**EXHIBIT NO. ___(MJV-1T)**
**DOCKET NO. UE-121697/UG-121705**
**DOCKET NO. UE-130137/UG-130138**
**WITNESS: DR. MICHAEL J. VILBERT**

**BEFORE THE**
**WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION**

| | |
|---|---|
| WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,<br><br>Complainant,<br><br>v.<br><br>PUGET SOUND ENERGY, INC.,<br><br>Respondent. | DOCKET NOS. UE-121697 and UG-121705 (*consolidated*) |
| WASHINGTON UTILITIES AND TRANSPORTATION COMMISSION,<br><br>Complainant,<br><br>v.<br><br>PUGET SOUND ENERGY, INC.,<br><br>Respondent. | DOCKET NOS. UE-130137 and UG-130138 (*consolidated*) |

# PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF DR. MICHAEL J. VILBERT ON BEHALF OF PUGET SOUND ENERGY, INC.

**NOVEMBER 5, 2014**

**PUGET SOUND ENERGY, INC.**

**PREFILED DIRECT TESTIMONY**
**(NONCONFIDENTIAL) OF DR. MICHAEL J. VILBERT**

**CONTENTS**

**PUGET SOUND ENERGY, INC.**

**PREFILED DIRECT TESTIMONY (NONCONFIDENTIAL) OF DR. MICHAEL J. VILBERT**

## I. INTRODUCTION AND SUMMARY

**Q. Please state your name and address.**

A. My name is Dr. Michael J. Vilbert, and I am a Principal and Manager of the San Francisco office of The Brattle Group ("*Brattle*"), an economic consulting firm with a worldwide practice in electric power and natural gas markets. *Brattle* has a staff of over 300 with offices in San Francisco; Cambridge, Massachusetts; New York City; Washington, D.C.; London; Madrid; and Rome. My business address is 201 Mission St., Suite 2800, San Francisco, CA 94105.

**Q. Please describe your education and job experience.**

A. My work concentrates on financial and regulatory economics. I hold a B.S. from the U.S. Air Force Academy, an MBA from the University of Utah, and a Ph.D. in finance from the Wharton School of Business at the University of Pennsylvania.

**Q. Have you previously testified as an expert witness?**

A. Yes. *Brattle's* specialties include financial economics, regulatory economics, and the gas, water and electric industries. I have worked in the areas of cost of capital, investment risk and related matters for many industries, regulated and unregulated alike, in many forums. A partial list of the regulators before which I have testified or filed cost of capital testimony include the Arizona Corporation

Commission, the Pennsylvania Public Utility Commission, the Public Service Commission of West Virginia, the Public Utilities Commission of Ohio, the Tennessee Regulatory Authority, the Public Service Commission of Wisconsin, the South Dakota Utilities Commission, the California Public Utilities Commission, the Michigan Public Service Commission, and the Federal Energy Regulatory Commission ("FERC"). I have also testified in Canada before the Canadian National Energy Board, the Alberta Energy and Utilities Board, the Ontario Energy Board, the Quebec Régie de l'énergie, and the Labrador & Newfoundland Board of Commissioners of Public Utilities. Exhibit No. ___(MJV-2) contains more information on my professional qualifications.

**Q. What is the purpose of your testimony?**

A. First, I have been asked by Puget Sound Energy, Inc. ("PSE") to assess the empirical evidence on the effect that the policy of decoupled ratemaking has on the cost of capital for a regulated utility. Specifically, is there statistical support for the hypothesis that decoupling reduces the cost of capital? Decoupling is an increasingly important innovative ratemaking approach for natural gas distribution and electric utilities because it takes away the throughput incentive to sell more therms of natural gas and kWh of electricity. This paves the way for regulated utilities to embrace energy efficiency while staying financially strong to make required investments in infrastructure.

In a minority of cases, about 20 percent, in which this issue has been considered by state commissions, the allowed return on equity ("ROE") for the regulated company was explicitly reduced in conjunction with the approval of decoupling,

with only one such example since 2011. The reductions have been between 10 and 50 basis points ("bps").

In Order 07, the Washington Utilities and Transportation Commission (the "Commission") stated that no empirical evidence had been offered in that proceeding for the theoretical proposition that decoupling reduced the cost of equity.[1] *Brattle* has conducted statistical analyses of both the natural gas delivery industry and the electric industry to investigate this issue. My testimony discusses the work that my colleagues and I have done in determining whether there is empirical evidence supporting the notion that decoupling reduces the cost of capital.

Second, I have been asked to review the extent to which the companies that comprise Dr. Morin's cost of capital sample have decoupling and other innovative rate making policies. These policies are of interest because they may provide some risk mitigation to regulated companies. These other policies include multi-year revenue and rate caps (including some with revenue adjustment mechanisms ("RAM") or other attrition adjustment mechanisms), capital expenditures riders, formula rates, performance based ratemaking, construction work in progress ("CWIP") in rate base, fuel adjustment clauses, and purchased power adjustment clauses.

[1] *WUTC v. Puget Sound Energy, Inc.*, Order 07 Final Order Granting Petition at page 48, Dockets UE-121697, *et al*. (consolidated) (June 25, 2013).

