Delmarva Power and Light Co. Electric Rate Cases in Delaware: Accounting Concepts and Empirical Data

White Paper

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I. Introduction

President Trump signed the Tax Cuts and Jobs Act (TCJA) into law on December 22, 2017. The new bill cuts the corporate income tax from 35% to 21%. Based on this new law, the utility industries, which primarily operate their business within US borders, expect to see significant tax savings in 2018. Since the corporate income tax is paid from ratepayers' pockets, regulators in several states (usually named Public Service Commission or Public Utility Commission) have taken actions to ensure the tax cut benefits go to ratepayers[1] (RTO Insider, 2018). Delaware lawmakers also called for lower power rates that pass federal tax cut savings on to customers. In response to growing concern from the public, the Delaware Public Service Commission (DE-PSC) ordered all rate-regulated utilities to estimate the 2017 Tax Act's effects on their cost of service by March 31, 2018.[2]

Delmarva Power and Light Company (DPL) is the largest energy utility in Delaware, serving 312,000 electric customers and representing 52%[3] of the state's total retail electricity sales (Delmarva Power & Light Co., n.d.; US Energy Information Administration, 2018). DPL's business consists of electricity purchases, retail sales, as well as the distribution to retail customers in certain portions of Delaware and Maryland.[4] DPL also provides essential consumer information on billing, customer service issues, and safety. As an investor-owned public utility, DPL is under DE-PSC regulation. The PSC regulates investor-owned public utilities including electric, natural gas, cable, water, wastewater, and telecommunications to ensure safe, reliable, and reasonably priced services for Delaware consumers (Delaware Public Service Commission, 2018). Under the regulation, DPL is required to submit rate cases and receive PSC's approval before rate adjustment. From September 2009 to August 2017, DPL filed five rate cases and the most recent petition (Docket # 17-0977) filed in August 2017 is under review as of March 2018.

The purpose of this paper is to assist ratepayers, government officers, and readers interested in utility ratemaking to understand the rate determination processes and accounting concepts as well as the potential impacts of the tax cut. This paper is organized as follows. Section II highlights the key findings. Section III describes the data collected and utilized for this study. Section IV illustrates required revenue regulation and the revenue calculation procedure, using DPL's rate case as an example. Section V provides information of the potential impacts of the tax cut for DPL and ratepayers. Section VI discusses the rate case negotiation between DE-PSC and DPL, based on previous DPL rate change petitions and PSC Orders. Section VII concludes and provides future research direction.

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[1] For example, public commissions in South Carolina, Arkansas, Virginia, Maryland, and Washington requested their regulated utilities to identify the benefits of tax cut for ratepayers.

[2] Order No. 9166 in PSC Docket No. 17-1240

[3] DPL sold 3,655,732 megawatt-hours (MWh) electricity to retail customers in 2016 and the total sales in Delaware were 6,990,155 MWh.

[4] DPL also runs natural gas distribution and retail sale business for customers in parts of New Castle County in Delaware.

II. Key Findings

1. DE-PSC adopts the required revenue regulation to evaluate the shareholder earning requirements and determine the rate. The rationale of ratemaking is to sustain DPL's profits to attract future capital investment.
2. The Tax Cuts and Jobs Act will significantly reduce DPL's required revenue from $31.2 million to $12.6 million. However, ratepayers still need to pay more to cover the rate base growth.
3. The ratemaking procedure between DPL and DE-PSC empirically demonstrated the "negotiation game," resulting in higher rates for customers.
4. Future studies about data access and data analysis/transformation are needed to facilitate the rate determination procedure. Also, more ratepayer-oriented studies are expected to enhance customers' knowledge about electricity bills, as well as help utilities and the PSC understand the needs of customers.

