White Paper: What effect does a utility's capital structure have on electricity prices?

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Abstract:

From the observation that Wisconsin's largest public utility, We Energies, has among the highest electricity prices in the state a remedy (an alternative financing structure) to decrease customer's bills is explored. Here, how We Energies' capital projects are funded and how they ultimately affect their customer's monthly bills is examined by estimating We Energies' 2020 revenue deficiency under a publically financed structure using data from their 2020 publically litigated rate case. The cost of capital from a comparably sized publically owned utility is used in place of We Energies' investor-owned cost of capital, which allows for a direct interrogation of the effect capital structure has on revenue deficiency. From the estimated revenue deficiency, the average residential customer's monthly bill is found to decrease by 11.5% and approach parity with other Wisconsin investor-owned utilities.

Section I: Introduction

This white paper investigates how the capital structure of Wisconsin's largest public utility, We Energies, affects its customers' monthly electricity bills. Using forecasts and assumptions settled upon during We Energies' most recent rate case, this paper estimates We Energies' 2020 revenue deficiency and its average residential customer's monthly bill under a publicly financed capital structure. By comparing these estimates with the revenue deficiency and rate increases authorized by the Wisconsin Public Service Commission (PSC) in the rate case, a clear comparison can be made between a publicly financed, fictitious, We Energies and the investor-owned We Energies of today. This paper will provide a primer on the two types of utility capital structures, investor-owned and publicly financed, how electricity rates are determined for both, and how each is affected by its cost of capital. This paper does not identify the process by which a change in capital structure or ownership would take place, nor does it estimate the costs associated with such a change. This is outside the scope of this work and is left to future investigations.

Motivating this research is the observation that We Energies' monthly electricity bills are higher than other Wisconsin utilities and increasing. Figure 1 demonstrates this trend by plotting We Energies' average residential customer's monthly bill over time against the averaged residential bills of Wisconsin's other major investor-owned utilities (IOUs) and Wisconsin's 82 publicly owned utilities. The monthly bill estimates assume a monthly consumption of 600 kWh and are provided by the Wisconsin PSC. We Energies' monthly bill is seen to be noticeably higher than its major-IOU peers and markedly higher when compared to Wisconsin's publicly owned utilities. This trend is consistent over time as We Energies and the other major IOUs continue to increase their cost of electricity while Wisconsin's publicly owned utilities have kept their cost of electricity level, and even decreasing, since 2015. From 2010 to 2020 We Energies' average monthly bills have increased by 21.9%. Over the same time period Wisconsin's major IOUs have increased their monthly bills by 15.7% while publicly owned utilities have increased theirs by 4.7%

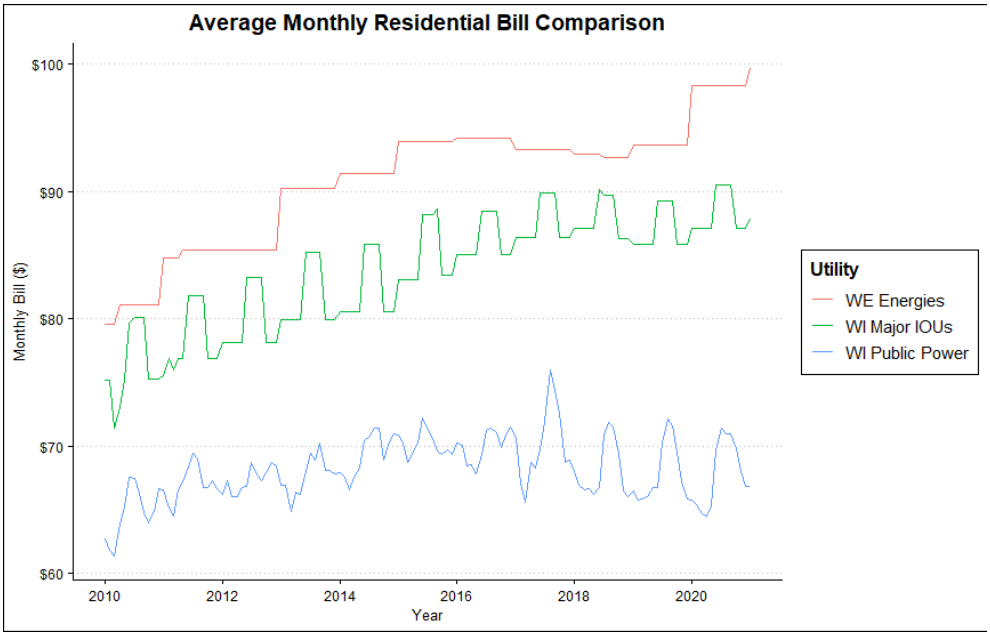

Figure 1. Average Monthly Residential Bill Comparison Between WI Utilities

Comparing the differences more directly, Table 1 presents each's 2020 average residential monthly bill as reported by the PSC. Seen starkly, We Energies' average monthly bill is higher than Wisconsin's other major IOUs and publicly financed utilities. Customers of We Energies pay $1.36 more a month for electricity than customers of Madison Gas and Electric Company, $10.84 more than customers of Northern States Power Company, and $14.92 and $13.09 more than Wisconsin Power and Light Company and Wisconsin Public Service Corporation, respectively. We Energies' customers are paying $30.55, or 45% more each month for their electricity than their publicly financed peers. A further breakdown of Wisconsin electricity prices by price per kWh and daily fixed charges is provided in the appendix.

