COMMONWEALTH OF VIRGINIA
STATE CORPORATION COMMISSION

APPLICATION OF **THE RAPPAHANNOCK ELECTRIC COOPERATIVE** **For a general increase in rates**	**Case No. PUR-2017-00044**

Direct Testimony of Melissa Whited

On Behalf of
Sierra Club

September 19, 2017

Rappahannock Electric Cooperative

Case No. PUR-2017-00044

Melissa Whited

Summary of Testimony

The purpose of my testimony is to address Rappahannock Electric Cooperative's ("REC" or the "Cooperative") proposed rate design, focusing specifically on the Access Charge assessed to residential and small commercial customers. Specifically my testimony will:

1. Explain that drastically increasing fixed rate charges results in rate shock, inequitable impacts on customers, reduces customers control over their bills and reduces incentives for energy efficiency conservation and distributed generation.

2. Explain that the Cooperative's proposal would violate the fundamental rate design principles of rate stability, equity, and efficient price signals and would undermine the Commonwealth's efforts to reduce energy consumption and promote energy efficiency.

3. Provide recommendations to the Commissions for alternative methods for addressing the Cooperative's concerns about revenue sufficiency, which will be more equitable, efficient and effective, such as increasing the volumetric rate, revenue decoupling, minimum bills or beneficial electrification.

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1. Introduction and Qualifications

Q Please state your name, title, and employer.

A My name is Melissa Whited. I am a Principal Associate at Synapse Energy Economics, located at 485 Massachusetts Avenue, Cambridge, MA 02139.

Q Please describe Synapse Energy Economics.

A Synapse Energy Economics (Synapse) is a research and consulting firm specializing in electricity and gas industry regulation, planning and analysis. Our work covers a range of issues, including economic and technical assessments of demand-side and supply-side energy resources; energy efficiency policies and programs; integrated resource planning; electricity market modeling and assessment; renewable resource technologies and policies; and climate change strategies. Synapse works for a wide range of clients, including attorneys general, offices of consumer advocates, public utility commissions, environmental advocates, the U.S. Environmental Protection Agency, U.S. Department of Energy, U.S. Department of Justice, the Federal Trade Commission and the National Association of Regulatory Utility Commissioners. Synapse has over twenty-five professional staff with extensive experience in the electricity industry.

Q Please summarize your professional and educational experience.

A I have seven years of experience in economic research and consulting. At Synapse, I have worked extensively on issues related to utility regulatory models, rate design, policies to address distributed energy resources (DER), and market power. I have analyzed rate design issues pertaining to DERs for proceedings in Massachusetts, Colorado, New York, Utah, Nevada, Wisconsin, Hawaii, and Maryland. In 2015, I presented to the Utah Net Energy Metering Workgroup on rate design options for customers with distributed generation. I have sponsored testimony before the Massachusetts Department of Public Utilities, the Hawaii

Public Utilities Commission, the Public Service Commission of Utah, the Public Utility Commission of Texas, and the Federal Energy Regulatory Commission. I hold a Master of Arts in Agricultural and Applied Economics and a Master of Science in Environment and Resources, both from the University of Wisconsin-Madison. Prior to rejoining Synapse, I published in the Journal of Regional Analysis and Policy an article regarding the economic impacts of water transfers, analyzed state water efficiency policies while at the Wisconsin Public Service Commission, and conducted econometric analyses of energy efficiency cost-effectiveness. My resume is attached as Schedule MW-1.

Q On whose behalf are you testifying in this case?

A I am testifying on behalf of the Sierra Club.

Q Have you testified in front of the Virginia State Corporation Commission previously?

A No.

Q What is the purpose of your testimony?

A The purpose of my testimony is to address Rappahannock Electric Cooperative's (REC or the Cooperative) proposed rate design, focusing on the access charge (also known as a fixed customer charge) assessed to residential and small commercial customers. The Cooperative's proposal to double the residential access charge and drastically increase the small commercial access charge represents a significant departure from REC's current rate design. My testimony explains that such a radical departure would violate the fundamental rate design principles of gradualism, equity, and efficient price signals, and reduce customer control, disproportionately impact low-usage and low-income customers, and decrease incentives for energy efficiency and distributed generation. I also provide recommendations for alternative methods for addressing the

Cooperative's concerns about revenue sufficiency due to flat growth, which will be more equitable, efficient, and effective.

