedent would incorporate a consistent asset risk adjusted for market rates

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CHANGES SINCE BRATTLE'S CALCULATIONS

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Changes since Brattle's Calculations

Increases in certain factors can have a direct impact

- **Higher Risk-free Rate**
  - Increases Net CONE: Due to higher cost of equity = higher ATWACC
- **Higher Corporate Bond Yields**
  - Increases Net CONE: Due to higher debt costs = higher ATWACC
- **Higher Asset Risk**
  - Increases Net CONE: Due to higher beta = higher ATWACC
  - Definitely should be higher than a regulated utility ROE
  - Needs to reflect leverage assumption because higher debt levels create higher risk for equity
- **Change in Ownership of U.S. IPPs**
  - US IPPs are now owned by private equity or divesting and restructuring
  - Questions the use of publicly-traded companies clearly in transition
  - Imply leverage too high for the business

Events since Brattle performed its calculation support increasing cost of capital

Changes since Brattle's Calculations

Corporate bond (BBB) yields have risen

ATWACC = Equity % * Equity Rate + Debt % * **Debt Rate** * (1-tax rate)

Source: St. Louis Federal Reserve Board, https://fred.stlouisfed.org/series/BAMLC0A4CBBBEY

Brattle Calculations

US Corporate BBB bond yields have risen by around 80 basis points

Changes since Brattle's Calculations

The flight to quality has raised riskier bond yields (BB)

ATWACC = Equity % * Equity Rate + Debt % * **Debt Rate** * (1-tax rate)

Source: St. Louis Federal Reserve Board, https://fred.stlouisfed.org/series/BAMLH0A1HYBBEY

Brattle Calculations

US Corporate BB bond yields have risen by around 110 basis points

Changes since Brattle's Calculations

Corporate yields for US IPP credit ratings (B) also rose

ATWACC = Equity % * Equity Rate + Debt % * **Debt Rate** * (1-tax rate)

Source: St. Louis Federal Reserve Board, https://fred.stlouisfed.org/series/BAMLH0A2HYBEY

US Corporate B bond yields have risen by around 100 basis points

Changes since Brattle's Calculations

Long-term risk-free interest rates have risen by 40 basis points

ATWACC = Equity % * **Equity Rate** + Debt % * Debt Rate * (1-tax rate)

20 Year Treasury Rate: 2.90% for Jul 19 2018 Add to Watchlists Create an Alert

Overview | Interactive Chart

20 Year Treasury Rate is at 2.90%, compared to 2.93% the previous market day and 2.61% last year. This is lower than the long term average of 4.72%.

Category: Interest Rates
Region: United States
Report: H.15 Selected Interest Rates
Source: Federal Reserve

20 Year Treasury Rate Chart View Full Chart

5d | 1m | 3m | 6m | YTD | 1y | 5y | 10y | Max

Export Data | Save Image | Print Image

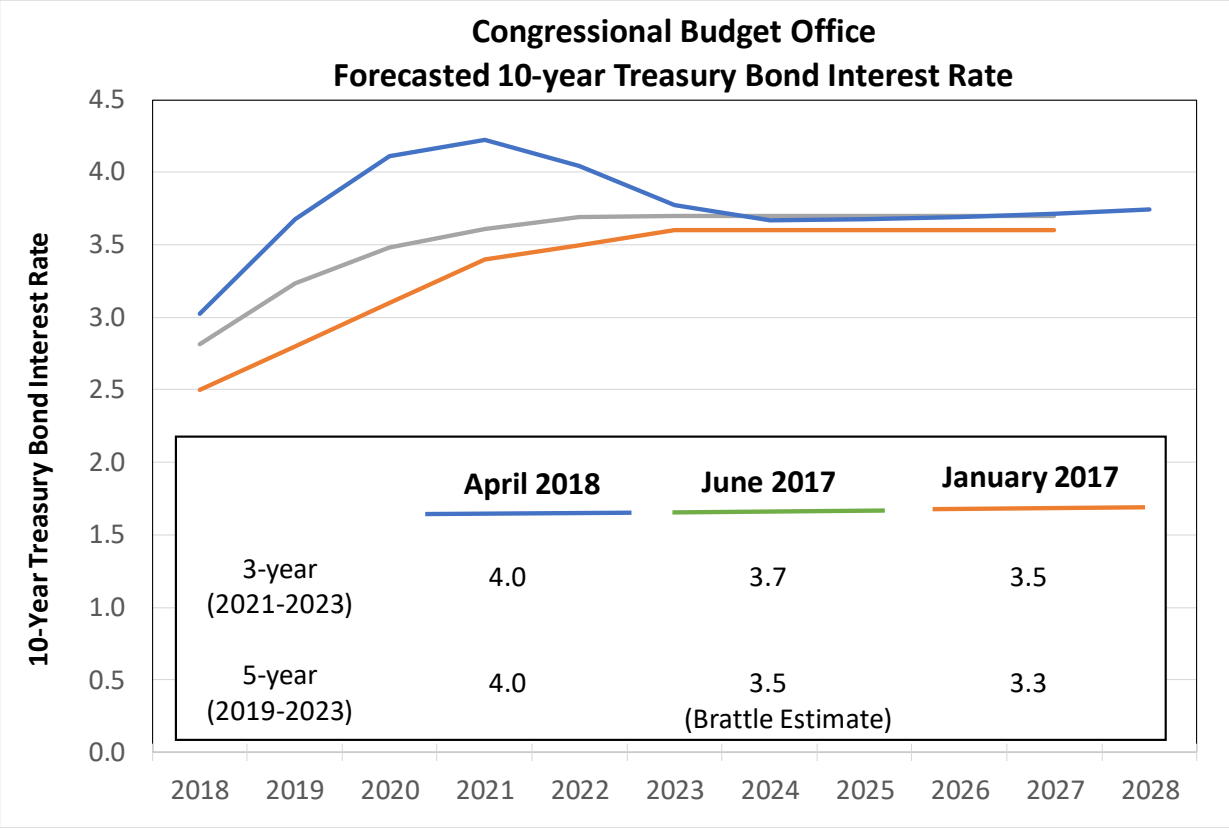
Source: Ycharts, Interactive Charts, 20-year Treasury Rate