2020 Average Monthly Bill Comparison

	WE Energies	Madison Gas And Electric Company	Northern States Power Company (WIS)	Wisconsin Power And Light Company	Wisconsin Public Service Corporation	WI Public Power
Average Monthly Bill	$98.34	$96.98	$87.50	$83.42	$85.25	$67.79

Table 1. Average Monthly Bill Comparison

In addition to We Energies' comparatively high cost of electricity, the unequal burden this places on Milwaukee's low-income communities is also motivating this investigation. We Energies is the monopoly provider of electricity in Milwaukee, Wisconsin's largest urban area, meaning that all Milwaukeeans pay the same amount for electricity as dictated by WI Statute 196.60 (WI Statute 196.60) which prohibits discriminatory rate setting such as, and including, progressive income-based rate setting. Because of the wide variance in household income throughout Milwaukee, these equal rates place an unequal burden on low-income households. By dividing a household's average monthly income by its monthly electricity bill, the burden felt by different communities throughout Milwaukee can be

estimated. Using We Energies' average 2019 residential bill and the monthly average income of the 31 zip codes that make up the city of Milwaukee, each neighborhood's electricity burden can be estimated.

This is done for the 31 zip codes that make up the city of Milwaukee using We Energies' average 2019 residential bill to estimate each neighborhood's 2019 electricity burden. Table 2 highlights the four highest and least burdened communities. A complete list of the city's electricity burden by zip code is provided in the appendix. From the table, it is seen that We Energies places a 5.5 times greater burden on Milwaukee's most impoverished neighborhood, the community surrounding Marquette University, than the city's most affluent, Whitefish Bay. The starkness in burden diminishes as the city's median income is approached, with the average electricity burden falling between 1.5-2.0% of pre-taxed monthly income. While these numbers represent little unless examined in the context of a wholistic, post-tax, monthly budget, they do indicate that rising electricity rates are, and will continue to, have an unequal impact on Wisconsin's most vulnerable communities.

Milwaukee Electricity Burden Comparison

Zip Code	Neighborhood	Population	Monthly Average Income	Electricity Burden
Lowest Energy Burden				
53217	Whitefish Bay	28,661	$12,770	0.73%
53132	Franklin	35,782	$9,026	1.04%
53213	Wauwatosa	27,667	$8,947	1.05%
53203	Downtown	1,726	$8,361	1.12%
Highest Energy Burden				
53204	Walker's Point	38,678	$3,837	2.44%
53206	Arlington Heights	22,520	$2,956	3.17%
53205	Triangle	8,908	$2,951	3.17%
53233	Marquette	15,143	$2,334	4.01%

Table 2. Comparison of Electricity Burden by Zip Code for the City of Milwaukee

The subsequent sections of this investigation will be structured in the following manner. Section II will introduce the two flavors of capital structure used by public utilities and identify how a utility's capital structure affects its cost of electricity. Section III identifies the data used in the estimations and outlines the methodology followed to estimate a revenue deficiency and average monthly residential bill for a 2020, publicly financed, fictitious We Energies. Section IV presents and discusses Sections III's estimations. Section V summarizes this investigation's conclusions and comments on future work in the area.

Section II: Background

The nomenclature surrounding electric utilities can be muddled with public utility, public power, and publicly-owned utilities meaning different things to different people. In this paper, a public utility is defined as any utility given a monopoly franchise, license, or permit to generate and distribute electricity in a given service area. The monopoly franchise is granted by the state legislature or regulating body to reduce redundant infrastructure created by competition between utilities and to allow for economies of scale to be realized at a regional level. There are two types of public utilities, investor-owned utilities and publicly-owned utilities. The two set out to provide the same cost-efficient, reliable electricity to their

customers but under different business models. An investor-owned utility is a for-profit company that must compensate investors for their invested capital and is regulated by a commission of publicly-elected or appointed regulators. In contrast, publicly owned utilities, or public power, are community-owned, not-for-profit entities that are often outside the jurisdiction of regulating bodies. Throughout the industry and literature, publicly-owned utilities are synonymous with public power. The two terms can, and will, be used interchangeably during this investigation.