**Q. How have you organized your testimony?**

A. Section II discusses the concept of decoupling ratemaking, or decoupling for regulated utilities, including both electric companies and natural gas local distribution companies ("gas LDCs"). The growing use of this ratemaking policy is likely to be a fundamental part of the "regulated utility of the future" as it evolves to help society meet its climate change goals through advanced energy efficiency. Section III discusses the theoretical reasons offered for why decoupling, unlike most ratemaking policies, is sometimes questioned when it is approved as to whether it materially lowers the cost of capital financial markets seek in return for providing capital. Commissions regularly determine the cost of capital for regulated firms and consider a multitude of quantitative and qualitative factors. Decoupling is held out by some parties as a factor requiring a separate, explicit reduction in the cost of capital beyond the standard process. The section contains a discussion of what empirical and statistical evidence has been developed to test different theories. Section IV lays out the empirical analysis that my co-authors from *The Brattle Group* and I have done for the gas LDC industry. Section V explains the empirical analysis that I and co-authors from *The Brattle Group* have done for the electric industry. Section VI presents data on the range of innovative rate making mechanisms that are being used in electric and gas delivery industries for the companies in Dr. Morin's sample. Section VII provides my conclusions.

**Q. Please summarize your testimony.**

A. For both the natural gas and the electric empirical studies, the result of careful data collection and statistical analyses demonstrates there is no statistically significant evidence supporting the theory that decoupling lowers the cost of capital.

I recognize that decoupling may reduce the volatility of short-term revenues. However, decoupling is never instituted in a vacuum. The fact that the statistical evidence does not support the hypothesis of a reduction in the cost of capital is consistent with the view that decoupling is instituted as a policy response to support other regulatory goals that increase short- and long-term risk to utilities. Gas and electric utilities are high fixed cost industries. Effective energy efficiency programs, customer concerns over the environment, the requirement to integrated renewable energy sources, and in some areas customer distributed generation, together result in decreasing sales and increasing risk to utilities, a trend that is expected to continue. Decoupling is thus a way to balance those increasing risks to fixed cost recovery and a fair opportunity to earn the authorized rate of return.

## II. THE NATURE OF DECOUPLED RATEMAKING FOR REGULATED UTILITIES

**Q. What is decoupling?**

A. Decoupling is a form of regulated ratemaking that separates (i.e., decouples) cost recovery from changes in the volume of sales for a regulated utility. Under traditional rate design, volumetric rates for the commodity (kWh or therm)

include a significant portion of fixed cost recovery. As sales growth rates decline and certainly if they go negative, regulated companies would not be expected to earn their allowed ROE and would have to file general rate cases more frequently which would stress the regulatory system. Decoupling addresses the mismatch between declining sales and increasing fixed costs.

**Q. Are there different kinds of decoupled ratemaking policies?**

A. Yes. There are three basic kinds of decoupling, and the first two are the focus of this testimony:

- True Up Decoupling
- Fixed-Variable Rate Design
- Lost Revenue Adjustment Mechanism ("LRAM") for energy efficiency and demand side management program savings.

As discussed above, true-up decoupling allows the regulated company a better opportunity to recover its authorized revenue by comparing actual sales with forecast sales at the end of the period.

Fixed-Variable rate design is a form of decoupling that addresses the issue of changing sales in a different way. The volumetric charges are much closer or equal to the variable costs. Fixed costs are recovered in fixed charges and possibly demand charges that do not change significantly with lower sales volumes.

LRAMs are not included in the Brattle empirical analysis because they only address the loss of base revenue from the kWh or therm sales reductions determined to be the direct result of energy efficiency programs promoted by the

regulated utility itself. This is a partial decoupling of revenues which looking forward can also decline from distributed generation and changing consumer attitudes toward the environment.

**Q. What is the policy goal of decoupling?**

A. Decoupling originated as a policy response in the 1980s when utilities were first encouraged to develop energy efficiency programs that significantly reduced the consumption and sales of regulated commodities, such as electricity, gas, or water. The policy has grown rapidly over the last decade in both the natural gas delivery and the electric industries as they are heavily fixed cost industries, and standard rate designs have always collected a large part of fixed cost in volumetric charges.

Order 7 of the Commission states the purposes as follows:

> The decoupling mechanisms we approve mean that PSE's recovery of the fixed costs it incurs for infrastructure and operations necessary to deliver power and natural gas will no longer depend on the amounts of electricity and natural gas the company sells. This removes the so-called throughput incentive, thus promoting PSE's more aggressive pursuit of cost-effective conservation to which it commits as part of the decoupling mechanisms. With the throughput incentive eliminated, the company will be indifferent to the loss of sales as the result of the success of its conservation efforts.[2]

To meet climate control objectives, the U.S. will have to continue to rely on energy efficiency programs for the long term as well as to promote sources of

[2] Order 07, Synopsis, p. ii.

clean energy with low or no emissions of greenhouse gases. Decoupling helps utilities respond to this policy objective.

**Q. How often have regulatory commissions explicitly assessed a reduction in the allowed ROE at the time decoupling is authorized?**

A. About one-fifth of regulatory approvals of decoupling have explicitly reduced the allowed ROE, sometimes with the agreement of the utility as part of a settlement. However, to my knowledge, the reductions have never been based upon empirical evidence demonstrating that decoupling reduces the cost of capital. Exhibit No. ___(MJV-3) shows the range of reductions in the allowed ROE.

**Q. In the decoupling decisions contained in Exhibit No. ___(MJV-3), is there a pattern over time on basis point deductions to the allowed ROE?**

A. Yes. In Exhibit No. ___(MJV-4), the reductions for electric utilities are shown with the dates for the decisions to display the pattern over time. The pattern is that the 10 and 50 bps reductions were in the middle period of the expansion of the policies. There have been no decisions with bps deductions in the period from 2011 to the present in this data set.