The 20-year risk-free rate directly impacts the required cost of equity

Changes since Brattle's Calculations

Projected risk-free rates have risen by at least 50 basis points

ATWACC = Equity % * **Equity Rate** + Debt % * Debt Rate * (1-tax rate)



Source: Congressional Budget Office, https://www.cbo.gov/about/products/budget-economic-data#4

The proposed cost of equity should similarly increase using Brattle's approach

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Changes since Brattle's Calculations

There is a perception of increasingly higher levels of regulatory risk

ATWACC = Equity % * **Equity Rate** + Debt % * Debt Rate * (1-tax rate)

"Regulatory risk for U.S. natural gas and power markets is staggering and could jeopardize future consumer, environmental and geopolitical benefits spurred by the shale revolution, panelists at the World Gas Conference in Washington, D.C., said June 26."

The power and gas markets are "at a crossroads right now between the market working and what I'm going to call regulatory and political interventions," said Orlando Alvarez, BP Energy Co.'s head of North America gas and power.

"The regulatory risk right now for the gas and power market is high" and increasing uncertainty for those markets.

Source: Jasmin Melvin, "Regulatory risk could limit gas' future role in power generation, execs say," June 27, 2018

State and federal interference make market rules and economics raise risk

Changes since Brattle's Calculations

Two of the three US IPP comps have been acquired by private equity

Dynegy acquired by VISTRA

Calpine acquired by EnergyCapital Partners

NRG Energy is restructuring nrg®

The List of IPPs Used to Develop Return on Equity and Leverage

Table 17: Baseline ATWACC for the Publicly Traded Merchant Generation Companies (35% Federal Tax Rate)

Company	Firm Value [1]	S&P Credit Rating [2]	Equity Beta [3]	Return on Equity [4]	Cost of Debt [5]	Debt/ Equity Ratio [6]	After Tax WACC [7]
NRG Energy Inc	$23,278	BB-	1.17	10.7%	5.8%	73/27	5.4%
Calpine Corp	$16,586	B+	1.06	10.0%	5.6%	63/37	5.8%
Dynegy Inc	$9,903	B+	1.25	11.3%	6.7%	66/34	6.5%
TransAlta Corp	$4,020	BBB-	1.47	12.8%	6.3%	66/34	6.8%
Algonquin Power & Utilities Corp	$7,676	BBB	0.84	8.5%	5.1%	46/54	6.0%
Northland Power Inc	$9,003	BBB	0.92	9.0%	5.1%	58/42	5.6%
Capital Power Corp	$3,723	BBB-	0.95	9.2%	3.9%	47/53	6.0%

Implies leverage structure was too high for the business

Changes since Brattle's Calculation

Key take-aways

A number of factors influencing cost of capital have changed since the Brattle Group performed their discount rate calculations

- **Higher Risk-free Rate**
  - Long-term Treasury Bonds have increased by 40% to 50%
- **Higher Corporate Bond Yields**
  - Credit markets are experiencing a flight to quality
  - Corporate bond yields have increased
  - Interest rates for BB to BBB rated bonds have risen by 100 to 150 basis points
- **Higher Asset Risk**
  - Regulatory risk is higher due to state and federal interventions
  - Market rules and returns from competitive markets are uncertain
- **Change in Ownership**
  - Comparable companies were in transition and betas do not reflect risk
  - Change in ownership from publicly-traded markets to private equity should send a signal about appropriate leverage ratios

All of these factors support a higher discount rate than Brattle's ATWACC

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CHALLENGES TO BRATTLE'S ROE

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Challenges to Brattle's ROE

There are a number of inconsistencies and issues

- **U.S. IPPs cannot be used to derive beta as they were under distress**
  - Indicates leverage levels too high for the business
  - Acquisition by private equity indicates need for a different capitalization structure

- **Use of a single observation is not comparable**
  - Predominantly contracted assets
  - Primarily located in another country
  - Portfolio includes only one partially-merchant gas plant out of 67 facilities
  - Different tax rate

- **The proposed return on equity understates the true asset beta of a natural-gas fired generation unit in the U.S.**
  - Inconsistent with prior FERC decisions that have consistent asset betas
  - Reflects lower risk of contracted assets in Canada versus merchant generation
  - Reflects exchange rate risk and international beta
  - Reflects a much lower risk profile than the reference unit

Brattle's proposed return on equity is too low

Challenges to Brattle's ROE

Diversifiable risk of distressed assets may overwhelm beta calculation

"What are the estimation options for distressed firms?
To estimate the cost of equity, you should use the bottom-up unlevered beta (the weighted average of unlevered betas of the businesses that your firm operates in) and the current market debt to equity ratio of the firm."