In order to provide electricity to their customers these investor-owned and publicly financed utilities must invest in capital-intensive projects such as large-scale coal, natural gas, hydro, wind, or solar power plants to generate electricity. To distribute the electricity utilities also build costly distribution infrastructure like substations and transmission lines. This requires the utility to raise large amounts of money, what the industry calls capital. Capital can be raised from a variety of sources. The sources differ for IOUs and public power, but generally fall into two categories: debt and equity. Debt capital is raised by both types of utilities, while capital equity is raised only by IOUs. Debt capital is raised by investors making loans to the utility through the purchase of corporate, or commercial bonds that return an agreed-upon rate of interest to the investor over a fixed period of time as the principal, or borrowed amount, is repaid. Equity originates from the utility issuing partial ownership shares to investors who in turn expect to be compensated for their invested capital through dividends and stock price appreciation. Because equity investors are the last to be repaid in the event of financial hardship, including bankruptcy, they are thought to assume more risk than debt investors and thus require a higher rate of return on their invested capital. This is an important assumption to highlight when thinking about a utility's cost of capital; because equity investors assume more risk they receive additional compensation through higher rates of return, which in turn raises the cost of capital. A question outside the scope of this paper is just how much risk are equity investors assuming, and is the compensation they receive proportional to that risk? To the author's knowledge, utility defaults are uncommon.

The equity and debt capital raised by IOUs are typically categorized as common equity, preferred equity, long-term debt, and short-term debt. Common equity is capital raised from investors by issuing common stock interests in the company, while preferred equity represents capital raised by issuing preferred stock interests. Important differences between the two are: common shareholders are given voting rights while preferred shareholders are not, preferred shareholders are given priority of repayment over common shareholders (but behind debt lenders), and preferred equity typically has a lower cost of capital. IOU's long-term debt is commonly financed with 5, 10, 20, or 30-year maturity securities and is typically loaned to the utility through a bank or other financial institutions. Short-term debt is debt that matures in less than 1 year and is also typically financed through financial institutions like banks or credit unions. Compared to long-term debt short-term debt is usually lent to the utility at a lower interest rate than long-term debt. These four sources of capital and representative annual cost rates for each are shown in Table 3. The annual cost rates are taken from We Energies' 2020 rate case and are typical of an IOU.

WE Energies' Cost of Capital

Source of Capital	Annual Cost Rate
Common Stock Equity	10.00%
Preferred Stock Equity	3.95%
Long-Term Debt	4.60%
Short-Term Debt	2.80%

Table 3. Typical IOU's Capital Structure and Annual Cost Rates

The annual cost rate is the compensation each investor receives for their invested capital and includes interest, fees, and other financing costs. From the table, common equity capital is shown to compensate investors with a substantially higher rate of return than preferred stock equity or either type of debt capital. Common equity investors are compensated 253% more than preferred equity investors for their invested capital, 217% more than long-term debt lenders, and 357% more than short-term debt lenders. The discounted annual cost rate of short-term debt compared to long-term debt is also shown with short-term debt being lent at a 1.8% discounted rate.

Publicly owned utilities do not issue ownership stakes in their operations and thus solely rely on long-term and short-term debt to finance their capital projects. Long-term debt is usually raised through the issuance of municipal revenue bonds. Municipal bonds are debt instruments issued by a state, municipality, or county to finance their capital infrastructure projects. Bond purchasers receive annual interest payments until the bond's maturity date, or else the principal is repaid in full. Municipal bonds are typically exempt from state and federal taxes which is a cost-saving opportunity for municipalities. As estimated by the American Public Power Association, a $250 million-dollar infrastructure project would cost $79 million dollars less if it was funded by tax-exempt debt and municipal bonds (Issue Brief: Municipal Bonds and Public Power 2021). This is a 31.6% project savings and results in the same amount not being collected from customers who ultimately fund these capital projects.

A capital structure representative of a publicly owned utility is shown in Table 4. This is Omaha Public Power District's (OPPD) estimated capital structure as taken from their 2020 annual report (OPPD Annual Report 2021). OPPD is the 12th largest public power utility in the united states servicing eastern Nebraska and is representative of a typical, medium to large-sized public power utility. From the table, it is seen that their municipal bond annual cost rate is comparable to an IOU's long-term debt annual cost rate and substantially lower than common equity's. Common equity has more than double the annual cost rate of municipal bonds.