2. SUMMARY OF CONCLUSIONS AND RECOMMENDATIONS

Q Please summarize your primary conclusions and recommendations.

A My conclusions and recommendations can be summarized as follows:

1. The Cooperative's proposed increase in the fixed customer charge would result in rate shock for many customers, would have inequitable impacts on customers, would reduce customers' control over their bills, and would reduce incentives for energy efficiency, conservation, and distributed generation.
    a. The Cooperative's proposal would increase the fixed customer charge by 100 percent for residential customers and 32 percent for small commercial customers. This does not meet the widely-accepted rate design criterion of rate stability, and would result in rate shock for many customers.
    b. The Cooperative's proposal does not adhere to the widely-accepted rate design principle of promoting customer equity, since low-usage and low-income customers would be hit with the highest rate increases.
    c. The Cooperative's proposal does not adhere to the widely-accepted rate design principle of providing customers with an incentive to use electricity efficiently, since a larger proportion of the customer's bill will be divorced from energy usage.
    d. The Cooperative's proposal will undermine the Commonwealth's efforts to reduce energy consumption and promote energy efficiency.[1]

1 Energy efficiency has been prioritized by the Commonwealth in numerous ways. For example, Executive Order 31, signed by Governor McAuliffe on October 16, 2014, sets targets for reducing energy consumption by 15% in government buildings, but also states "While the Commonwealth embraces the challenge of reducing energy

2. The Cooperative failed to demonstrate in its application that a dramatic increase to the fixed charge is the only way to recover its allowed revenues. The Cooperative has not had a rate case since 1992, and yet has been successful in recovering adequate revenues under the current rate design. While I do not dispute that the Cooperative requires an increase in revenues, the increase should be recovered through volumetric rates, not higher fixed customer charges.
3. If revenue sufficiency is found to be a problem, there are superior alternatives to increasing the fixed customer charge. I recommend that alternatives including revenue decoupling, minimum bills, and beneficial electrification be studied, and that the Cooperative's proposed increases to fixed customer charges be rejected.

3. Overview of the Cooperative's Rate Design Proposal

Q Please summarize REC's proposal.

A REC has requested an overall rate increase of $22 million and proposes to collect this additional revenue primarily through drastically increasing the fixed customer charges for its residential and small commercial classes.[2] REC also proposes to implement seasonal energy charges, but I do not address this aspect of REC's proposal in my testimony.

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consumption, localities, businesses, and individual consumers are encouraged to use energy efficiently, and utilize available tools to conserve energy." Further, SB 1416 established a goal of reducing electricity consumption by 10% for investor-owned utilities. While this does not apply to cooperatives, there is no question that energy efficiency is one of the Commonwealth's energy policy goals. The Cooperative's rate designs should not undermine those goals.

2 Direct Testimony of David F. Koogler, Case No. PUR-2017-00044, 12-14 (May 23, 2017).

Q Please explain how rates would change under the Cooperative's proposal.

A Residential customers would see a doubling of the fixed customer charge under REC's proposal. Single phase customers would see their fixed customer charge jump from $10 per month to $20 per month (an increase of 100 percent), while three-phase customers would see it increase from $12.15 per month to $24.30 (also an increase of 100 percent). In contrast, the volumetric rate would only see an small increase, between 3 and 13 percent.[3]

Small commercial customers would see their fixed customer charge rise by 32 percent: from $28 per month to $37 per month for single phase customers and from $47.50 per month to $62.75 per month for multi-phase customers. However, their volumetric rate would *decrease* by 12 to 26 percent.[4]

Conversely, large commercial and industrial customers will generally experience no changes in their rate elements and no change in the relationship between customer charges and other rates.

The proposed rate changes are summarized in Table 1.