- New York Stern School of Business, http://pages.stern.nyu.edu/~adamodar/New_Home_Page/valquestions/distresspaper.htm

"The dynamics of financial markets and businesses can lead to structural changes over time in the relationship between the market's performance and that of individual investments. In this context, the standard assumption of a time-invariant beta may potentially be inadequate, as a constant estimate fails to capture the changes over time in systematic (i.e., non-diversifiable) risk."

- NERA, July 2016, http://www.nera.com/content/dam/nera/publications/2016/PUB_Estimating_Equity_Betas_0916.pdf

"In some industries dominated by private businesses, there may not be enough guideline company data to run such proxy beta calculations."

- Value Adder, https://www.valuadder.com/blog/2016/02/10/is-capm-useful-in-private-company-valuation/

The fact that all three U.S. companies were in transition challenge their betas

Challenges to Brattle's ROE

Brattle effectively used a single observation to set the equity rate

Subset of Canadian IPPs
Used to Develop Return on Equity and Leverage

TransAlta Corp	$4,020	BBB-	1.47	12.8%	6.3%	66/34	6.8%
Algonquin Power & Utilities Corp	$7,676	BBB	0.84	8.5%	5.1%	46/54	6.0%
Northland Power Inc	$9,003	BBB	0.92	9.0%	5.1%	58/42	5.6%
Capital Power Corp	$3,723	BBB-	0.95	9.2%	3.9%	47/53	6.0%

TransAlta Corp is not comparable

Out of 67 plants operating in the portfolio, only 9 are in the U.S.

Less than one-third are merchant – all located in Canada:
- 2 coal plants
- 5 hydro plants
- 10 wind plants

An additional four are partially merchant:
- 3 coal plants
- 1 natural gas plant

Source: https://www.transalta.com/facilities/plants-operation/

TransAlta represents contracted generation, not a merchant business in the U.S.

Challenges to Brattle's ROE

Brattle implicitly adopted the asset beta of a contracted project

Comparison of TransAlta Capital Structure
To Brattle Proposal and if Adjusted to reflect FERC Precedent

Capital Structure	TransAlta	Brattle Proposal	ISO-NE (2017)
Return on Equity	12.80%	12.80%	13.40%
Cost of Debt	6.30%	6.50%	7.75%
Capital Structure			
Debt Weight	66%	65%	60%
Equity Weight	34%	35%	40%
Assumed Tax Rate	28.00%	29.25%	40.20%
Assumed Risk-free Rate	3.40%	3.50%	2.24%
Assumed Market risk Premium	6.90%	6.90%	7.00%
Implied Beta *	1.36	1.35	1.59
Asset Beta **	0.57	0.58	0.84
WACC	8.5%	8.7%	10.0%
ATWACC	7.3%	7.5%	8.1%

Brattle's implied betas do not reflect a merchant generator or FERC precedent

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Challenges to Brattle's ROE

Key take-aways

- **Brattle's analysis was limited by the lack of publicly-available data on IPP companies**

- **Only three U.S. IPPs were publicly available, and all were in some form of transition or distress**
  - Calpine and Dynegy were acquired by private equity companies
  - NRG is undergoing restructuring outside of bankruptcy, including divestiture and debt reduction

- **The remaining "comparable companies" are Canadian IPPs,**
  - Brattle did not adjust for exchange rate risk
  - Brattle did not adjust for impact of international betas
  - Brattle did not adjust beta to account for assumed leverage of 65%

- **Brattle ultimately relied on a single company: TransAlta**
  - TransAlta is not comparable
  - TransAlta 's generation portfolio is predominantly contracted assets
  - TransAlta's assets are, for the most part, located in Australia and Canada
  - There is only one partially-merchant gas plant

As a result, Brattle's basis for the ROE assumption understates asset risk

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COMPARISON TO UTILITY ROE

Comparison to Utility ROE

Regulated ROE for utilities should provide a floor

- **Regulated ROE for utilities should be lower than the ROE for a merchant generation project**
  - Merchant generation project has no guaranteed revenues
  - Regulated utilities earn a regulated return on relatively stable cash flows
  - Reference unit is assumed to be project financed versus balance sheet

- **Utility leverage tends to be lower than IPPs**
  - Regulators award leverage for purposes of calculating the WACC
  - Book value of leverage versus equity can be near assumed leverage levels; market value of equity tends to decrease leverage even further
  - Utilities earn higher returns if they have less leverage than assumed levels in the regulated WACC
  - Merchant plants earn higher returns with greater debt levels