III. Data

This paper analyzes the electric rate structure of DPL's operation in Delaware jurisdiction, based on DPL's accounting and financial records and rate case documents. The primary data source is DE-PSC's E-filing system, DelaFile, for DPL data specifically prepared for the state of Delaware, which includes petitions, public hearing records, testimony minutes and supplementary files. Information not documented in DelaFile (e.g., data for rate case #09-414) was obtained through a Freedom of Information Act (FOIA) request.

Supplementary data sources are the Electric Utility Annual Report (Form 1) filed by the Federal Energy Regulatory Commission (FERC) and the Form 10-K, an annual financial performance report of a company, required by the Securities and Exchange Commission (SEC). It is noteworthy that most federal governments requested filings are on the corporate-level scope. Therefore, the DPL federal reports contain the entire DPL performance information across multiple states.

IV. How do Utilities Make Money? The Rate of Return Regulation

DPL is an investor-owned utility with the exclusive right to sell electricity in a given service territory in Delaware. To protect customers' interests, the DE-PSC regulates DPL's investment, the rate of distribution, and profit margin. On the other side, the DE-PSC allows DPL to earn a reasonable return on its physical assets that it owns and operates. The DE-PSC adopts the rate of return regulation to protect customers and ensure a fair return for utilities. Required revenue is the objective of ratemaking under the rate of return regulation.

When DPL submits rate cases to PSC, the commission evaluates the required revenues estimated by DPL and determines rate increase allowance. Required revenues

represent the amount of money a utility needs to collect to cover its expenses and make a reasonable profit. The calculation is based on rate base, the rate of return, and expenses. The basic formula lists as below.

Required Revenues = (Rate Base x Rate of Return) + Expenses

Where:

Required Revenues = revenues a utility needs to cover expenses and provide a reasonable return
Rate Base = capital investment required to provide service
Rate of Return = return earned, or allowed to be earned, on the utility rate base
Expenses = operation and maintenance expenses, depreciation, and tax

The main target of a rate case is to decide the required revenues for a regulated utility. Rate base, the rate of return, and expenses are three pillars to compose the required revenue. Typically, the utility estimates its required revenue for a test period, which is used for the overall required revenue development. The test period is twelve months and the DE-PSC allows partial forecasted and partial actual test months to better reflect the conditions during the rate effective period. Following sections will explain each component of required revenue and its accounting principles and items in more detail. A numerical example will show the step-by-step calculation of required revenue. The data is derived from the application and supplemental documents submitted by DPL for rate case #17-0799. It is noteworthy that the numbers used in this white paper are the first version of rate case #17-0799. This company revised and resubmitted its data later and new discussions continue for this rate case as of March 15, 2018.[5] Also, all the numbers are DPL's claimed (proposed) amounts.

(1) Rate Base

Rate base is the value of the total assets of a firm used for providing services to its customers. In general, rate base is composed of addition and deduction items. Additions increase the value of rate base, commonly including power plants in service, electricity infrastructure, materials and supplies, and cash working capital. Deductions include accumulated depreciation, accumulated deferred income taxes, and customer deposits and advances. Because the allowable profits are determined by rate base, the rational action for a utility is to enlarge its rate base. In other words, one way for utilities to ensure future revenues and profits is by increasing its capital investment (Payne, 2017).

[5] This section shows the original application submitted by DPL on August 17, 2017. DPL submitted another adjustment document on October 18, 2017 and increased the required revenue deficiency from $24,425,436 to $31,198,425. Another adjustment was submitted on February 9, 2018 after considering the potential impact of the Tax Cuts and Jobs Act. The most current required revenue deficiency is $ 12,603,795.

Table 1 lists items that DPL included in its rate base.[6] This estimation is generated from a twelve-month test period that DPL presented in testimony for rate case # 17-0977. The data in this test period includes five months of actual data (January 2017 to May 2017) and seven months of forecasted data ending December 2017. This table shows the calculation of rate base with typical elements.