OPPD's Cost of Capital

Source of Capital	Avg. Annual Cost Rate
Revenue Bonds	4.24%
Revenue Notes - Commerial Paper	0.61%
Subordinated Revenue Bonds	4.26%
NC2 Separate Revenue Bonds	4.21%
Minibonds	5.05%

Table 4. Typical Publicly Owned Utility's Capital Structure and Annual Cost Rates

2.1 Capital Structure's Impact on Electricity Prices

The capital structure of a public utility impacts its customers' cost of electricity through the rate-setting process. Typically, an IOU participates in a publicly litigated legal proceeding adjudicated by its regulating body after submitting an initial application to adjust rates. In contrast, publicly owned utilities commonly determine their rates in-house and publish documentation after outlining their process and assumptions. Although the two rate-setting processes differ, the principles underlying each are the same. Both begin by forecasting how much electricity will be needed in the coming years, what regulators call test years, and then estimate how much revenue has to be collected from ratepayers to recover the cost of providing the forecasted demand. This is called a utility's required revenue, the revenue required to provide safe, reliable, and affordable electricity. The required revenue is then proportionally divided amongst the utility's customers according to how much fuel and infrastructure each uses while consuming the provided electricity. Customers are commonly categorized as either residential, small general service, or large general service. Residential customers are typically homeowners, small general service customers are usually commercial businesses such as office buildings or retail stores, and large general service customers are generally manufacturing facilities or large institutions such as hospitals and universities. Each of these broad categories is often comprised of multiple subclasses with each utility grouping its customers differently.

The allocation of the forecasted required revenue by the ratepayer group is called a cost-of-service survey (COSS) and is integral to the rate-setting process. It is also the most often contested as it involves making, and coming to an agreement on, numerous assumptions about the determination and allocation of each rate class's infrastructure usage. As the COSS is context and utility specific, this paper does not investigate the allocations determined in the COSS portion of We Energies' 2020 rate case, but instead focuses on the determinates of the forecasted required revenue and assumes the COSS to be decoupled from the required revenue determination. This assumption can be made because the COSS is performed after forecasting the test year's required revenue and uses the forecasted required revenue as an input. Simply put, the revenue requirement calculation determines what that total cost should be and the COSS determines what percent of that total each ratepayer should be responsible for.

To examine how the required revenue estimate is arrived at for both IOUs and public power we will first explore how IOUs estimate their required revenue and then contrast that with how publicly owned utilities arrive at the same estimate. Each IOU calculates its forward-looking required revenue a little differently, but the calculation can be generalized to the inputs shown in Eq. (1).

$$RR = O\&M + A\&G + T + D + (WACC * RB) \quad (1)$$

Where *O&M* captures operations and maintenance costs, *A&G* administration and general expenses, *T* taxes, *D* the depreciation of capitalized assets, *WACC* the weight average cost of capital, and *RB* the rate base or sum total of undepreciated capitalized assets. Each of these inputs is calculated using the test year's forecasted load, fuel prices, wholesale electricity prices, and labor estimates.

From Eq. (1) several observations can be made about the impact a utility's cost of capital, or weighted cost of capital (*WACC*), has on its revenue requirement. The first is that because regulated IOUs are required to pass on operational, maintenance, and administration expenses at cost, charging no mark-up to their customers, the return on invested capital becomes central to the IOU producing a profit for their equity investors who expect to be compensated for their capital through surpluses returned as dividends. This is captured in Eq. (1) by *WACC* and the rate base (*RB*). Both are central to the utility producing a surplus. The *WACC* is the average annual cost rate of the utility's capital sources weighted by the utility's state in each. As shown in Table 3 the annual cost rate of IOUs' capital varies substantially, from 10% for common equity to 2.8% for short-term debt.

For an IOU, long-term and short-debt annual cost rates are determined by market forces such as interest rates and credit ratings, while common and preferred stock equity cost rates are determined subjectively by the PSC during the rate case proceeding. The PSC sets returns on equity based on, in their own words, "…balancing the needs of the investor with the needs of the customer" (PSC Commission 2020). The PSC explains that equity return rates must be set high enough to compensate equity investors for the opportunity cost of investing their capital elsewhere but not too high as to overly burden ratepayers. The opportunity cost equity investors experience is estimated by comparing equity return rates across the general economy and specifically, the utility sector. In 2019 the average return of equity authorized in vertically integrated electric utilities was 9.73% with 10.5% being the largest and 8.75% the lowest (Fontanella 2021). This puts We Energies' 10.0% return on common equity higher than the industry average and means that We Energies' initial application, asking for a 10.35% return on common equity, would be among the highest in the industry.

The opportunity cost equity investors experience is estimated by comparing equity return rates across the general economy and specifically, the utility sector. By setting equity return rates appropriately the utility is able to ensure a continued stream of equity investment while at the same time not overburdening the ratepayer, who ultimately pays for the returns on capital.

Following the same logic, that the profit needed to compensate equity investors can only originate from returns on capital investment, the rate base becomes central to providing a surplus to compensate equity investors with. Averch and Johnson illustrate this in their 1968 model of regulated firms that finds that because a utility's allowable profits are based upon the rate base, the utility is incentivized to increase its capital stock, or simply put, over-invest in capital infrastructure (Averch and Johnson 1962). The empirical literature attempting to verify the Averch & Johnson effect has produced mixed results with some finding significant capital over investment (Courville 1974; Lavado and Hua 2004; Thesis and Spann 1974) and at least one other finding little evidence of it (Boyes 1976). Regardless of the empirical findings, the mechanism underlying the effect, that profits can only be realized through returns on capital, is as true today as it was in 1968.