Reference unit ROE and leverage should be higher than utilities

Comparison to Utility ROE

List of 29 electric power utilities analyzed

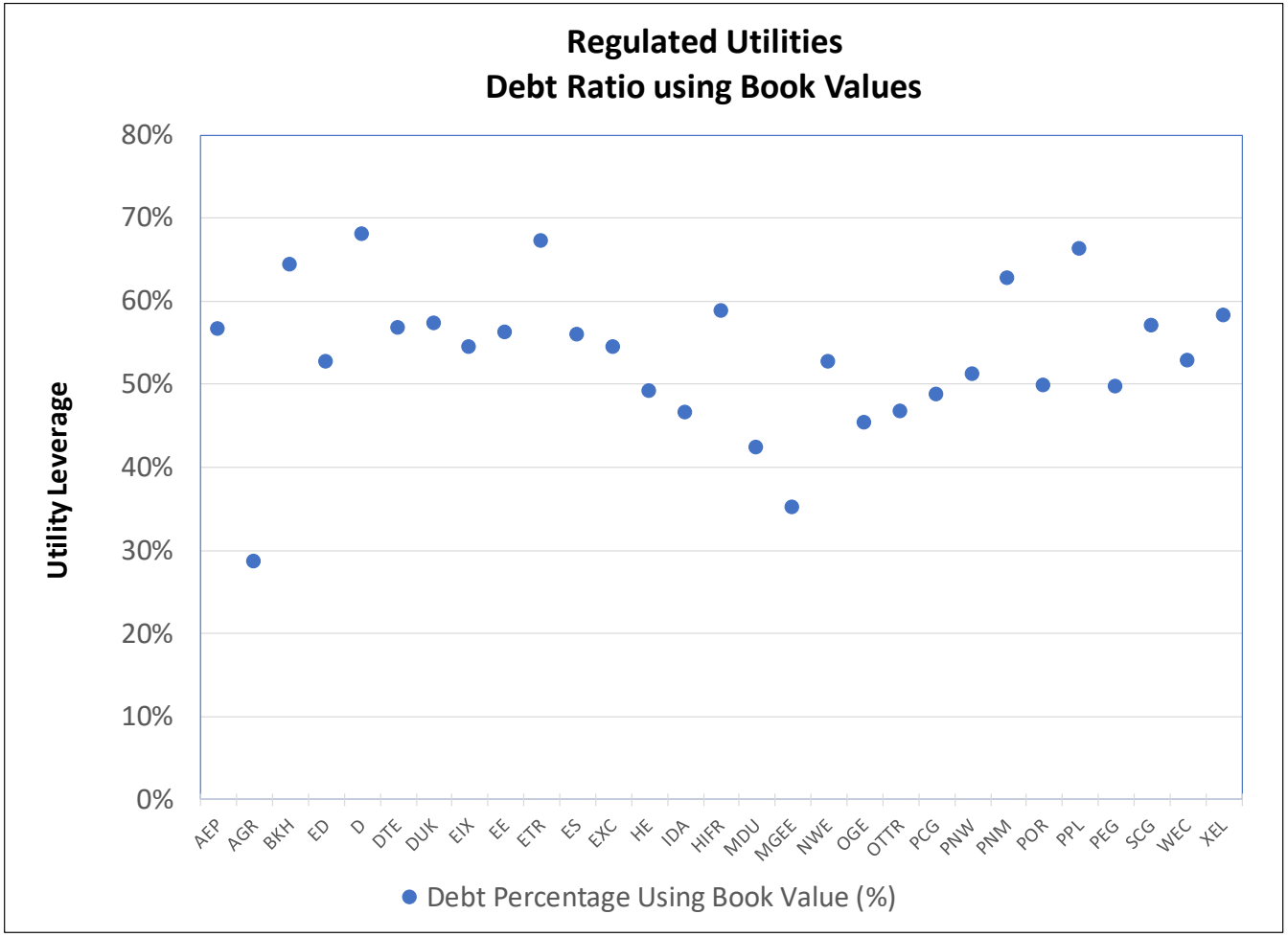
Utilities Analyzed
To Compare to Brattle ROE

American Electric Power	AEP	MDU Resources Group, Inc	MDU
Avangrid Inc.	AGR	MGE Energy, Inc	MGEE
Black Hills Corporation	BKH	NorthWestern Corporation**	NWE
Consolidated Edison, Inc.	ED	OGE Energy Corp.	OGE
Dominion Energy Inc.	D	Otter Tail Corporation	OTTR
DTE Energy Company	DTE	PG&E Corporation	PCG
Duke Energy Corporation	DUK	Pinnacle West Capital Corporation	PNW
Edison International	EIX	PNM Resources Inc.	PNM
El Paso Electric Company	EE	Portland General Electric Company	POR
Entergy Corporation	ETR	PPL Corporation	PPL
Eversource Energy	ES	Public Service Enterprise Group Incorporated	PEG
Exelon Corporation	EXC	SCANA Corporation	SCG
Hawaiian Electric Industries, Inc.	HE	WEC Energy Group, Inc.	WEC
IDACORP	IDA	Xcel Energy Inc.	XEL
InfraREIT, Inc	HIFR		