Similar information for the gas LDCs is shown in Exhibit No. ___(MJV-5). The majority of these decisions were before 2006, including four California gas utilities deregulated before 2000 without a reduction in the allowed ROE.

## III. PRINCIPLES OF FINANCIAL THEORY ON THE RELATIONSHIP BETWEEN DECOUPLING AND THE COST OF CAPITAL

**Q. What is the rationale for the theory that adoption of decoupling should reduce a regulated company's risk?**

A. Decoupling may reduce the short-term volatility of a regulated company's revenues. Depending upon the details of the decoupling policy, a decoupling policy with a true-up may result in full recovery of forecast revenues albeit with a potential lag (or lead). In financial theory, volatility is related to risk, so some theorize that reduced volatility will translate into reduced risk and therefore a reduced cost of capital.

**Q. What is the theoretical explanation for why decoupling may not reduce the cost of capital?**

A. First, the cost of capital is defined as the expected return on comparable risk investments. The cost of capital is measured in capital markets using market returns. This is the reason that cost-of-capital analysts rely upon market prices and market returns to estimate the cost of capital. Revenue is an accounting variable, and decoupling does not address changes in costs, so net income is more variable than revenue. Even net income, an accounting variable, is not directly related to market returns. So, the first reason is that reducing the volatility of revenues is not the same as reducing the volatility of market returns, although there may be an indirect link.

Second, the cost of capital is a function of risk, but it is important to distinguish the type of risk that affects the cost of capital from risk that does not. Financial theory specifies that the overall cost of capital of a publicly traded company is a function of the business risk of the assets owned by the company. When some of the assets are financed with debt, the business risk of the assets is divided between the equity investors and the debt holders. Because equity investors can only receive a payment after all other claims on the company's cash flow have been made, equity investors bear the greatest risk and are sometimes called the residual claimants. Therefore, equity investors must expect a higher return to bear more risk. Some of a company's risk can be diversified away by formation of a portfolio so only non-diversifiable risk affects the cost of capital.[3] The risks that can be diversified are also called unsystematic risks (also known as unique or diversifiable risk). Thus, the cost of equity is a function of what financial theory defines as the systematic risk (also known as market, business or non-diversifiable risk) and financial risk resulting from the use of debt to finance assets. A bestselling textbook in corporate finance by Brealey, Myers and Allen states the following in discussing capital structure and the company cost of capital:

> The risk of a common stock reflects the business risk of the real assets held by the firm. But shareholders also bear financial risk to the extent that the firm issues debt to finance its real investments.

[3] Brealey, Myers and Allen, *Principles of Corporate Finance*, Chapter 20, 9th edition, McGraw Hill Irwin, 2008.

> The more a firm relies on debt financing, the riskier its common stock is."[4] [Emphasis added]

Systematic and unique risks are both important because the price investors are willing to pay for an investment depends upon both types of risk but only systematic risk affects the cost of capital. To summarize this point, the second reason that decoupling may not affect the cost of capital is that decoupling may only affect diversifiable risk, in which case the cost of capital would not be affected.

Third, when decoupling is instituted, if investors perceive that it lowers systematic risk to a greater degree than other regulatory policies are increasing systematic risk, the cost of equity capital would fall. However, decoupling is usually adopted in response to other regulatory policy decisions, specifically to ameliorate a utility's incentive to increase its profit through increased sales. The incentive to increase sales is called the throughput incentive, which is in direct conflict with the regulatory policy goal with respect to energy efficiency and customer-sited generation and/or to deal with a declining sales situation. Energy efficiency programs and declining sales are likely to increase the systematic risk of regulated companies with the result that decoupling may simply cancel the increased risk from programs such as energy efficiency.

To summarize, decoupling would reduce the cost of capital only if it reduced systematic risk, the risk that affects the cost of capital, and only if the adoption of

[4] Brealey and Myers, *Principles of Corporate Finance*, 4th Edition, McGraw Hill Irwin, 1991, p. 189.

decoupling more than offset an increase in systematic risk for the company from other regulatory policies likely to increase systematic risk. If decoupling primarily reduced diversifiable risk, the cost of capital for equity would not be affected, but the policy would benefit debt holders.

**Q. What is the basis for the possibility that decoupling merely offsets an increase in risk from other regulatory policies?**

A. The expectations for a regulated company are more demanding now than in the relatively recent past. Utilities face increasingly stringent emission standards, the requirement to meet a renewable portfolio standard for generation resources, the need to integrate distributed generation, slowing sales from energy efficiency programs and the emphasis on energy conservation in conjunction with the requirement to invest to replace aging infrastructure. Falling sales coupled with the requirement for substantial capital investment results in increasing rates to customers which puts more pressure on the regulated company. In recognition of the challenges facing utilities, regulators have developed a number of policies such as decoupling to help utilities respond to these challenges. In my view, the cost of capital of utilities would have increased substantially if regulators had not adopted these policies because utilities would have more difficulty fully recovering their costs. Even with regulatory support, some utilities have had difficulty earning their allowed ROE.