Section III: Data and Methodology

In this investigation the data and methodology are intertwined, as both, excluding public power's average cost of debt, originate from We Energies' public rate case proceeding, docket 05-UR-109, "Joint Application of Wisconsin Electric Power Company and Wisconsin Gas LLC for Authority to Adjust Electric, Natural Gas, and Steam Rates". The values used to calculate We Energies' publically financed revenue deficiency are taken directly from the PSC's Final Decision of 05-UR-109 (PSC Commission 2020). These values include the net investment rate base, forecasted operating income, earned rate of return, and line-item adjustments. By using the same forecasts utilized during the rate case, an apples-to-apples comparison can be made between the revenue deficiency of a hypothetical, publically financed, We Energies' and the PSC's authorized revenue deficiency.

To relate revenue deficiency back to the required revenue introduced in section II, Eq. (1), a utility's revenue deficiency is modeled/represented in Eq. (2) as the difference between the test year's forecasted required revenue and the test year's forecasted revenue at current rates.

$$RD_{2020} = RR_{2020} - R_{2019} \tag{2}$$

Where RD_{2020} is 2020's revenue deficiency, RR_{2020} is 2020's forecasted required revenue, and R_{2019} is 2020's forecasted revenue at current 2019 rates.

While required revenue is the principal underlying revenue deficiency, the PSC determines the test year's revenue deficiency not in relation to required revenue, but as a function of the required rate of return, forecasted earned rate of return, net investment rate base, tax adjustment factor, and line-item adjustments. By taking the difference between the required and forecasted earned rate of return, multiplying their difference by the utility's rate base and tax adjustment factor, and then adding further line-item adjustments a revenue deficiency for the test year is determined. This is modeled by Eq. (3).

$$RD_{2020} = \left(ROR_{Req} - ROR_{E}\right) * NIBR * Taxes + Adjustments \tag{3}$$

Where RD_{2020} is revenue deficiency, ROR_{Req} is required rate of return, ROR_{E} is earned rate of return, *NIBR* is average net investment rate base, *Taxes* are the Tax Gross-up Factor, and *Adjustments* are

other line-item adjustments specific to the rate case. The required rate of return is determined during the rate case and is a function of the weighted average cost of capital, construction work in progress (CWIP), and regulatory adjustments. A table showing how We Energies' 2020 required rate of return was determined is provided in the appendix but in comparison to publicly financed utilities this is We Energies' weighted average cost of capital. IOUs make adjustments to their *WACC* for capital applicable primarily to utility operations, CWIP, and regulatory items all of which publically financed utilities do not consider which is why an IOU's ROR_{Req} is considered its *WACC* in relation to public power. The forecasted earned rate of return is simply the test year's forecasted operating income at current rates divided by the net investment rate base. The operating income at current rates represents the surplus to be returned to investors as compensation for their invested capital which is represented by the net investment rate base. When dividing the two the rate of return on invested capital is found.

As mentioned, the earned rate of return, net investment rate base, and line-item adjustments are kept constant when estimating We Energies' publically financed revenue deficiency. What instead changes is the required rate of return and the tax gross-up factor. OPPD's average cost of capital, or debt, is substituted for We Energies' required rate of return as defined in their 2021 Corporate Operating Plan (2021 Corporate Operating Plan 2021). Their cost of capital is representative of the annual interest rates a public power We Energies would have access to through municipal bonds. The tax gross-up factor will be assumed 1 in the estimation model as publicly owned utilities are rarely subject to state and federal taxes. Assuming this to be held constant at 1.3774 for a publicly financed We Energies would inflate the impact public financing has on revenue deficiency.

To estimate the average residential ratepayer's monthly bill several assumptions have to be made. It is assumed that any decrease in revenue deficiency from the change in capital structure will be equally distributed across rate classes. By assuming this the model does not capture the PSC's subjective allocation of increased revenue collection across rate classes, as informed by the COSS. Not capturing the allocation of revenue increases decreases the accuracy of the residential customer's monthly bill estimate, but without access to the PSC's decision-making process, it is impossible to model their hypothetical allocations. It is the author's hunch that the model's estimate is a conservative one. The .54% increase in required revenue as determined in the 2020 rate case caused We Energies' average residential monthly bill to increase by 4.99%. If this allocation of costs is carried over to the publicly financed estimation any decrease in revenue deficiency can be expected to have a multiplier effect on residential monthly bills.