Table 1 Rate base components and numeric example of Delaware

(1) Line No.	(2) Item		(3) Detail
1	Electric Plant in Service	$	1,485,620,226
2	Intangible Assets	$	2,258,214
3	Less: Depreciation Reserve	$	448,831,642
4	Net Plant in Service	$	1,039,046,798
5			
6	Construction Work in Progress (CWIP)	$	0
7	Working Capital	$	85,562,608
8	Plant Materials & Supplies	$	17,486,097
9	Plant Held For Future Use	$	0
10	Amortizable Balances	$	4,343,295
11	Deferred Federal and State Tax Balance	$	(298,331,880)
12	Deferred Investment Tax Credit	$	(859,381)
13	Customer Deposits	$	(21,349,119)
14	Customer Advances	$	(3,579,609)
15			
16	Total Rate Base	$	822,318,809

Source: Author compiled from (Delmarva Power & Light Co., 2017b, 2017c)

The used and useful standard is applied to the rate base determination, which means only the capital investment in facilities that are used and useful for providing service to customers can be included. The electric plant in service is the largest portion of the rate base, but when calculating the net plant in service, the utility needs to less its accumulated depreciation. Other additions are working capital, plant materials and supplies, and prepaid balances. Working capital is the money a utility needs to pay the operating expenses before receiving its revenues from this service. Plant materials and supplies include meters, transformers, wire, and related parts that are used for providing adequate and reliable service to customers. Prepaid refers to payments in advance of the period to which they apply, such as expenses on insurance and rents.[7]

Construction work in progress (CWIP) may be a component of the rate base

[6] Original table in this document include numbers for "system electric," "total distribution," and "Delaware distribution." This paper presents data specific for Delaware jurisdiction.

[7] Detailed definition and information of each rate base item can be found in Chapter 3 of Lowell E. Alt Jr.'s book.

depending on the PSC's regulation, so that will vary by state. CWIP is the cost incurred by a utility during plant construction. Some states allow utilities to include these financing or interest costs in the rate base while other states accumulate and include the costs as part of the total plant cost and recognize them in the allowance for funds used during construction (AFUDC or AFDC). Plant held for future use refers to when a utility acquires property in advance of actual use. Some states disallow this cost's inclusion in the rate base based on the use and used rationale.

The deductions on rate base in this DPL case include deferred federal and state tax balance, deferred investment tax credit, customer deposits, and customer advances. The deferred federal and state tax occurs because of different depreciation methods adopted by the federal and state government. Usually, the state PSC takes the straight-line depreciation method and the federal and state tax departments allow the use of accelerated depreciation methods. Two depreciation methods create a timing difference which results in more tax money paid by the customers than the utility paid to the government in a specific period. The differences are accumulated in an account called accumulated deferred income tax. A way to compensate customers is to deduct the accumulated deferred tax from rate base, which is shown in this DPL case. Regarding deferred investment tax credit (ITC), the Internal Revenue Code (IRC) section 46(f)(1) and 46(f)(2) allows utility investors and customers to share the benefit. One option is to distribute the ITC benefit to ratepayers through a reduction in the rate base (Yankee, 200 7). Rate base deductions can also be derived through customer deposits, which are new customers' security deposits used for protecting utilities from potential losses from missed bill payments from customers. The customer advances (also called customer advances for construction) is also a rate base deduction. This money is collected from customers for construction and may be wholly or partially refunded to the customer at a later date.

(2) Rate of Return

Based on the required revenue equation, rate base and rate of return are two factors that drive a utility's profits. The rate of return is used to ensure stakeholders continue investing the utility. The rate of return is calculated based on the capital structure. A utility's capital structure presents the source of funds, which are debt and equity. Debt is the money a utility borrows, usually in the form of bonds. Equity are the shares of stock a utility sells in the market. The cost of debt is the interests, determined by the market. The cost of equity is also called return on equity (ROE), set by the PSC in the rate case. The weighted-cost of equity and debt become the cost of capital, i.e., the rate of return.