Utilities represent a subset of the EEI list

Comparison to Utility ROE

Utility leverage is lower than assumed reference unit leverage



Debt Ratio using book values reflect regulated WACC assumptions

Average Leverage
= 53%

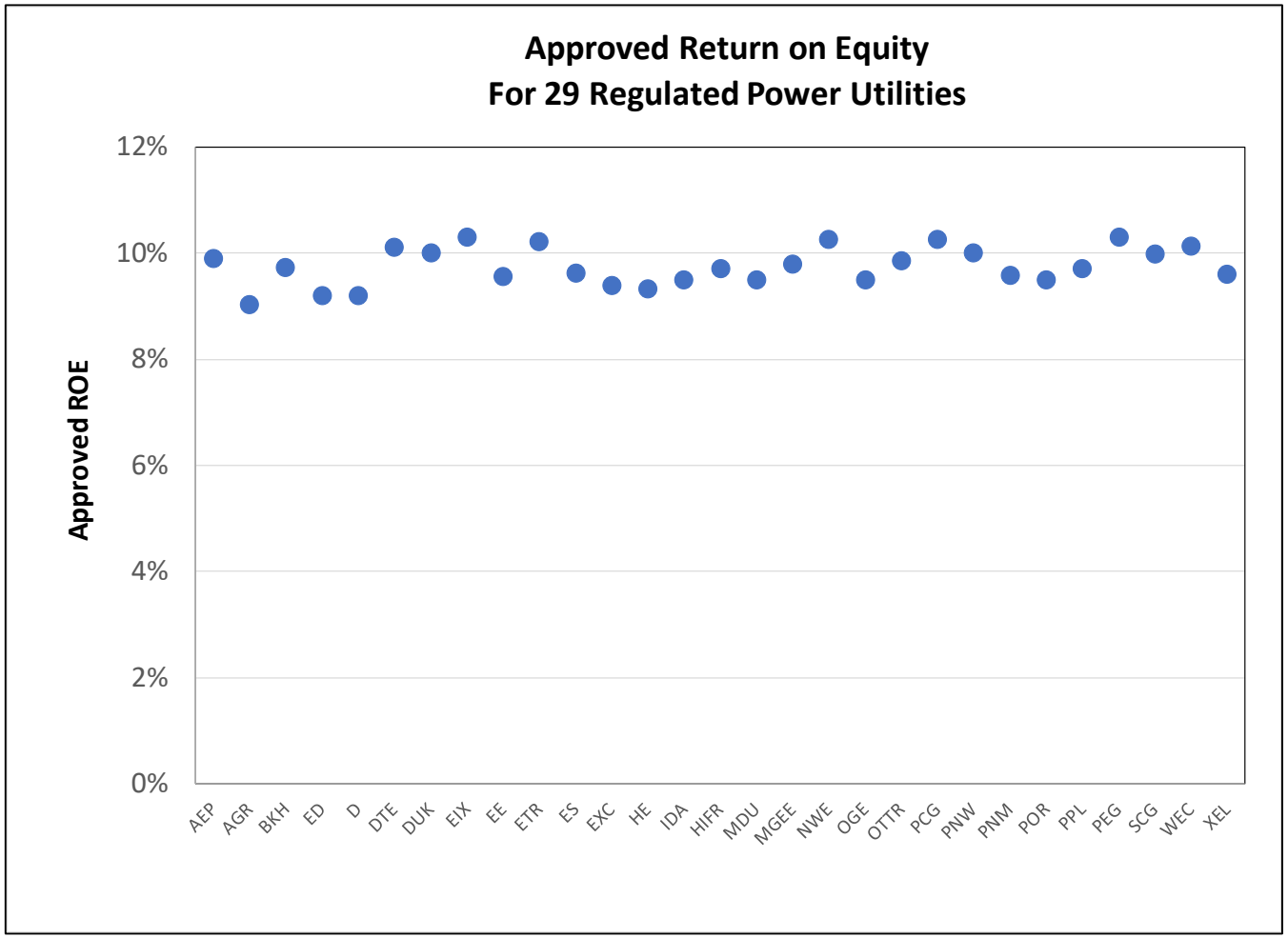
Statistical Range=
0.36 – 0.71

Brattle Assumption:
65%

To be comparable, the return on equity has to be adjusted to reflect 65% leverage