3 Exhibit JDG, Schedule 15A

4 *Ibid.*

Table 1. Summary of Proposed Changes to Rates

Class	Rate Component		Current	Proposed	Percent Change
Residential (A-1, A-2, A-1-P, A-1-TOU)	Access Charge	Single Phase	$10.00	$20.00	**100%**
		Three Phase	$12.15	$24.30	**100%**
	Delivery Charge $/kWh	First 300 kWh	$0.0398	$0.0409	**3%**
		Above 300 kWh	$0.0275	$0.0310	**13%**
Small General Service (B-1)	Access Charge	Single Phase	$28.00	$37.00	**32%**
	Delivery Charge $/kWh		$0.0290	$0.0214	**-26%**
General Service (B-3)	Access Charge	Single Phase	$28.00	$37.00	**32%**
		Three Phase	$47.50	$62.75	**32%**
	Delivery Charge $/kWh	First 100 kWh/kW	$0.0291	$0.0250	**-14%**
		Next 100 kWh/kW	$0.0261	$0.0220	**-16%**
		Next 200 kWh/kW	$0.0171	$0.0140	**-18%**
		Over 400 kWh/kW	$0.0141	$0.0124	**-12%**

Q How will the Cooperative's rate design proposal change the relationship between rate elements?

A The Cooperative's proposed rate design would fundamentally alter the relationship between customer charges and volumetric rates by drastically increasing the fixed portion of customers' bills relative to the portion that customers can control through their usage. In doing so, the Cooperative's rate design proposal would:

- Reduce customers' control over their bills,
- Dampen incentives for energy efficiency and conservation,
- Increase low-usage customers' bills the most, resulting in rate shock for these customers, and
- Disproportionately impact low-income customers.

Q What reason does the Cooperative provide for doubling the residential fixed customer charge and increasing the small commercial fixed charge by 32 percent?

A Cooperative Witness Matthew Faulconer states that the proposed rates will more fairly recover costs from customers and reduce the Cooperative's dependence on revenue from volumetric sales.[5] Witness David Koogler further explains that the Cooperative has been unable to offset rising costs through growth in the number of customers or sales, since the Cooperative "has experienced only modest growth in new connections, while at the same time per-customer energy use has remained relatively constant."[6]

Q Do these reasons point to a need for a radical change to the residential and small commercial fixed charges?

A No. While I do not dispute the Cooperative's need to increase rates in order to recover its costs, the Cooperative has failed to justify why it needs to implement drastic increases to the fixed charge to recover its costs. The current rate design has served the Cooperative since 1992, with no need for an interim rate case to increase distribution revenue.[7] The fact that the Cooperative has not had a Commission proceeding for the purpose of changing its distribution rates in 25 years suggests that the current rate design functions well in recovering costs from customers.

Furthermore, the Cooperative's steep increase in the fixed customer charge is inconsistent with widely-accepted rate design principles and Commonwealth

5 Direct Testimony of Matthew A. Faulconer, Case No. PUR-2017-00044, 11-12, (May 23, 2017).

6 Direct Testimony of David F. Koogler, Case No. PUR-2017-00044, 6 (May 23, 2017).

7 Direct Testimony of Matthew A. Faulconer, Case No. PUR-2017-00044, 6 (May 23, 2017).

energy policy goals, and would disproportionately harm low-usage and low-income customers, as described below.

4. PRINCIPLES OF RATE DESIGN

Q What ratemaking principles should be considered when designing rates?

A In his seminal work, *Principles of Public Utility Rates*, Professor James Bonbright discusses eight key criteria for a sound rate structure. These criteria are:

1. The related, "practical" attributes of simplicity, understandability, public acceptability, and feasibility of application.
2. Freedom from controversies as to proper interpretation.
3. Effectiveness in yielding total revenue requirements under the fair-return standard.
4. Revenue stability from year to year.
5. Stability of the rates themselves, with minimum of unexpected changes seriously adverse to existing customers.
6. Fairness of the specific rates in the appointment of total costs of service among the different customers.
7. Avoidance of "undue discrimination" in rate relationships.
8. Efficiency of the rate classes and rate blocks in discouraging wasteful use of service while promoting all justified types and amounts of use:
    a. in the control of the total amounts of service supplied by the Cooperative;
    b. in the control of the relative uses of alternative types of service (on-peak versus off-peak electricity, Pullman travel versus coach travel, single-party telephone service versus service from a multi-party line, etc.).[8]

8 James Bonbright, *Principles of Public Utility Rates*, Columbia University Press, 1961, page 291, provided in Schedule MW-2.

Q Are these principles widely recognized and used by commissions?

A Yes. The principles listed above have been recognized for many years as the standard that is used by not only the Commission[9] and its Staff[10] but also commissions across the country.

Q Is the Cooperative's rate design proposal consistent with Bonbright's principles?

A No. The Cooperative's proposal does not meet the principles of rate stability (often referred to as "gradualism"), fairness among customers, or efficiency. I will describe these failings below.