For example, the capital structure of DPL was $1,602 million of debt and $1,326 million of shareholders' equity. Therefore, the capital structure of DPL was 54.7% debt and 45.3% equity (Table 2). The cost of debt, i.e., the average interest rate, was 2.2% as of 2016 (US Department of Treasury, Bureau of the Fiscal Service, 2017) and the ROE

approved by the DE-PSC was 9.7%.[8] Based on above information, the rate of return of DPL would be 5.6%, as calculated in Table 3.

Table 2 DPL balance sheet data (in millions)

Source	December 31, 2016	
Current Liabilities	$	381
Long-term Debt	$	1,221
Shareholder's Equity	$	1,326

Source: (US Securities and Exchange Commission, 2017)

Table 3 DPL rate of return calculation

Source	Percentage	Cost	Weighted Cost
Debt	54.7%	2.2%	1.2%
Equity	45.3%	9.7%	4.4%
Totals	100%		5.6%

Source: Author compiled from (US Department of Treasury, Bureau of the Fiscal Service, 2017; US Securities and Exchange Commission, 2017)

In rate case #17-0977, DPL requested to increase ROE to 10.1%, which led to a 6.98% rate of return (Table 4). In DPL's calculation, it only considered long-term debt. In this circumstance, equity would have more significant weight resulting in a larger rate of return, which could enlarge DPL's profits.

Table 4 Rate of return request by DPL

Source	Percentage	Cost	Weighted Cost
Long-term Debt	49.48%	3.8%	1.88%
Equity	50.52%	10.10%	5.10%
Totals	100%		6.98%

Source: Author compiled from (Delmarva Power & Light Co., 2017c)

(3) Expenses

Expenses used to provide services to customers are included in the required revenue. On the contrary, expenses that are not related to customer service or only benefit utility shareholders usually are not allowed in the required revenue, examples including corporate image advertising and charitable contributions (Alt, 2006). Following is a brief description of expenses included in the required revenue calculation.

[8] The commission determines the ROE by balancing the interests of ratepayers and shareholders. The most recent approved ROE in Delaware is 9.7%, which fell within the middle of the range of ROE set by rate cases settled in 2017 across the US. Based on the 2017 annual survey of ROE conducted by the Fortnightly, 57 rate cases were filed across the US and the authorized ROE rates ranged from 8.5 % to 11.75 % (Cross, 2017).

Operation and maintenance, depreciation and amortization, and taxes are typical categories of expenses included in required revenue. Operating and maintaining facilities to provide reliable service is the primary mission of utilities. These costs, including labor and materials, are therefore included in the required revenue calculation. DPL's operation and maintenance expenses, in addition to facility costs, administrative and customer service also create significant expenses. Customer account management and customer service expenses include meter reading, billing, and the operation of customer call centers. Administrative and general expenses refer to employee salaries, benefits and pensions, insurance, outside service, franchise requirements and regulatory expenses.

Power plants and transmission and distribution facilities wear out over time. Utilities are allowed to allocate the cost of tangible assets (facilities and plants) over their limited lifespans and treat annual depreciation as an expense. Straight-line depreciation and accelerated depreciation are methods normally applied to depreciation calculation. In addition to depreciation for tangible assets, utilities use amortization to annually spread out the cost of intangible assets (Alt, 2006).

Utilities pay many types of taxes when providing services, such as federal and state income taxes, property taxes, and gross revenue taxes. Because these taxes are related to providing services to customers, they are treated as expenses in the required revenue calculation. In addition to income taxes, other expenses related to payroll (FICA, federal and state unemployment, payroll taxes), property (franchise, state real & personal property), and revenue (utility tax, local tax, and other tax) are added into the required revenue calculation as well.

Table 5 lists the operating expenses included in DPL rate case #17-0977. This is estimated data for the test year and the total operating expenses are $187,912,960. Expenses included in the required revenue will directly pass through to ratepayers and the utilities are not supposed to earn profits on them.