Comparison to Utility ROE

Regulated ROE for utilities averages 9.75% +/- 0.75%



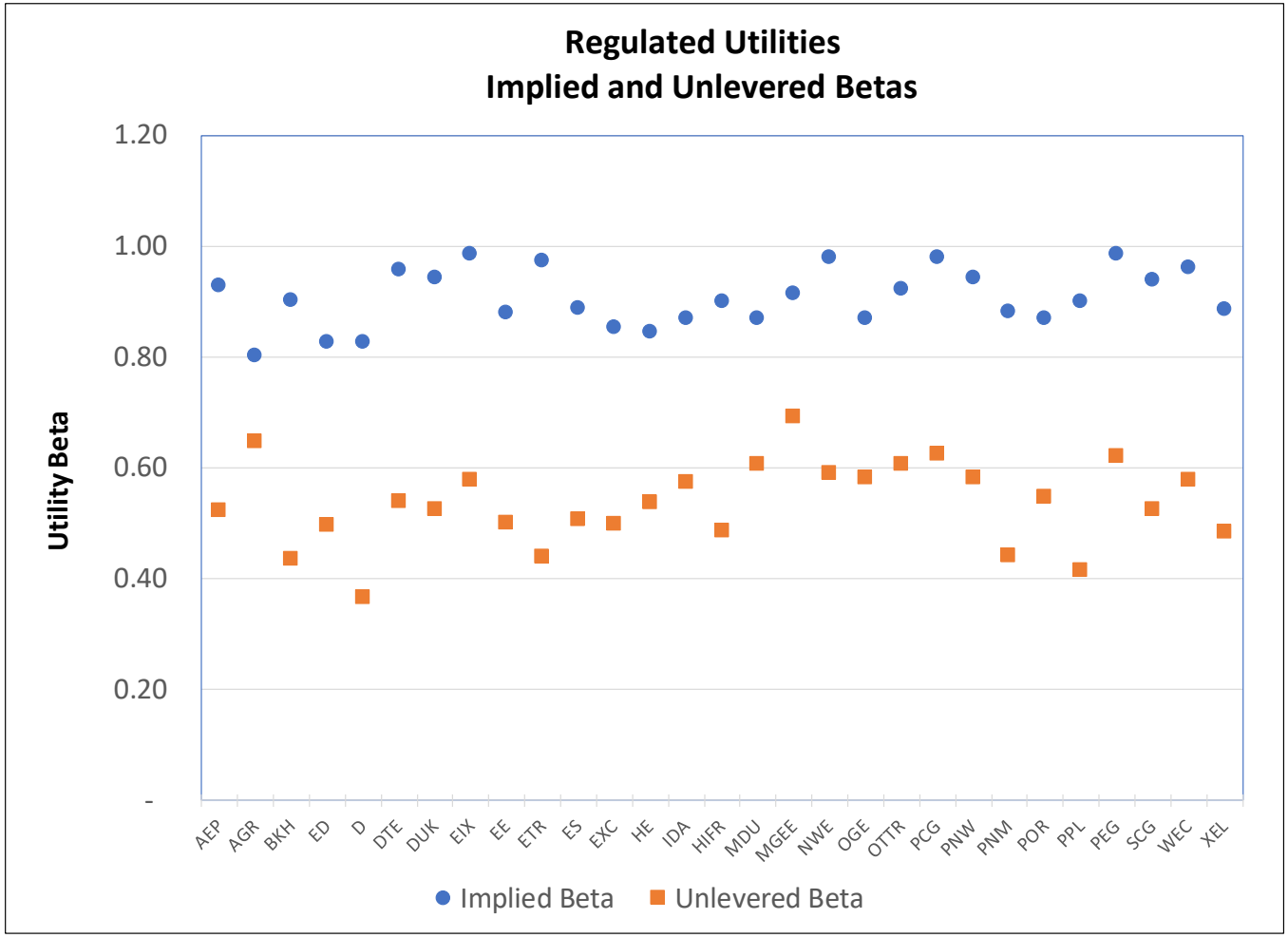
Average = 9.75%

Statistical Range:
8.25% - 10.5%

Reference unit ROE should be higher than utilities, holding leverage constant

Comparison to Utility ROE

Implied utility betas are below 1.0; utility asset betas are around 0.50



Implied beta
assumes Brattle's 3.5% risk free rate and 6.9% market premium

Unlevered beta
assumes 40.5% tax rate and reported book value of debt

The unlevered beta adjusts for pre-tax reform rates and book leverage

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Comparison to Utility ROE

Regulated utility betas need to be relevered to reflect higher debt ratio

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What are the formulas for unlevering and levering Beta?

Unlevered Beta = Levered Beta / (1 + ((1 – Tax Rate) x (Debt/Equity)))

Levered Beta = Unlevered Beta x (1 + ((1 – Tax Rate) x (Debt/Equity)))