**Q. Please explain whether the slowing and possible future decline in sales for the natural gas and the electric utilities are a systematic risk, or unique, non-systematic risk, or some of both?**

A. This is not a simple question, and I believe it cannot be answered by finance theory, but principally by factual analysis. As shown in Exhibit No. ___(MJV-6), from 1950 to about 2000, increasing sales, driven by sales per customer, was common for electricity, but sales growth declined so that sales are much flatter after 2000. For natural gas, sales growth declined much earlier with flat sales from about 1970 to 1990, but with a slight resurgence in 1990 to 2000. From 2000 to the present, sales growth overall is zero. See Exhibit No. ___(MJV-7). Many individual companies have seen sales growth fall off dramatically. Volumetric rates with increasing sales allowed full recovery of fixed costs and in many cases made new investment possible without the need to have a general rate case or to institute a capital recovery mechanism between rate cases. This is not possible with declining sales. From 2000 to 2010, the growth rate for residential gas use was zero.

Many gas LDCs experienced a decline in sales per customer starting in 2000. Falling sales in a heavily fixed cost business with volumetric rates to recover fixed costs represented an increase in the risk that these companies would be unable to recover their fixed costs. A policy response was the institution of straight fixed variable rates, a form of decoupling. A new and difficult to measure risk to electric utilities in many states today is the possible future decline of sales from the combined impact of increasing energy efficiency and the customer sited

solar generation, particularly when supported by net energy metering policies.[5] As long as the volumetric rates that recover a portion of fixed costs are in place, the full recovery of fixed costs will be in jeopardy from declining sales.

In a world without decoupling, base revenues are collected substantially through volumetric charges (dollars per kWh or dollars per therm). In the business cycle, sales do go up and down. Some fixed costs such as depreciation change slowly. Other costs such as labor wages and benefits can change from year to year but changes in costs will be collected only if there is either a general rate case or a mechanism in place to change the revenue level. All these factors, together, make the regulated utility industry riskier than in the past.

**Q. How can decoupling be a beneficial policy for the utility while not shifting risk unfairly to the ratepayers?**

A. Decoupling provides a balance of risk between the utility and its customers. In many jurisdictions, including Washington, society in general and regulators in particular, wish to promote energy efficiency and to reduce greenhouse gases, harmful emissions and reliance on fossil fuels. If successful, sales of electricity and natural gas are likely to fall, but with volumetric rates set to collect a portion of fixed costs, the regulated company would not expect to recover fully its authorized fixed costs. Without a policy such as decoupling, these policies are

[5] The most extreme example is Hawaii, where the Hawaiian Electric Companies now have over 10 percent penetration of customer sited solar generation, which is growing rapidly, and ambitious energy efficiency programs. The Hawaiian Companies are experiencing overall declines in annual retail sales of almost two percent. These Companies do have a decoupling mechanism that was instituted after the Hawaiian Clean Energy Initiative became state policy.

likely to increase risk for the utility. In addition, another goal is to have a financially strong utility able to provide safe and reliable service to customers. Failing to recover costs weakens the utility financially so decoupling is adopted to balance these goals.

**Q. How can decoupling be a good policy for the utility and customers if it does not lower the cost of capital?**

A. It is important to keep in mind that the purpose of decoupling is to address the incentive for regulated companies to increase sales which conflicts with the regulatory policy goal of energy conservation. Decoupling serves that purpose well. Decoupling is good for customers because it removes disincentives to energy efficiency and conservation. In addition, decoupling is symmetric in that if sales are greater than forecast, customers receive a refund. Credit rating agencies uniformly praise the adoption of decoupling and other such measures because they strengthen the probability that debt holders will be fully paid.

**Q. How does decoupling affect debt holders?**

A. Credit ratings represent the credit rating agencies' estimation of the probability that an investor in a company's debt will receive the promised interest and principal payments. In other words, the credit rating represents a measure of the likelihood that the company will not default. Debt holders clearly benefit from decoupling and other such measures because the volatility of a company's revenues is decreased which reduces the probably of default.

## IV. EMPIRICAL ANALYSIS OF THE IMPACT OF DECOUPLING IN THE REGULATED NATURAL GAS DELIVERY INDUSTRY

**Q. What kind of decoupling policies are used in the natural gas industry and why?**

A. Decoupling is widely used in the natural gas industry, in part because gas sales growth rates fell and sometimes went negative earlier than for the electric industry. Exhibit No. ___(MJV-8) shows the prevalence of decoupling in the various states. *Brattle's* empirical analysis focuses on the first two mechanisms: revenue decoupling with true-up and fixed-variable rates.

One reason for the expansion of decoupling is that gas delivery is a heavily capital intensive industry with high fixed costs. Volumetric rates do not provide adequate cost recovery if the sales are declining. Moreover, for safety and reliability, new investments are frequently needed, and capital recovery is essential if regulated companies are going to have access to capital at reasonable rates. The gas LDCs whose operating subsidiaries are in the first two groups of states in Exhibit No. ___(MJV-8) are the source of the sample for *Brattle's* empirical analysis of impact of decoupling.

**Q. How did you collect the data for the gas LDC sample?**

A. The analysis is based on a sample of gas holding companies ("HCs") that were exclusively or primarily involved in the regulated natural gas local distribution industry. The companies in the gas LDC sample are nearly "pure plays" in the

natural gas distribution industry,[6] which makes the gas industry analysis very "clean" in the sense that other factors that may affect the cost of capital are not generally present in the sample. This characteristic makes it easier to interpret the statistical results. The source of the cost of capital estimates over the study period is a series of *Brattle* expert reports on the cost of capital. *Brattle's* expert witnesses submitted cost of capital testimony 26 separate times between October 2005 and May 2012 based on a sample of six to twelve gas LDC holding companies.[7] Across the 26 dates, over 240 HC-specific cost-of-capital estimates were submitted into evidence.