Table 5 DPL operating expenses estimation (test year)

(1) Line No.	(2) Item		(3) Expense
1	Operation and Maintenance		
2	Production	$	0
3	Transmission	$	0
4	Distribution	$	50,104,404
5	Customer Accounts	$	32,988,423
6	Customer Service and Information	$	2,320,210
7	Sales	$	342,543
8	Administrative and General	$	40,952,291
9	Total Operation and Maintenance Expense	$	126,707,871
10			
11	Depreciation and Amortization		
12	Production	$	0
13	Transmission	$	0
14	Distribution	$	29,794,468
15	General	$	3,892,980
16	Common-Electric	$	2,503,089
17	Amortization	$	110,261
18	Other Amortization	$	3,411,640
19	Total Depreciation and Amortization Expense	$	39,712,437
20			
21	Taxes other than Income Taxes		
22	Payroll Related	$	1,865,905
23	Property related	$	6,139,785
24	Revenue Related	$	384,759
25	Total Taxes other than Income Taxes Expense	$	8,390,448
26			
27	Income Taxes and Provisions		
28	State Income Tax	$	(1,924,286)
29	Federal Income Tax	$	(7,067,880)
30	Deferred State Income Tax	$	4,779,366
31	Deferred Federal Income Tax	$	17,554,555
32	Net Investment Tax Credit Adjustment	$	(239,551)
33	Total Income Taxes and Provisions Expense	$	13,102,204
34			
35	Total Operating Expenses	$	187,912,960

Source: Author compiled from (Delmarva Power & Light Co., 2017b, 2017c)

(4) Required Revenues and Adjusted Revenue Deficiency

After the rate base (Table 1), the rate of return (Table 4), and expenses (Table 5) are determined, the required revenue can be calculated. For the particular case of #17-0977, the total required revenue is $245,310,813 (Table 6).

Table 6 Required revenue calculation

	Required Revenue Calculation	
A	Total Expenses ($)	187,912,960
B	Total Rate Base ($)	822,318,809
C	Rate of Return (%)	6.98
D	Return ($) on Rate Base (C X B)	57,397,853
E	Required revenue ($) (A+D)	245,310,813

Source: Author compiled from (Delmarva Power & Light Co., 2017a, 2017b, 2017c)

However, the information ratepayers received from the media outlets as well as from DPL's application documents and PSC's Order typically do not display the total required revenue but the adjusted revenue deficiency, i.e., how much "additional" revenue DPL needs to cover its estimated cost of service. For example, in DPL's rate case #17-0977 application document, it states that:

> *"By this Application, Delmarva seeks approval of a proposed increase in its electric base rates of $24,425,436 or 4.5% in total revenues. Delmarva requires this increase in its electric distribution rates to allow it to cover its expenses of providing service and earn a fair return on its investor-supplied capital."* (Delmarva Power & Light Co., 2017e, p. 3)

The revenue deficiency is calculated based on operating income deficiency and adjusted for income taxes using the revenue conversion factor (RCF). The operating income deficiency is required operating income subtracting Pro-Forma operating income, i.e., the estimated operating income based on business-as-usual electric rates. The required operating income equals the multiplication of rate base by the rate of return.[9] After identifying the operating income deficiency, the RCF is used to adjust the income tax so that it further modifies the expenses, rate base, and required revenue. The RCF is equal to (1- tax rate)/tax rate. The tax rate is the effective combined state and federal tax rates (Alt, 2006). In the initial application of rate case #17-0977, the RCF utilized was 1.71279. In the additional supplemental testimony, the RCF was changed to 1.40926 to represent the impact of the Tax Cuts and Jobs Act. Table 7 is the calculation of adjusted revenue deficiency. The final number of $24,425,436 is what

[9] Required Operating Income = Required Revenues – Expenses
Required Revenue = Expense + (Rate Base X Rate of Return)
Thus, Required Operating Income = Rate Base X Rate of Return

ratepayers usually see from news outlets.