In the 2020 rate case, residential customers bore 138% of the revenue deficiency. Meaning residents will be paying the total revenue deficiency for 2020 and then some, while only making up 40.7% of the revenue. General secondary customers, large volume users such as industry, commercial, or governmental groups are having their rates reduced by 30% for flat rate users and 23% for time-of-use customers. -> WeE_Revenue_Present_Authorized.xlms -> sourced from the appendix of Final Decision.

such the unprotected EDIT tax credit for 2020 rate case.

Again, Eq. (3) highlights how central the return on invested capital is to determining revenue deficiency with the difference between required and earned dictating what percent of the rate base, applicable capital investment,

Section IV: Estimation Results

The results of estimating the revenue deficiency under a publicly financed We Energies is presented in Table 5 alongside the revenue deficiency authorized by the PSC's 2020 rate case.

Revenue Deficiency

	Investor-Owned Cost of Capital	Public Power Cost of Capital
Average Net Investment Rate Base	$4,738,613	$4,738,613
Operating Income at 2019 Rates	$409,009	$409,009
Earned Rate of Return	8.63%	8.63%
Required Rate of Return	8.88%	4.39%
Earnings Deficiency as % of NIRB	0.25%	-4.24%
Earnings Deficiency	$11,993	$(200,917)
Tax Gross-up Factor	1.3744	0
Tax Adjusted Deficiency	$16,484	$(200,917)
P4 Settlement Adj. - Utility Allocation	$(1,200)	$(1,200)
Revenue Deficiency	**$15,284**	**$(202,117)**

Table 5. Investor-Owned Financed vs. Publicly Financed Revenue Deficiency

Replication of the PSC's assumptions is demonstrated by average net investment rate base, operating income at 2019 rates, earned rate of return, and P4 settlement adjustment being held constant between the two estimations. By substituting We Energies' required rate of return with OPPD's cost of capital a new earnings deficiency as a percent of the NIRB is arrived at which when multiplied by the average net investment rate base results in a dollar amount of earnings deficiency before tax and settlement adjustments. This makes up the bulk of the public power's estimate of revenue deficiency as the tax gross-up factor is set at 0.

The table shows that under We Energies' current investor-owned capital structure revenue deficiency was forecasted, and approved, to be $15,284,000. Under a publicly financed We Energies, with access to low-interest municipal bonds, the revenue deficiency is shown to turn into a revenue surplus of $202,117,000, a $217,401,000 decrease in the revenue required to be collected from ratepayers.

The results of estimating an average monthly bill under a publicly financed We Energies are presented in Table 6 alongside a residential customer's average monthly bill at rates authorized by the PSC's 2020 rate case.

Cost of Capital Impact on Average Residential Monthly Bill

	Investor-Owned Cost of Capital	Public Power Cost of Capital
Revenue Increase	15,284,000 0.54%	-202,117,000 -7.09%
Average Monthly Residential Bill	$98.34	$87.02

Table 6. Average Residential Customer's Monthly Bill Comparison

Here, the percent revenue increase expresses the percent change in total utility sales from 2019 to 2020 accounting for the revenue deficiency. The total utility sales are used instead of total operating revenue to calculate the percent increase because total operating revenue includes revenue received from property leases and financial investments. Additional revenue is not easily raised from these sources, which results in any revenue deficiency typically being raised from ratepayers or total utility sales.

The table shows that We Energies was authorized to collect .54%, or $15,284,000, more in revenue from their customers in 2020. This resulted in a monthly $98.34 electricity bill for the average residential customer. Under a publicly financed We Energies it is estimated that 7.09% less revenue will need to be collected in 2020 than was in 2019. When this 7.09% decrease in revenue collection is evenly divided among rate classes it results in an $87.02 monthly bill for the average residential customer. When this 7.09% decrease in the average monthly bill is compared to the 4.99% increase authorized by the 2020 rate case, the impact that the cost of capital financing has on electricity prices is found to be significant. Because a disproportionate amount of the .54% revenue increase had to be collected from residents based upon the PSC's adjustments to the cost-of-service study's allocations it is reasonable to hypothesize that a reduction in collected revenue should disproportionately impact residential customers, making the across the board 7.09% reduction in the average residential bill a conservative estimate.

Tying these estimates back into the observation that We Energies' customers are paying more for their electricity than other Wisconsinites, the monthly bill estimated under a publicly financed We Energies' is added to the comparison of average electric bills for residential customers of Wisconsin utilities in Table 7.

2020 Average Monthly Bill Comparison

	WE Energies	WE Energies Publically Financed	Madison Gas And Electric Company	Northern States Power Company (WIS)	Wisconsin Power And Light Company	Wisconsin Public Service Corporation	WI Public Power
Average Monthly Bill	$98.34	$87.02	$96.98	$87.50	$83.42	$85.25	$67.79

Table 7. 2020 Average Monthly Bill Comparison Between Wisconsin Public Utilities

It is seen that the newly estimated bill of $87.02 brings We Energies' electricity bill near parity with the other major IOUs. We Energies' customers would pay less for electricity under a publicly funded capital structure than Madison Gas and Electric Company and Northern States Power Company customers, and make their rates competitive with Wisconsin Power and Light Company and Wisconsin Public Service Corporation. While now competitive with their IOU peers under a publicly financed capital structure, We Energies' customers would still pay $19.23, or 28.4%, more for their electricity than the average customer of Wisconsin's public power utility.