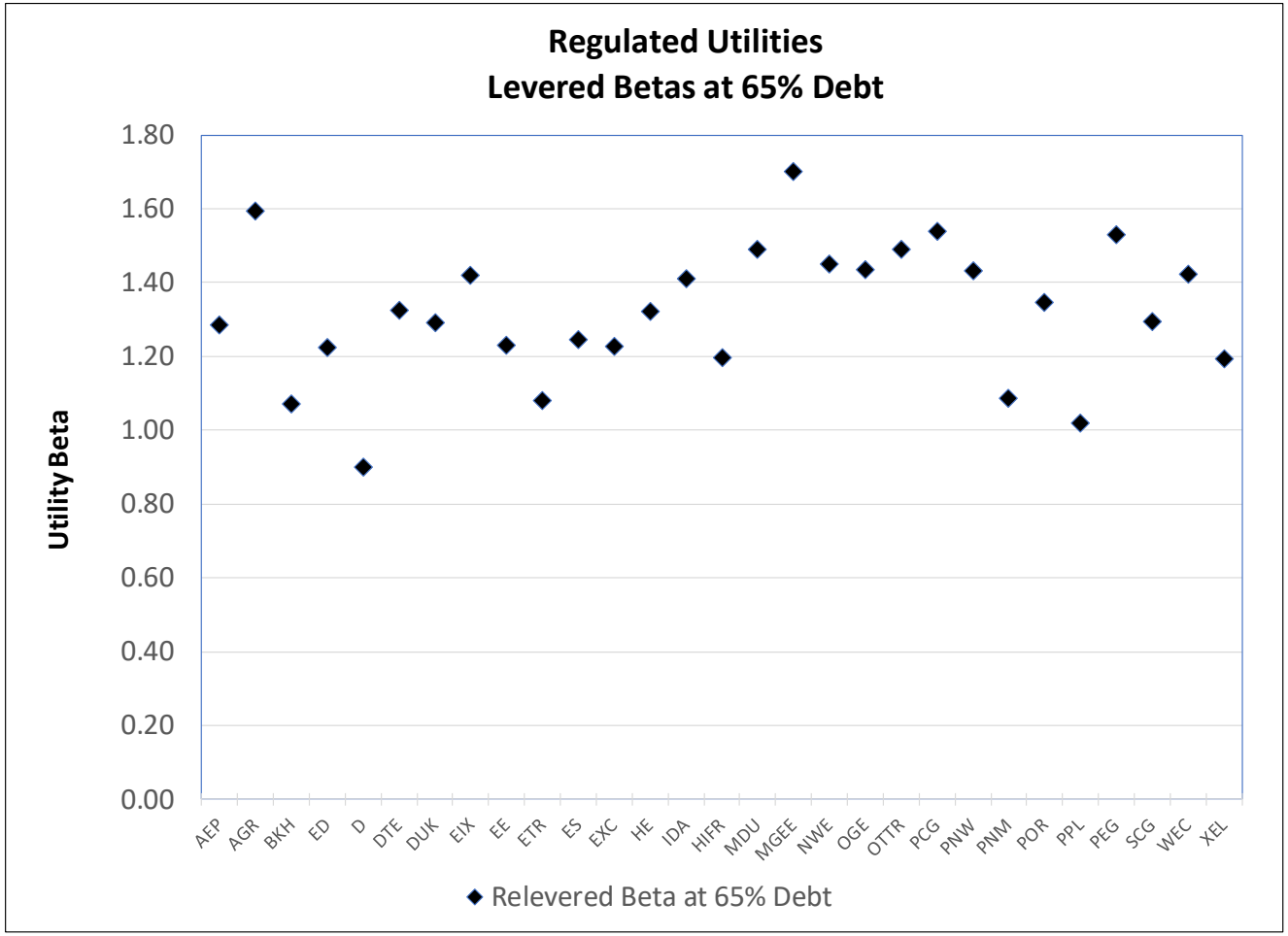
Formulas Used*

* This formula and the associated calculations assumes that the debt beta effectively is zero – a common assumption in relevering formula. Under certain conditions, a simplifying assumption can be made to exclude the tax rate adjustment. Given the impact of the change in tax rates and Brattle's assumption of constant leverage before and after Tax Reform, the tax rate adjustment component is maintained.

The formulas for levering and unlevering require a tax rate and debt/equity ratio