Table 7 Adjusted revenue deficiency calculation

(1) Line No.	(2) Item		(3) Detail
1	Adjusted Net Rate Base	$	822,318,809
2	Required Rate of Return		6.98 %
3	Required Operating Income	$	57,397,853
4			
5	Pro Forma Operating Income	$	43,137,240
6	Operating Income Deficiency	$	14,260,613
7	Revenue Conversion Factor		1.71297
8	Adjusted Revenue Deficiency	$	24,425,436

Source: (Delmarva Power & Light Co., 2017b, 2017c)

After understanding the accounting concepts and required revenue calculation, the next section will explore the potential impacts of the Tax Cuts and Jobs Act on electric rates.

V. Impact Evaluation of the Tax Cuts and Jobs Act of 2017

On December 22, 2017, President Trump signed into law the Tax Cuts and Jobs Act of 2017 (TCJA). Effective January 1, 2018, the corporate income tax rate is permanently reduced from 35% to 21%. DPL reflected the potential TCJA impact of an additional supplemental testimony for rate case #07-0977 held on February 9, 2018. This section summarizes the testimony and highlights the impacts based on the principles of required revenue calculation.

According to DPL's calculation, the TCJA reduces the required revenue request by approximately $18.6 million, decreasing it from $31.2 million to $12.6 million. The rate-making implications of TCJA include (1) the federal income tax expense reduction, and (2) the accumulated deferred federal income taxes (ADIT) revaluation, and (3) a modification for tax-related calculation in all ratemaking adjustments and the tax gross-up factor used for required revenue calculations. The detailed expected reductions in the overall required revenue are listed in Table 8.

Table 8 Summary of the TCJA required revenue changes

(1) Line No.	(2) Item		(3) $ Millions
1	Federal Income Tax Expense	$	(8.7)
2	Excess Deferred Federal Income Taxes	$	(6.1)
3	Cost of Service Tax Gross-up	$	(3.3)
4	Other Ratemaking Adjustment	$	(0.5)
5	Total Reductions	$	18.6

Source: (Delmarva Power & Light Co., 2018a)

At the first glance, TCJA brings strong rate decrease potential for customers. However, the devil is in the details. First, the reduction potential is not large enough to compensate for the increasing amount DPL requested for. DPL requested an additional $31.2 million required revenue. With an expected $ 18.6 million reduction, ratepayers still need to pay $12.6 million. Second, regarding the required revenue calculation, TCJA will decrease the expenditure but increase the rate base, which adds to the utility's profits. Table 9 compares the differences of required revenue before and after TCJA consideration. Column 3 contains information DPL requested before TCJA[10] and Column 4 is data including TCJA impact. As mentioned in Section IV, the utility earns profits from the rate base and rate of return. Therefore, DPL could expect more profits after TCJA implementation.

In conclusion, although TCJA is creating a significant reduction of DPL's required revenue, money still flies out of ratepayers' pockets and more profits will flow into DPL's account.

[10] It is noteworthy that on October 18, 2017, DPL increased its required revenue request from $24,425,436 (shown in Table 7) to $31,198,425 for rate case #17-0977 after correcting some ratemaking adjustments and updating its accounting data. Therefore, Table 9 compares the most up-to-date data submitted by DPL to the PSC.

Table 9 The comparison before and after TCJA in effect

(1) Line	(2) Item		(3) October Update	(4) TCJA Update
1	Adjusted Net Rate Base	$	804,804,165	810,684,525
2	Required Rate of Return		6.98%	6.98 %
3	Required Operating Income	$	56,175,331	56,585,780
4				
5	Pro Forma Operating Income	$	37,960,357	47,642,225
6				
7	Operating Income Deficiency	$	18,214,974	8,943,555
8				
9	Revenue Conversion Factor		1.71279	1.40926
10				
11	Adjusted Revenue Deficiency	$	31,198,425	12,603,795

Source: Author compiled from (Delmarva Power & Light Co., 2017d, 2018b)

VI. Discussion: Dirty Secrets of Required Revenue Regulation

This paper used DPL's rate case #17-0977 as an example to illustrate the basic accounting concepts and calculation procedure of required revenue. Also, the potential impact of the new tax act was discussed and identified that the ratepayers still need to pay more for their electric bills.