Section V: Conclusion

By estimating the revenue deficiency and average monthly residential bill for a publically financed We Energies, and comparing these estimates with the revenue deficiency and electricity rates authorized by the PSC in We Energies' 2020 litigated rate case, the impact cost of capital has on the price of electricity is demonstrated. A 7.09% decrease in revenue deficiency and an identical decrease in the average residential customer's monthly bill is found when public financing is used to raise capital as opposed to the .54% increase in revenue deficiency and 4.99% increase in the average monthly bill authorized by the rate case. These numbers are significant and represent the importance cost of capital has on the price of electricity for customers.

Further investigations should build on the methodology presented here and aim to model how an estimated revenue deficiency would be allocated across rate classes. This would increase the accuracy of the estimations and conceivably demonstrate an even larger impact on residential customers' monthly bills. Another avenue that should be explored is gathering more robust data on public power's average cost of debt. As the cost of debt is representative of only, even if comparable, one publicly financed utility. More data points should be collected in the pursuit of arriving at an average, representative, cost of publicly funded capital. Additional work should be directed at quantitatively, or qualitatively, measuring the presence of the Aversh-Johnson effect in We Energies' capital expenditures.

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Appendix:

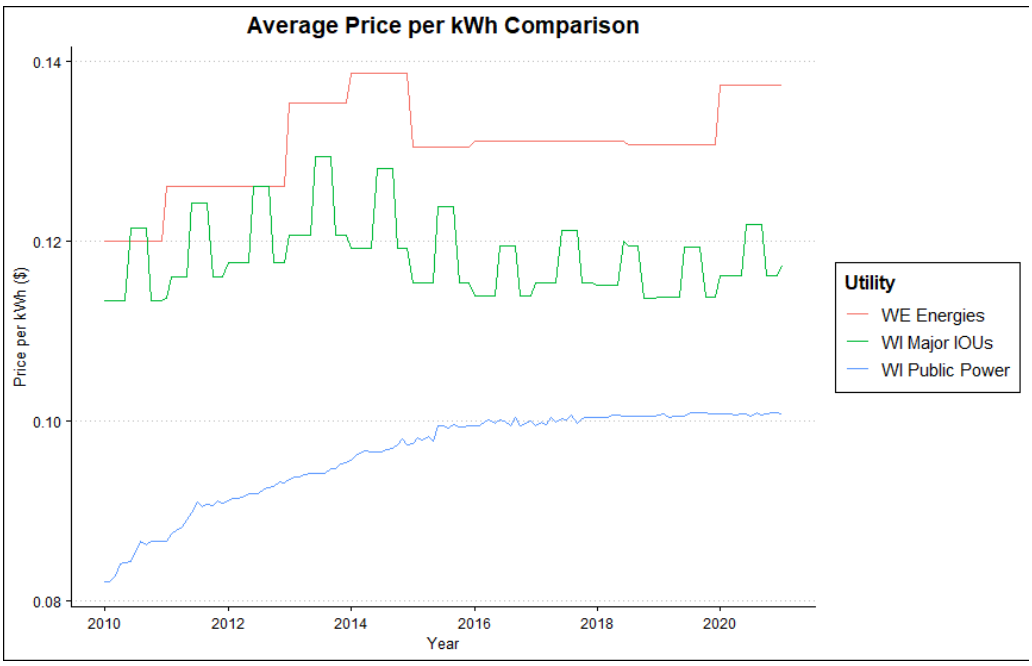

Figure 2. WI Utility price/kWh Comparison

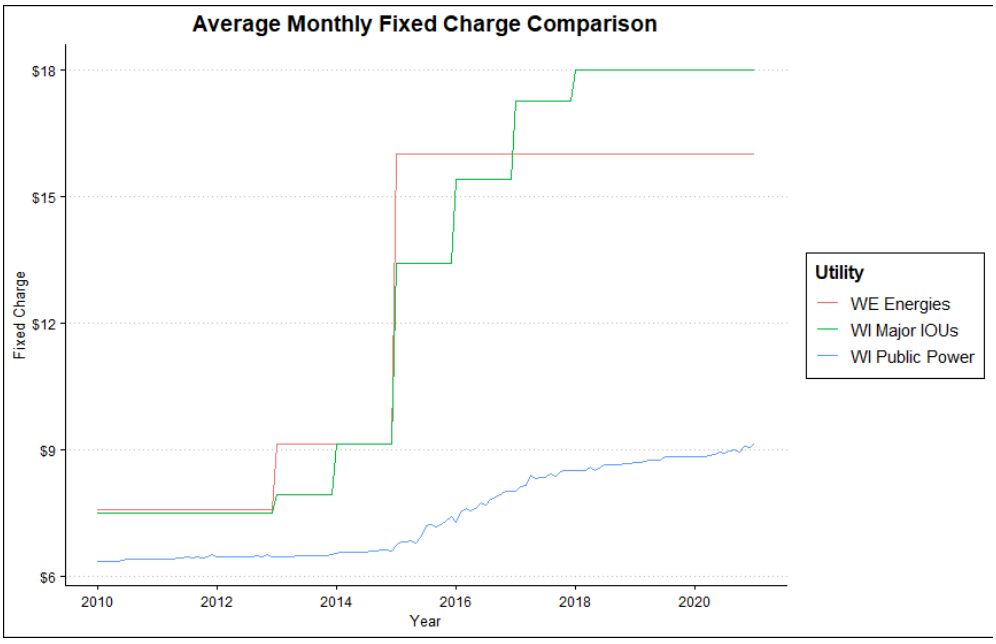

Figure 3. WI Utilities' Monthly Fixed Charge Comparison

Milwaukee Electricity Burden Data

Zip Code	Population	Monthly Average Income	Electricity Burden
53217	28,661.0	$12,770	0.73%
53132	35,782.0	$9,026	1.04%
53213	27,667.0	$8,947	1.05%
53203	1,726.0	$8,361	1.12%
53211	35,457.0	$8,232	1.14%
53130	7,564.0	$8,132	1.15%
53226	18,940.0	$7,886	1.19%
53129	14,148.0	$7,835	1.20%
53154	36,066.0	$7,782	1.20%
53202	24,921.0	$7,016	1.33%