**Q. Please explain the study period and how the cost of capital and the decoupling data were developed?**

A. The study period is six and one-half years between October 2005 and May 2012. The data development recognizes an important dichotomy, which is a standard feature in estimating the cost of capital for a regulated company. On one hand, HCs, not their subsidiaries, have the market information necessary to estimate the cost of capital, because they have publicly traded stock and bonds, and are under scrutiny by a variety of financial analysts. The 26 studies have estimated the cost of capital by rigorous methods that meet the filed testimony standards.

[6] Pure play is a financial term referring to a company which is exclusively in one line of business, which in this case is the delivery of natural gas at retail.

[7] The variance in the number of companies in the sample stems from the sample selection criteria used by cost of capital witnesses to eliminate companies which have characteristics which may bias the estimates.

On the other hand, individual, state-regulated subsidiaries, not the HCs themselves, can be granted decoupled rates by state regulatory commissions and operate under particular state policies for energy efficiency, distributed generation, rate design, and renewable energy development. We characterized the degree of decoupling of each holding company by examining the decoupling policies of its subsidiaries.

To begin this second step, we identified all regulated gas LDCs belonging to each HC in the sample and then used a combination of primary and secondary sources to identify the subset of those gas LDCs that had decoupled rates during the study period. The 12 HCs collectively held 46 regulated natural gas LDC subsidiaries as of June 2012. We defined decoupling to include true-up decoupling schemes and straight fixed-variable rates. We excluded LRAMs. LRAMs were shown in Exhibit No. ___(MJV-8) but generally address only the sales reductions from the utility's own energy efficiency programs and not those from other causes like customer distributed generation, price elasticity, changing tastes, and other causes that also impact the utility.

The number of states and gas LDCs with decoupling mechanisms in place increased significantly during the study period. Only four gas LDC subsidiaries had decoupling at the beginning of the period, but 24 subsidiaries had decoupling by the end. Eleven of those changes were in the years 2007 through 2009.

An indicator variable (1 or 0) for each subsidiary of a HC in each year is assigned and then weighted in terms of the average quantity of gas delivered by the decoupled subsidiaries for each HC in the study period. The HC decoupling

index each year is the weighted average of the Indicators for the subsidiaries in that year. Exhibit No. ___(MJV-9) reports the twelve gas HCs and shows the evolution of the decoupling index values from the beginning to the end of the study period. There is a strong upward movement in the average decoupling index in the sample in the six years between March 2006 and May 2012.

**Q. What regression equation did you estimate and what was the null statistical hypothesis?**

A. In the regression equation, the dependent variable is the after-tax weighted-average cost of capital ("ATWACC") which is calculated as follows:

After-Tax WACC = (Equity Share) * (ROE)
+ (Debt Share) * (Cost of Debt) * (1-Corp Tax Rate)

The share weights for equity and debt are based upon the market value capital structure for each sample company. ROE is estimated using the multi-stage version of the Discounted Cash Flow ("DCF") model. In our analyses, we find that use of the multistage DCF model results in a better explanation of the cost of capital, with higher adjusted R-squared,[8] than use of the single stage DCF model.

The key independent variable is the decoupling index variable for the holding company, which is a weighted average of the index variable for decoupling of the gas subsidiaries. The weights are the gas deliveries in MCF of subsidiaries in relation to the entire holding company. Data on these magnitudes were available

[8] R-squared is sometimes called the "goodness of fit measure" and measures the degree of explanatory power of a statistical relationship. The higher the R-squared, the higher is the degree of the overall fit of the estimated regression equation to the sample data.

from the United States Energy Information Administration ("EIA") by year. We updated the data.[9]

The equation is estimated with ordinary least squares. We use the clustered standard error estimation method to account for correlation in each company's performance across time and increase accuracy. If decoupling substantially reduced the cost of capital, the estimated coefficient on the decoupling index variable should be negative and statistically significant. The hypothesis to be tested is that decoupling lowers the cost of capital. The neutral or null hypothesis is that there is no effect on the cost of capital from the adoption of decoupling. The statistical test is whether there is evidence at the 0.05 p-value level that the neutral hypothesis is false.

**Q. What were the results of the cost of capital study for the gas sample?**

A. The statistical results do not disprove the neutral hypothesis that there is no impact on the cost of capital from adoption of decoupling. The results are shown in Exhibit No. ___(MJV-10). The coefficient of the decoupling index variable is -8.7 bps. The p-value for this coefficient is 0.37, considerably above the 0.05 p-value (5 percent) threshold.[10] In statistical terms, this p-value is not considered to

[9] EIA, *ANNUAL REPORT OF NATURAL AND SUPPLEMENTAL GAS SUPPLY & DISPOSITION*, FORM EIA-176 (2012) Data Set.

[10] In testing for statistical significance, the p-value is the probability of obtaining a test statistic at least as large as the one observed, assuming the neutral or null hypothesis is true. The neutral or null hypothesis in this case is that decoupling does not reduce the cost of capital. "In most scientific work, the level of statistical significance required to reject the null hypothesis (i.e., to obtain a statistically significant result) is set conventionally at .05, or 5%. The significance level [or p-value] measures the probability that the null hypothesis will be rejected incorrectly, assuming that the null hypothesis is true." See Rubinfeld, Daniel, "Reference Guide on Multiple Regression," in National Research Council, Reference Manual on Scientific Evidence, 3rd ed. Washington, DC: The National Academies Press. 2011

provide statistically significant evidence that the cost of capital is reduced for the gas LDC companies that implemented decoupling.