5. Inconsistency with the Principle of Rate Stability

Q Please describe Bonbright's principle regarding rate stability.

A This principle means that customer rates should not change suddenly, particularly if this will cause harm to customers by significantly increasing a customer's bill.

Q In what way should customer rates exhibit stability?

A Customer rates generally have two or three primary components (the energy charge, fixed customer charge, and possibly a demand charge). Bonbright's principle refers to how much these charges change from one period to the next, and specifies that unexpected, adverse changes be minimized. Large increases in customer bills can impose financial hardship on customers, particularly low-

9 *See*, *e.g.*, *Application of Columbia Gas of Virginia, Inc., for a general rate increase*, Case No. PUE-980287, 1999 WL 35764055, Report of Hearing Examiner, *12 & nn.137–138 (November 2, 1999) (collecting Commission decisions weighing factors "similar to those outlined by Bonbright").

10 *See*, *e.g.*, *Commonwealth of Virginia ex rel. State Corporation Commission v. Captain's Cove Utility Company*, Case No. PUE-2010-00062, Report of Hearing Examiner, 21 (September 16, 2011); *Application of Dale Service Corporation, for an expedited increase in rates*, Case No. PUE-2006-00070, Report of Hearing Examiner, 10 & n.5 (January 10, 2007).

income customers, and cause customer confusion and frustration. Substantial changes to electricity rates are also difficult for customer to adjust to, since customers invest in household appliances with long lifetimes under the assumption that rates will remain relatively stable.

Q Is the Cooperative's proposal consistent with this principle of rate stability?

No. The Cooperative proposes to increase the fixed customer charge for residential customers by 100 percent. This extreme increase would be detrimental to many customers, particularly those who consume less energy than the average, many of whom are low-income customers (as detailed below).

6. Inconsistency with the Principles of Fairness and Avoidance of Undue Discrimination

Q Please describe Bonbright's principles regarding fairness and avoiding undue discrimination.

A These principles refer to treating similarly-situated customers in a similar manner.

Q Is the Cooperative's rate design proposal consistent with the principle of fairness and avoidance of undue discrimination?

A No. REC's proposal exacerbates inequities among residential customers.

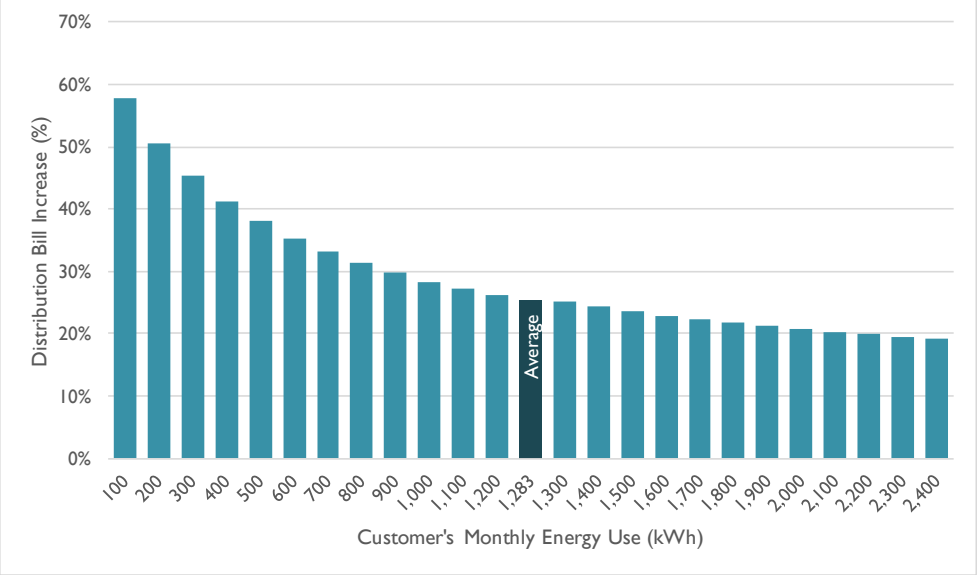
Q In what way would REC's rate design unfairly impact different types of residential customers?

The Cooperative's proposed rate design would hit low-usage customers the hardest – including customers who have worked hard to conserve energy, or who have invested their personal financial resources in energy efficient technologies or distributed generation. REC's rate design already punishes low-usage customers by charging them a higher electricity rate for the first block of energy consumption. The Cooperative's proposed increase to the fixed customer charge

exacerbates this impact by also hitting low usage customers hardest, since the fixed charge component is a higher proportion of these customers' bills.