The DPL ratemaking proceeding empirically demonstrated the "negotiation game" illustrated by Heather Payne, who argued that the "less expensive and more public involvement" of a successful negotiation does not exist in typical utility ratemaking process (Harter, 1982; Payne, 2017). Primary reasons include: first, utilities are consistently requesting more than they need. Second, meaningful public participation was lacking in ratemaking process because of resource and knowledge limitations. Payne argued that the ratemaking process is a game among utilities, public staff, and commissions and the loser is always the ratepayers. The game is described as:

> *"An examination of both historical and recent rate cases demonstrates that utilities, public staff and utility commissions continue to play a game in which each party is able to demonstrate that they are meeting their own objectives and that utility investments and the rates necessary to support them are prudent. One way this occurs is through settlements that transpire between public staff and utilities during ratemaking proceedings: the utility asks for a rather large increase; public staff says that the request is too high and would be too expensive for the public; the utility and public staff negotiate to somewhere around half of what the utility requested and present this to the commission; and the commission*

approves the new utility rate case. This way, the utilities get an increase in profits, public staff can claim they are working for the public interest, commissioners claim they are doing their jobs, and the ratepayers continue to pay more." (Payne, 2017, p. 1)

Unfortunately, the DPL rate negotiation process fit into the above description. DPL had submitted five petitions for an increase in electric distribution base rates and miscellaneous tariff changes since 2009 and four of the cases were settled. For previous rate cases, DPL marked a starting point for negotiations and the DE-PSC approved in part of the proposed increase and tariff revisions. Table 10 presents the filing date, required revenue requests, proposed rate of return, case status, PSC authorized required revenue and the authorized rate of return. Under the negotiation, ratepayers always encountered rate increases when DPL submitted rate cases, the only differences consisted of the scale in which increases were levied by the PSC.

Table 10 DPL rate case records

Rate Case	Filing Date	Proposed Required Revenue	Proposed ROE	Case Status	Authorized Required Revenue Increase	Authorized ROE
# 09-414	Sep. 18, 2009	$27,618,487	10.75%	Settled	$16,371,203	10.0%
# 11-528	Dec. 02, 2011	$31,760,741	Not specify	Settled	$22,000,000	9.75%
# 13-115	Mar. 22, 2013	$42,044,000	10.25%	Settled	$15,096,574	9.70%
# 16-0649	May 17, 2016	$62,766,280	10.60%	Settled	$31,500,000	9.70%
# 17-0977	Aug. 17, 2017	$24,425,436 *$31,198,425 **$12,603,795	10.10%	Suspending	--	--

Source: Author compiled from (Delaware Public Service Commission, 2011, 2014a, 2014b, 2017, Delmarva Power & Light Co., 2009, 2011, 2013, 2016, 2017a).

* The DPL adjusted the request required revenue from $24,425,436 to $31,198,425 on October 18, 2017 to reflect actuals and forecasted data and some corrections.

** The DPL modified the required revenue from $31,198,425 to $12,603,795 in the Additional Supplemental Testimony on February 9, 2018 to reflect the impacts of the Tax Cuts and Jobs Act of 2017.