In simple terms, the determination of statistical significance is a test of whether the evidence would lead you to reject the opposite hypothesis you wish to investigate. In this case, we set up the test to see if the evidence would allow rejection of the hypothesis that the cost of capital is not affected by the adoption of decoupling. This is called the null hypothesis. If the null hypothesis (i.e., there is no cost of capital effect) is rejected, then we would have statistical support for the hypothesis that decoupling does reduce the cost of capital. Typically a relatively high standard of statistical significance is required to reject the null hypothesis because the analyst does not want to accept the alternative hypothesis without sufficient evidence.

We use a so-called "one tailed test" because the alternative hypothesis is that the effect on the cost of capital is negative. Use of a one-tailed test makes it more likely that the neutral hypothesis can be rejected. However, the 0.37 p-value in our study results is too imprecise to reject the null hypothesis and too imprecise to accept the alternative hypothesis that decoupling lowers the cost of capital.

**Q. Do you believe that the results from the gas LDC study should be given substantial weight in addressing the issue of the effect of decoupling on the cost of capital?**

A. Yes. I consider these results to be very important because the companies in the gas LDC sample were part of a sample selected to be as close to "pure play" natural gas companies as possible. Their business risk is concentrated in their

single regulated industry. Our methodology separates the financial risk from the business risk, which drives the risk premium and the cost of equity capital. I conclude that since the impact of decoupling was not measurable at these many points where the policy was implemented, decoupling was, first, compensating for rising business risk and, second, was reducing the unique risks of the companies. This test cannot distinguish whether decoupling has no effect on the cost of capital or is merely offsetting increased systematic risk from other policy decisions.

**Q. Do these results for the gas LDC industry differ from previous results that you have published?**

A. Not in a material way. The previous study was done in 2011 and updated in July 2012.[11] These were results of a very similar study in terms of method but on a smaller sample of 18 cost-of-capital submissions that ended in June, 2010. The qualitative conclusion is the same: no statistical evidence to disprove the neutral hypothesis of no impact. In that study we reported five variations in terms of specifying the regression. The impact estimates varied, but all agree on the conclusion above.

[11] Joseph B. Wharton, Michael J. Vilbert, Richard E. Goldberg and Toby Brown, "The Impact of Decoupling on the Cost of Capital: An Empirical Investigation," revised *Brattle* paper, July 2012.

## V. EMPIRICAL ANALYSIS OF THE IMPACT OF DECOUPLING IN THE REGULATED ELECTRIC INDUSTRY

**Q. What kinds of decoupling policies are used in the electric industry?**

A. Decoupling grew rapidly from 2007 to 2012 and has continued to increase to the present. *Brattle's* study period starts in 2005 and continues through the second quarter of 2014. We also define a shorter period ending with 2012 that provides results corresponding generally to the two periods of the cost of capital analysis considered in this proceeding. The states that currently have electric decoupling policies of three kinds discussed above are shown in Exhibit No. ___(MJV-11).

**Q. How was the sample collected for the study of the effect of decoupling on electric utilities?**

A. The sample dataset was updated from the analysis that *Brattle* published in the report *The Impact of Revenue Decoupling on the Cost of Capital for Electric Utilities: An Empirical Investigation* in March 20, 2014.[12] Updating includes adding six quarters to extend the period of study from fourth quarter 2012 to the second quarter 2014.

Sample selection is systematic. We start with a large sample of regulated electric company subsidiaries and their holding companies, then compile data on which have a decoupling policy and when it was officially adopted by commission order.

[12] Michael J. Vilbert, Joseph B. Wharton, Charles Gibbons, Melanie Rosenberg, and Yang Wei Neo, *The Impact of Revenue Decoupling on the Cost of Capital for Electric Utilities: An Empirical Investigation*, Prepared for The Energy Foundation, March 20, 2014.

The final sample contains a subset of the following size:

- 14 electric holding companies[13];
- 22 state-regulated electric subsidiaries of the HCs. The subsidiaries operate in 11 states and during some quarters in the study period had decoupling; and
- 38 quarterly observations from 1Q 2005 through 2Q 2014, covering the period when there was rapid growth in the policy of decoupling for electric utilities.

**Q. Please explain how the decoupling data and the cost of capital data were developed on a consistent basis?**

A. Just as for the gas LDC sample, electric HCs, not their subsidiaries, have publicly traded stock that provides the financial information necessary to estimate the cost of capital, but individual, state-regulated subsidiaries, not the HCs themselves, apply for, and are granted, the policy of decoupling. We use a similar methodology to address this dichotomy. We measure the degree of decoupling of each HC by examining the decoupling policies of its subsidiaries after differentiating each state in which a subsidiary operates. We use the subsidiary's share of the HC's assets to establish the weights of the different subsidiaries to calculate the degree of decoupling for each HC.

There are several recent public surveys of innovative ratemaking policies that include decoupling.[14] The *Brattle* report used and supplemented the public survey

[13] The holding companies are American Electric Power Co. Inc. (AEP), CMS Energy Corp. (CMS), Consolidated Edison, Inc. (ED), DTE Energy Co. (DTE), Duke Energy Corp. (DUK), Energy East (EAS), Exelon Corp. (EXC), Hawaiian Electric Industries Inc. (HE), IDACORP Inc. (IDA), Integrys Energy Group Inc. (TEG), Northeast Utilities (NU), Pepco Holdings Inc. (POM), Portland General Electric Co. (POR), UIL Holdings Corp. (UIL).

data on regulated electric utilities that had adopted decoupling as of the summer of 2013. This report supplements the earlier sources with additional information on the specific date on which the regulatory policy of decoupling was adopted for a particular state subsidiary.