Figure 1 shows that low energy use residential customers will experience significantly larger percentage increases in the distribution portion of their bill under REC's proposal than high energy use residential customers. While the average distribution bill increase for residential customers would be approximately 25 percent, a residential customer using 400 kWh per month or less would see bill increases of more than 40 percent, while a customer consuming 2,000 kWh or more would only see increases of approximately 20 percent.

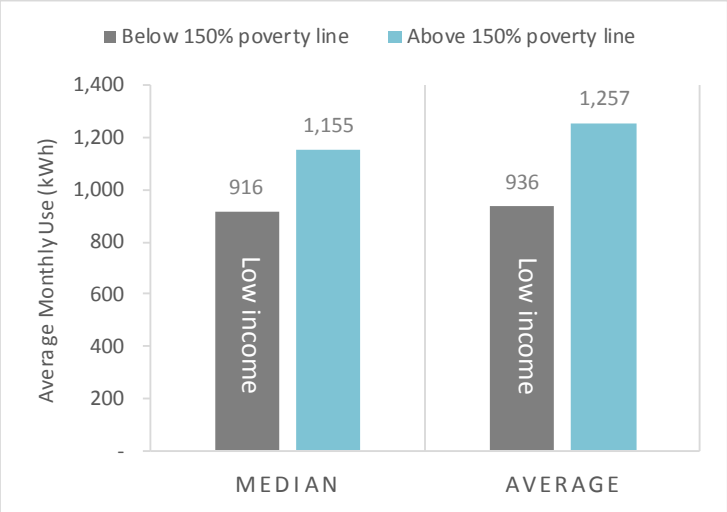
Figure 1. Residential Distribution Bill Impacts by Usage Level



Q What types of customers are low-usage customers?

A Data from the U.S. Energy Information Administration reveals that, in Virginia, low-income customers (i.e., those below 150% of the federal poverty line) tend to also be low-usage customers (in terms of both median and average usage). This is shown in Figure 2, below.

Figure 2. Average Electricity Usage by Customer Income Category - Virginia



Source: Energy Information Administration Residential Energy Consumption Survey, 2009 http://www.eia.gov/consumption/residential/data/2009.

Q What is the implication of low-income customers using less electricity than average?

A Because fixed charges tend to increase bills for low-usage customers the most, the fact that low-income customers use less energy means that higher fixed charges will raise electricity bills most for those who can least afford it. This shows that rate design has important equity implications, and fixed charges would have regressive impacts.

7. INCONSISTENCY WITH THE PRINCIPLE OF EFFICIENT USE

Q How does Bonbright define the principle of efficiency?

A Bonbright defines the principle of efficiency as "discouraging wasteful use of service while promoting all justified types and amounts of use."[11]

11 James Bonbright, *Principles of Public Utility Rates*, 291 (1961) (provided in Schedule MW-2).

Q Please explain what this means.

A The concept of efficiency means that rates should be designed to send price signals that discourage wasteful use of energy and encourage customers to pursue cost-effective means of reducing their energy consumption.

Q Does Virginia have energy efficiency policies?

A Yes. In 2007, the Commonwealth signed into law a statutory goal for the state to reduce electricity sales 10% by 2022 relative to 2006 electricity sales. Though voluntary, the Commission has expressed a clear understanding of the importance and benefits of energy efficiency. In the *Staff's Report to the State Corporation Commission in preparation for the Commission's Report to the Governor and the General Assembly* (2007), the Commission Staff states that:

> [m]ost of the sub-groups [of the proceeding] believed mass implementation of energy efficiency and conservation efforts would generate benefits to ratepayers and the state economy by helping to offset future increases in energy costs, provide electric system reliability benefits, offer customers the ability to better manage their energy costs, and maintain a competitive regional economy. Additionally, effective programs could help accelerate Virginia's environmental and air quality goals while helping to reduce the costs associated with future climate change policies.[12]

The Governor has also made energy efficiency a priority for his administration. In Executive Order 31, Governor McAuliffe stated, "[w]hile the Commonwealth embraces the challenge of reducing energy consumption, localities, businesses,

12 Commonwealth of Virginia State Corporation Commission Staff, *Report to the State Corporation Commission in preparation for the Commission's Report to the Governor and the General Assembly as Required by the Third Enactment Clause of SB 1416*, 4 (2007), available at https://www.scc.virginia.gov/pur/conserve/staff/staf_rept111607.pdf.

and individual consumers are encouraged to use energy efficiently, and utilize available tools to conserve energy."[13]

Further, the Cooperative has recognized the significant value associated with the efficient use of energy and the management of peak load in its demand response program application.[14] Unfortunately, the Cooperatives' proposed rate design would dilute incentives for its customers to pursue energy efficiency and conservation.