Comparison to Utility ROE

Relevered utility betas assuming 65% debt are above 1.0



Relevered beta assumes Brattle's assumptions of 29.25% tax rate and 65% debt

Average = 1.24

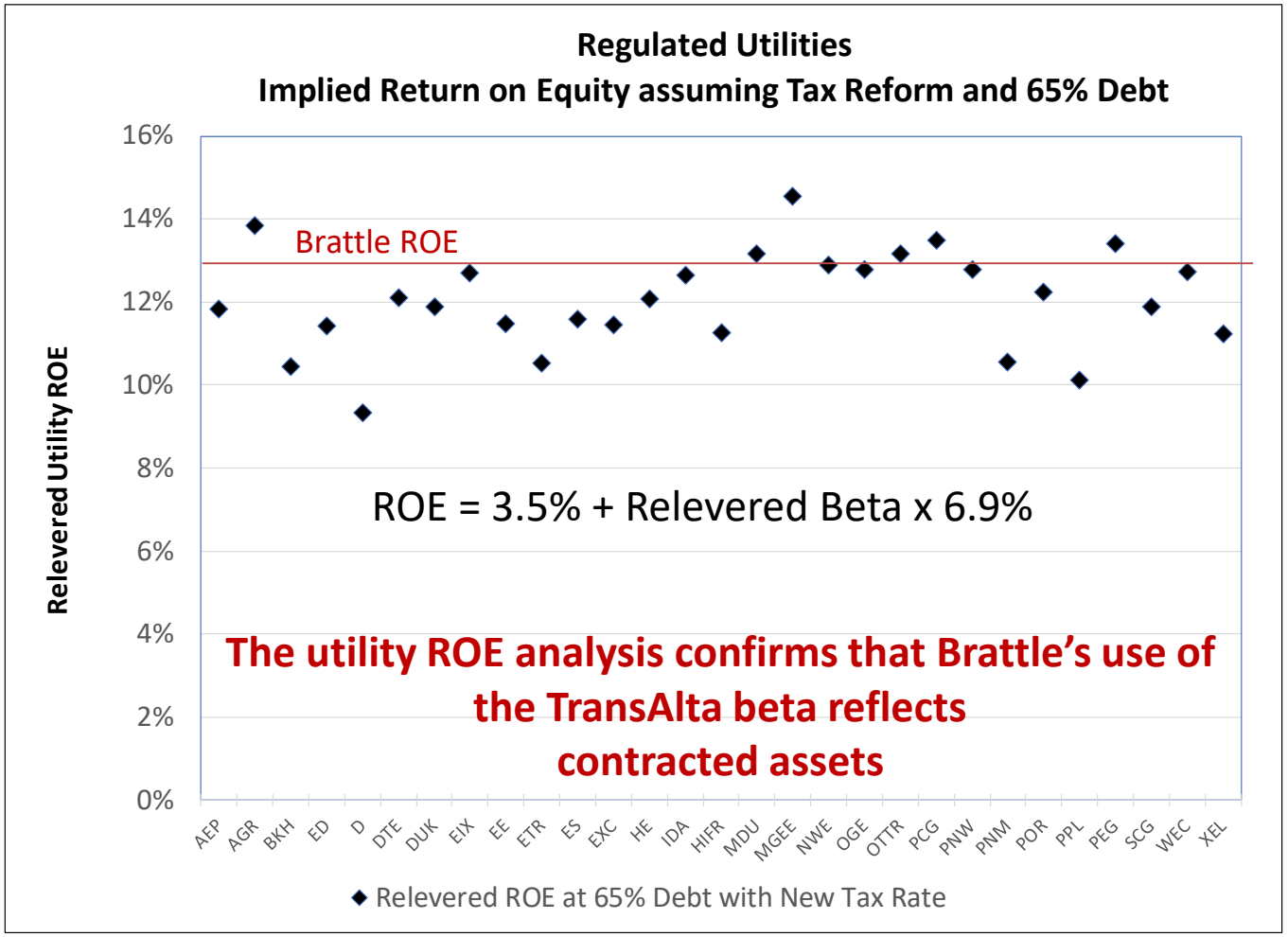
Statistical Range = 0.9 – 1.6

Brattle's Beta = 1.47

The relevered beta adjusts for new tax rates and assumed leverage of 65%

Comparison to Utility ROE

Brattle's proposed rate is the same as a utility ROE with 65% debt



Brattle's ROE = 12.8%

Average = 12.1%

Std Dev = 1.2%

Statistical range:
9.7% - 14.4%

In effect, Brattle uses an assumed equity rate similar to a regulated utility

Comparison to Utility ROE

Key take-aways

- **Regulated utilities are less risky and should have a lower required return on equity compared to a merchant generation plant:**
  - Ratebase
  - Regulated returns
- **A proper comparison requires an adjustment for leverage and tax rate – using book values is conservative**
  - Utility debt ratios (book value) = 0.53
  - Debt ratios using market values are even lower than book values
- **Relevering utility betas to reflect a 65% debt ratio provides a lower bound to what the appropriate discount rate should be**
  - Average = 12.1%
  - Statistical Range = 9.7% - 14.4%
  - Brattle's ROE falls squarely in the middle of the range for utilities = too low

Brattle's proposed ROE is too low for a merchant generation plant

PJM Quadrennial Review: Discount Rate

CONCLUSIONS

Conclusions

The ATWACC should be at least 200 to 250 basis points higher

Market	ATWACC	Equity %	Equity Rate	Debt %	Debt Rate	Tax Rate
Brattle (2018)	7.5%	35%	12.8%	65%	6.5%	29.25%
Energyzt Recommendation	9.7%	45%	15.0%	55%	7.5%	29.25%

ATWACC = Equity % * Equity Rate + Debt % * Debt Rate * (1-tax rate)

Delever to reflect acquisitions by private equity

Increase Brattle assumption by recent increases in BBB/BB corporate bond yields = 100 bp

CAPM = Risk Free Rate + Asset Beta * Incremental Market Risk

Increase to reflect recent rate expectations = 50 bp higher

Set at a level consistent with implied betas in previous FERC approvals, higher than regulated utility betas assuming same leverage

Energyzt's recommendation is internally and externally consistent with market

Conclusions

The Energyzt recommendation of 9.7% is supported in four ways

1) Consistency with FERC-approved WACC and beta values across markets

Capital Structure	PJM (2013)	ISO-NE (2017)	Energyzt Recommendation	Brattle Proposal
Implied Beta	1.60	1.59	1.59	1.35
Asset Beta	0.85	0.84	0.85	0.58
WACC	9.7%	10.0%	10.9%	8.7%

2) Internally consistent equity rate and leverage

Market	ATWACC	Equity %	Equity Rate	Debt %	Debt Rate	Tax Rate
Recommendation	9.7%	45%	15.0%	55%	7.5%	29.25%

3) An alternative that maintains Brattle leverage, but levers equity rate accordingly

Market	ATWACC	Equity %	Equity Rate	Debt %	Debt Rate	Tax Rate
Alternative	9.6%	35%	17.5%	65%	7.5%	29.25%

4) Above regulated utility betas with a premium reflecting merchant generation and leverage assumption

The ATWACC should be higher than what FERC approved for ISO-NE in 2017

The Energyzt recommendation is conservative

Rising Interest Rates

- Does not reflect rising interest rate environment signaled by Federal Reserve who has signaled additional interest rate increases
  - – Two more rate hikes in 2018
  - - Steepening interest rates in 2019 and 2020
- Projections still may underestimate increases in risk-free rates
- Corporate bond yields tend to magnify interest rate increases

Higher Risk

- Recent changes in ownership and restructuring could reflect a higher risk level than what historically has been the case
- The recommended beta is consistent with previous FERC decisions. A higher risk premium reflecting regulatory risk and increased market volatility may be more appropriate

Asymmetric Consequences

- Adverse consequences if the discount rate is too low versus too high

The asymmetrical risk of an incorrect Net CONE supports a higher ATWACC

Conclusions

The ATWACC should be higher than what Brattle proposes

- **The Brattle ATWACC inappropriately reflects outdated conditions and the risk of a business with contracted assets**
- **Multiple factors that have changed since Fall 2017 support a higher ATWACC**
  - Higher long-term risk-free rates
  - Higher credit-spreads
  - Increasing asset risk tied to regulatory uncertainty
  - Change to private equity acquisition and restructuring of US IPPs
- **The following adjustments to the ATWACC are recommended:**
  - Higher risk-free rate to reflect recent and anticipated rate hikes
  - Higher debt rate to reflect increases in corporate yields
  - Lower leverage to reflect acquisition by private equity
  - Higher beta to reflect asset risk, leverage and new tax rate
- **Lowering the ATWACC compared to previously approved assumptions is not justified; it should be higher than recent Net CONE ATWACCs**

Energyzt Recommendation: ATWACC should be 9.7%