On its specific date, each state subsidiary goes from 0, not decoupled, to 1, decoupled, and sometimes in the reverse direction. In general, a HC may have several subsidiaries, and the decoupling index for the HC is a weighted average of the index for its subsidiaries.

The after-tax weighted-average cost of capital ("ATWACC") is the dependent variable in the regression equation, just as in natural gas study:

After-Tax WACC = (Equity Share) * (ROE)
+ (Debt Share) * (Cost of Debt) * (1-Corp Tax Rate)

The equity and debt share weights are based upon market values. ROE is estimated using the multistage version of the DCF model.

The estimation of the cost of capital is for the sample HCs. We screened the universe to remove HCs whose estimated cost of capital could be biased by other

[14] Sources of information on decoupling and other innovative regulatory policies include Pamela Morgan, A Decade of Decoupling for U.S. Energy Industries: Rate Impacts, Designs, and Observations, December 2012; and Edison Electric Institute ("EEI"), Alternative Regulation for Evolving Utility Challenges: An Updated Survey, Pacific Economics Group Research LLC, Jan. 2013; Institute of Electric Efficiency ("IEE"). For this study, *Brattle* reviewed the sources and updated the periods that decoupling policies have been in place for different utilities.

factors by using a set of criteria that are standard in *Brattle's* cost of capital analysis.[15]

The cost of equity is the information of interest to regulators when they set the allowed ROE for a utility, so our focus is ultimately on whether there is a measurable reduction in the cost of equity from the policy of decoupling.[16] In general, the cost of equity increases not only with increased business risk but also with increased financial risk. Therefore, in testing for an impact on the cost of capital from decoupling, we systematically account for differences in the cost of equity in different HCs in the samples that arise from different levels of financial risk, which has nothing to do with decoupling.

**Q. What regression equation did you estimate and what is the null statistical hypothesis?**

A. In the regression equation the dependent variable is the overall after-tax weighted average cost of capital of each holding company. The key independent variable is the decoupling index variable for the HC, which is a weighted average of the index variable for decoupling of the HC's electric subsidiaries. The weights are the asset values of subsidiaries in relation to the asset value of the entire HC.

[15] To be included in the sample, the HCs must meet all of the following conditions: no recent, substantial merger and acquisition (M&A) activity; must have an investment grade credit rating, i.e., BBB- or better; has not cut its dividend in the last two quarters; and is a U.S. company.

[16] The distinction between the cost of equity (COE) and the return on equity (ROE) is that the COE is the estimated cost of equity whereas the ROE is the allowed return set by the regulator. In most cases, regulators strive to set the allowed ROE equal to the estimated COE, but there are some circumstances when the regulator may set the allowed ROE higher or lower than the COE in recognition of differences in risk between the sample and the regulated company.

For the electric industry analysis, one issue is that the electric HCs in the sample are not "pure plays" as are the companies in the gas LDC sample. The sample selection is driven first and foremost by the existence of subsidiaries that received a decoupling decision during the study period. Unlike the gas LDC sample, several of the HCs have unregulated subsidiaries.

To account for the effects of the changing nature of the HCs over time, we developed company-epoch-specific indicator variables. An "epoch" is defined as an uninterrupted sequence of observed values of pairs of cost of capital and the decoupling index. Interruptions in this series come from the following causes: mergers and acquisitions, dividend cuts, credit rating changes, and major regulatory or legal policy changes.

These suggest major changes in corporate position and structure that would be picked up by financial analysts, which may change the overall level of risk and the cost of capital for the HC independent from changes in the decoupling index.

The equation is estimated with ordinary least squares and clustered standard errors to account for correlation in each company's performance across time. If decoupling substantially reduced the cost of capital, the coefficient on the decoupling-index variable would be negative and statistically significant. In other words, the hypothesis to be tested is that decoupling lowers the cost of capital. The neutral or null hypothesis is that there is no negative impact of decoupling. The statistical test is whether there is evidence at a p-value less than 0.05, the 95 percent level, that the neutral or null hypothesis is false.

**Q. What are the results of the electric industry decoupling study?**

A. The statistical results do not reject the neutral hypothesis that there is no impact on the cost of capital from adoption of decoupling. The results are shown in Exhibit No. ___(MJV-12). The coefficient of the decoupling index variable is -26 bps. The p-value for this coefficient is 0.17 greater than the 0.05 p-value that is needed to disprove the neutral hypothesis.

**Q. Have you analyzed the impact of decoupling in the shorter period up to the beginning of 2013 which is of independent interest in this proceeding?**

A. Yes, we ran the same multistage DCF model for the period ending in the fourth quarter of 2012. These results of the model are similar in that the coefficient of the decoupling index variable is not statistically significant. The results are shown in Exhibit No. ___(MJV-13).

These results are similar to the results for the full period to 2014. The coefficient on the decoupling index is -25 bps. The neutral hypothesis cannot be rejected, with a p-value of 0.17, which is greater than the standard threshold of 0.05 required for the results to be statistically significant.

**Q. Do these results for the electric industry differ from previous results that you have published?**

A. Yes, but not in any material way. We published our first results on decoupling in the electric industry in March 2014.[17] The original study only went through the end of the year 2012, so it is more comparable to the second set of findings above that cover the same time period. The conclusion was that the base case and three alternative case impacts were not statistically significant at the 0.05 level. The p-value in the original study was 0.14 and the coefficient was -41 bps. For the current study, the methodology used the multistage DCF, added fixed-variable rates as decoupling policy, and added the epoch-company indicator variables.