53228	14,703.0	$6,587	1.42%
53220	26,360.0	$6,066	1.54%
53207	36,889.0	$6,045	1.55%
53222	26,367.0	$6,005	1.56%
53110	18,271.0	$5,603	1.67%
53219	34,878.0	$5,571	1.68%
53172	20,957.0	$5,553	1.69%
53224	22,308.0	$5,519	1.70%
53221	40,109.0	$5,464	1.71%
53227	23,609.0	$5,251	1.78%
53235	9,519.0	$5,162	1.81%
53214	35,543.0	$4,961	1.89%
53223	29,244.0	$4,911	1.91%
53225	26,551.0	$4,639	2.02%
53212	30,546.0	$4,568	2.05%
53208	30,161.0	$4,433	2.11%
53209	46,616.0	$4,303	2.18%
53218	41,974.0	$4,284	2.19%
53210	26,793.0	$4,151	2.26%
53215	60,010.0	$4,141	2.26%
53216	33,583.0	$4,122	2.27%
53204	38,678.0	$3,837	2.44%
53206	22,520.0	$2,956	3.17%
53205	8,908.0	$2,951	3.17%
53233	15,143.0	$2,334	4.01%

Table 8. Milwaukee's Electricity Burden by Zip Code

Revenue Deficiency

	WEPCO WI Juristiction	
Average Net Investment Rate Base	4,738,613	NA
Operating Income at current Rates	409,009	NA
Earned Rate of Return	8.63%	NA
Required Rate of Return	8.88%	NA
Earnings Deficiency as % of NIRB	0.25%	NA
Earnings Deficiency	11,993	NA
Tax Gross-up Factor	1.3744	NA
Revenue Deficiency with Utility Proposed Tax Credits, Fuel Refund, and Revenue Sharing	16,484	NA
P4 Settlement Adj. - Utility Allocation	-1,200	NA
Revenue Deficiency	15,284.00	NA

Table 9. We Energies' Forecasted Revenue Deficiency as Determined in their 2020 Rate Case

Rate of Return on Rate Base

	WEPCO Electric
Cost of Capital	7.49%
Average Percent of Utility Investment Rate Base plus CWIP to Capital Applicable Primarily to Utility Operations	86.38%
Adjusted Cost of Capital to Derive Percent Return Requirement Apllicable to Net Investment Rate Base (AFUDC Rate)	8.68%
Total Average CWIP Balances ($000)	124,545
Percent of CWIP Receiving Current Return	31.84%
Amount of CWIP Receiving Current Return ($000)	39,654
Current Earnings on CWIP Receiving Current Return at Adjusted Cost of Capital	3,440
Average Net Investment Rate Base	4,818,391
Adjustment to Required Return to Provide a Return on CWIP	0.70%
Earnings on Reg Items at Specified Rate	6,648
Regulatory Items at Specified Rate	0.14%
Adjusted Return Requirement on Utility Net Investment Rate Base	8.88%

Table 10. We Energies' Required Rate of Return as Determined in their 2020 Rate Case