Q Please explain the price signal that fixed customer charges send to customers.

A A fixed customer charge sends the signal to customers that they have no control over that portion of their bill, since they will have to pay the fixed portion regardless of how much electricity they consume. As the fixed charge increases, the overall size of a customer's bill is increasingly divorced from how much electricity they use, thereby diluting price signals associated with energy use.

Q What impact would REC's rate design proposal have on customer incentives to use electricity more efficiently or install distributed generation?

A A higher fixed charge relative to the volumetric charge reduces customers' incentive to use electricity more efficiently because more of the costs are recovered through the fixed component of the rate. Since only the variable component is avoidable, increasing the fixed customer charge makes customer efforts to reduce their electricity bill by lowering their energy consumption less effective. As a consequence, the price signal sent by higher fixed charges is likely to discourage many customers from implementing efficiency measures or

13 Executive Order 31, October 16, 2014.

14 *Application of Rappahannock Electric Cooperative for approval of a modified incentive for A/C switch demand-side management program; and for approval of a rate adjustment clause to recover the costs of the demand-side program pursuant to §56-585.3.A.5 of the Code of Virginia*, Case PUE-2016-00019 (February 17, 2016).

installing distributed generation—resulting in greater future energy consumption than would have occurred under the current rate design.

Q Do REC's current electricity rates otherwise send efficient price signals?

A No. REC's residential energy rates currently feature declining blocks, which charge lower prices for higher energy use – providing a weak incentive for customers to reduce their energy consumption.

Q What is the result of inefficient price signals?

Rate designs that feature high fixed charges or declining block rates tend to lead to higher costs on the system, since they induce customers to consume more energy. Higher energy use will ultimately lead utilities to procure more energy and generation capacity and expand investments in the capacity of power lines and substations, thereby raising electricity costs for all customers.

8. COMMISSION DECISIONS ON FIXED CHARGES

Q Has the Virginia State Corporation Commission rejected an increase in fixed customer charges in previous cases?

A Yes. In 2014, the Virginia State Corporation Commission rejected Appalachian Power Company's proposal to increase fixed customer charges for residential, small general service, and sanctuary worship service customers, stating:

> We reject APCo's proposed increases to customer charges for Residential Service ("RS"), Small General Service ("SGS"), and Sanctuary Worship Service ("SWS"). We agree with Consumer Counsel and Staff that APCo has not established that it is reasonable to increase such costs to

these customers at this time and in the manner proposed by the company.[15]

Q Have other Commissions recognized the detrimental impact of higher fixed customer charges?

A Yes, the negative effects of increasing fixed customer charges are well-recognized. For example, in 2016 the Maryland Public Service Commission approved a smaller increase to fixed customer charges than requested by Potomac Electric Power Company, explaining that a larger increase would result in customers having less control over their bills, as well as being antithetical to energy conservation efforts.

> In arriving at this increase, we place emphasis on Maryland's public policy goals that intend to encourage energy conservation. Maintaining relatively low customer charges provides customers with greater control over their electric bills by increasing the value of volumetric charges. No matter how diligently customers might attempt to conserve energy or respond to AMI-enabled peak pricing incentives, they cannot reduce fixed customer charges.[16]

In 2013, the Maryland Public Service Commission rejected a small increase in the fixed customer charge, noting that doing so would reduce customer control of their bills and would be inconsistent with the state's policy goals.

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15 *Application of Appalachian Power Company for a 2014 Biennial Review of the Rates, Terms and Conditions for the Provision of Generation, Distribution and Transmission Services Pursuant to 56-585.1 A of the Code of Virginia*, Case No. PUE-2014-00026, 33 (November 26, 2014).