## VI. THE RANGE OF OTHER INNOVATIVE RATE POLICIES IN THE PSE COST OF CAPITAL SAMPLE

**Q. Have you evaluated the types of innovative rate making policies used by the companies in Dr. Morin's cost of capital study for PSE?**

A. Yes. We collected data from various sources on eight innovative or alternative ratemaking policies, which operate outside the general rate case environment. These have been growing in use in the electric, gas and water industries. We identified the subsidiaries of the group of 28 regulated utility holding companies in Dr. Morin's cost of capital samples that have these policies in effect. These policies are discussed in three groups, as shown in Exhibit No. ___(MJV-14).

[17] Michael J. Vilbert, Joseph B. Wharton, Charles Gibbons, Melanie Rosenberg, and Yang Wei Neo, *The Impact of Revenue Decoupling on the Cost of Capital for Electric Utilities: An Empirical Investigation*, Prepared for The Energy Foundation, March 20, 2014.

The methodology was to first identify the subsidiaries in regulated industries using the SNL Corporate Structure database. I then mapped the subsidiaries to each of the policies in the list using our own data on decoupling and data provided in reports by EEI, IEE and other sources.[18] The data for electric decoupling is current. Some of the data for gas decoupling and other ratemaking policies are subject to change. The results should be considered indicative of the range of these types of policies in Dr. Morin's samples.

**Q. How prevalent in Dr. Morin's sample are the two decoupling policies *Brattle* studied in the natural gas and electric industries, as reported above?**

A. Both types of decoupling policies are quite prevalent in Dr. Morin's sample, as shown in Exhibit No. ___(MJV-15). All results in the tables are shown with an "X" indicating that at least one subsidiary of a holding company in the sample has the policy.

This table shows that a majority of the HCs in the sample have subsidiaries that have some form of decoupling policy in place.

**Q. How prevalent are the second group of polices in the sample?**

A. These are also prevalent but vary in relative frequency, as shown in Exhibit No. ___(MJV-16). The sample shows the degree of participation in these innovative and alternative rate policies, especially capital expenditure riders.

[18] *See* footnote 14, *supra*.

**Q. Are fuel and purchased power clauses also prevalent in the sample?**

A. Yes. This is shown in Exhibit No. ___(MJV-17). The use of fuel and power adjustment clauses is 100 percent for at least one subsidiary in each holding company.

## VII. CONCLUSIONS

**Q. Please summarize your findings on whether there is empirical evidence that the adoption of decoupling reduces the cost of capital?**

A. *Brattle's* two studies of the gas and electric industries complement each other and provide consistent results. Both studies failed to reject the null hypothesis that decoupling does not affect the cost of capital. Although the coefficients on both of the decoupling indexes were negative, they were not statistically significant. In other words, there was no statistically significant support for the alternative hypothesis that adoption of decoupling reduced the cost of capital.

Although the number of HCs in the natural gas sample was slightly smaller than in the electric sample, the natural gas LDC sample consists of companies that are nearly pure play companies in the natural gas distribution industry. This means that the companies are quite homogenous so that the cost-of-capital results are not potentially affected by other aspects of the HCs. The gas LDC study convincingly shows that the null hypothesis that adoption of decoupling had no effect on the cost of capital cannot be statistically rejected, with the p-value of 0.37, compared to the standard threshold of 0.05 p-values. In other words, the

empirical tests do not support the hypothesis that decoupling had a statistically significant negative effect on the cost of capital.

The study of the electric industry provides similar results. However, the electric utility sample of holding companies is a much more heterogeneous. Many of the HCs have unregulated subsidiaries. For a significant number of companies, there have been many mergers and acquisitions, dividend cuts, and policy changes that change the risks and add significant noise to the data. Yet the conclusions are similar -- a negative impact of decoupling on the cost of capital cannot be proven statistically, with the p-value of 0.17, compared to the standard of 0.05 p-values.

**Q. Are these results consistent with financial theory?**

A. Yes. I recognize that decoupling may reduce the volatility of revenues, which may reduce some risk to a company. However, the statistical evidence, based on the decoupling events of the period of very active implementation, does not support the hypothesis of a reduction in the cost of capital. This is consistent with the view that decoupling is instituted as a policy response to support other important regulatory goals that may increase risk to utilities under traditional cost of service regulation. Effective energy efficiency programs, customer distributed generation, changing tastes of younger generations, and the requirement to integrate renewable energy sources that can raise prices generally all have the tendency to result in decreasing sales growth or an absolute reduction in sales. In conjunction with volumetric rates, declining sales may not allow for full recovery of the utility's fixed costs. This increasing risk can be either systematic (part of the cost of capital) or diversifiable (not part of the cost of capital) in financial

terms, but it is probably some combination of both. Decoupling may reduce the random weather or business cycle fluctuations in the short-term, but its real purpose is to address for the secular downward trend in sales that accompanies energy efficiency. The adoption of decoupling then neutralizes the risk and is an important factor in maintaining the utility's financial strength and removing the throughput incentive. This in turn is important as gas utilities seek to provide safe and reliable service by focusing on safety, and electric utilities seek to move ahead with incorporating advanced technology in the two-way grid and acting as change agents in society's move to meet climate change goals.

**Q. Does this complete your testimony?**

A. Yes, it does.