The dirty secret of the rate of return regulation is the guaranteed profitability for utilities. The objective of the rate of return regulation is to ensure the utility continues to attract capital investment. In this rate design paradigm, ratepayers are charged not only for covering the expenses of providing service but also for guaranteeing the utility earn a fair return on its investor-supplied capital. This regulation also limits incentives for utilities to check their expenses since all costs can be passed on to customers. In addition, utilities have no incentives to operate efficiently because more capital investment generates more revenues, no matter if the investment is necessary or not (Averch & John son, 1962; Jamison, n.d.).[11] DPL's rate cases confirmed this phenomenon.

[11] The Averch-Johnson effect: a company increases its return to shareholders by making unnecessary investments.

The reasons for DPL's rate rise petitions vary from case to case, but all are related to infrastructure and technology investments. During 2009 to 2013, DPL submitted three rate cases with the purpose of advanced metering infrastructure (AMI) costs recovery and the total request amount was over $101 million. In 2016, the primary reason for the rate rise was the Direct Load Control (DLC) and Dynamic Pricing (DP) program costs recovery (rate case # 16-0649). In rate case # 17-0977, DPL failed to provide a specific reason for a rate increase; instead, merely stated the need for cost recovery from reliability and service improvement and to sustain its revenues with the growth in operating costs and rate base.

Table 11 DPL's reasons for rate increasing

Rate Case	Main Reason
# 09-414	To recover the costs of the AMI
# 11-528	To recover the costs of the AMI
# 13-115	To recover the costs of the AMI
# 16-0649	To recover the costs of DLC and DP
# 17-0977	No specific reason

Source: Author compiled from (Delmarva Power & Light Co., 2009, 2011, 2013, 2016, 2017a)

VII. Conclusion and Future Research Suggestions

Conclusions from above analysis include:

- DE-PSC adopts the required revenue regulation to evaluate the shareholder earning requirements and determine the rate. The rationale of ratemaking is to sustain DPL's profits to attract future capital investment, which provides limited incentives for DPL to check its expenses and operate efficiently.
- The Tax Cuts and Jobs Act will significantly reduce DPL's required revenue from $31.2 million to $12.6 million. However, ratepayers still need to pay more to cover the rate base growth.
- The ratemaking procedure between DPL and DE-PSC empirically demonstrated the "negotiation game," resulting in higher rates for customers.

Further research and discussions could be enhanced from two dimensions: data access and data analysis. For data access, all regulated utilities are required to annually submit their accounting and financial data (such as balance sheet and cash flows) to the federal government. All the financial information is open access. The public can reach utilities' financial data from Form 1 (required by FERC) and Form 10-K (required by SEC). However, all the information is documented at the company level. Limitations occur when using company-level data to conduct the state-level analysis. To overcome these

limitations, the primary data used in this white paper is derived from DE-PSC's DelaFile Electronic Filing system. DelaFile is the DE-PDC's repository for all documents, including applications, complaints, inquiries, and comments. However, searching data in the system is like looking for a needle in a haystack. It is necessary to have an introduction document to illustrate data archiving structure and data searching tips.

Electric rate analysis and the conversion into numbers on bills is another challenge. Ratepayers need more knowledge to understand their bills, the rate structure, as well as the procedure of rate making. This white paper illustrates the rationale and calculation of the required revenue and more ratemaking-related documents need to be published to build up ratepayers' capacity. Topics include but are not limited to "How to read and understand the electric bill?" "What is the composition of the electricity bill? and "How to convert utilities' required revenue to the amounts shown on customers' monthly bills?" Data transparency and accessibility has gradually improved thanks to the efforts of the DE-PSC and the federal and state governments. To effectively use data to benefit ratepayers is a direction deserving of more attention and investment.

In conclusion, ideas for future study include:

- Prepare an introduction document for DelaFile users for a better searching experience and advancing data utilization.
- Conduct research to detailed trace DPL's investment records, especially items listed as rate base.
- Prepare a brochure for ratepayers to illustrate how DPL's required revenue converts into the numbers on ratepayers' monthly bills.
- Conduct survey research to collect information about the customers' satisfaction for DPL's service and their understanding of the electric rates calculation.

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