16 *In The Matter of the Application of Potomac Electric Power Company for Adjustment to its Retail Rates for the Distribution of Electric Energy*, Case No. 9418, Order No. 87884, 110 (Maryland Public Service Commission, November 15, 2016).

> Even though this issue was virtually uncontested by the parties, we find we must reject Staff's proposal to increase the fixed customer charge from $7.50 to $8.36. Based on the reasoning that ratepayers should be offered the opportunity to control their monthly bills to some degree by controlling their energy usage, we instead adopt the Company's proposal to achieve the entire revenue requirement increase through volumetric and demand charges. This approach also is consistent with and supports our EmPOWER Maryland goals.[17]

In 2012, the Missouri Public Service Commission rejected a proposed increase in the fixed customer charge for residential and small general service classes, writing:

> Shifting customer costs from variable volumetric rates, which a customer can reduce through energy efficiency efforts, to fixed customer charges, that cannot be reduced through energy efficiency efforts, will tend to reduce a customer's incentive to save electricity. Admittedly, the effect on payback periods associated with energy efficiency efforts would be small, but increasing customer charges at this time would send exactly [the] wrong message to customers that both the company and the Commission are encouraging to increase efforts to conserve electricity.[18]

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17 *In The Matter of the Application of Baltimore Gas and Electric Company for Adjustment in its Electric and Gas Base Rates*, Case No. 9299, Order No. 85374, 99 (Maryland Public Service Commission February 22, 2013).

18 *In the Matter of Union Electric Company Tariff to Increase Its Annual Revenues for Electric Service*, File No. ER-2012-0166, Report and Order, 110-11 (Missouri Public Service Commission December 12, 2012).

Q Have you reviewed additional commission decisions?

A Yes. In 2015, I analyzed 51 decisions regarding increasing fixed charges. Of those cases, the utility's fixed charge proposal was rejected in full in 41 percent of the cases, was scaled back in 33 percent of cases, and approved in full in only 25 percent of cases. These decisions are shown in the table below.

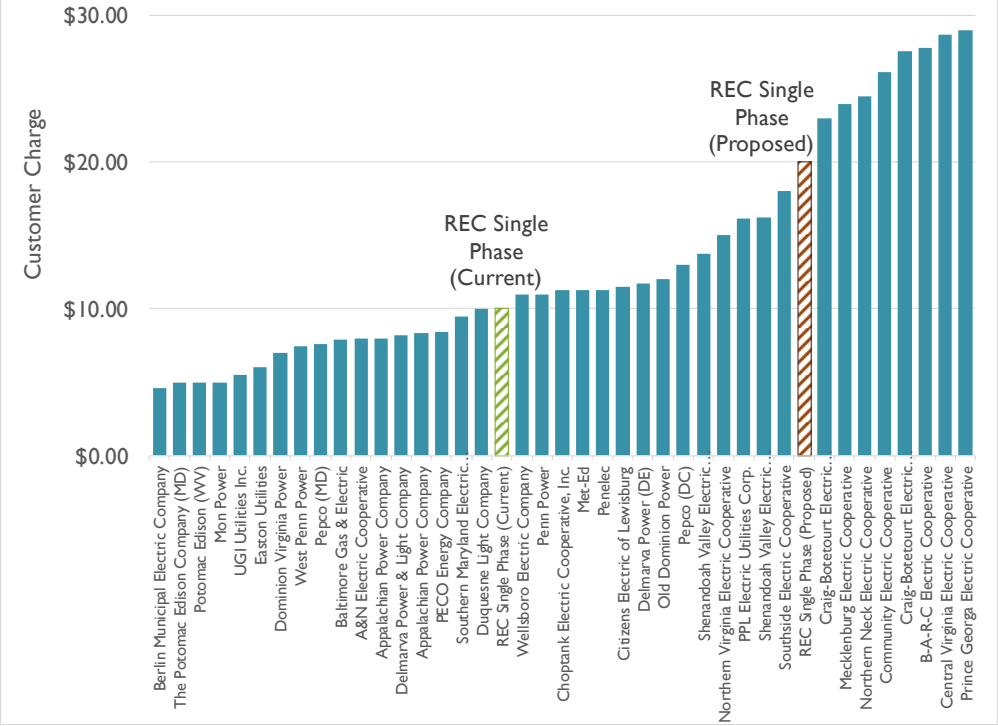
Table 2. Commission Decisions Regarding Fixed Charges

Utility	Docket/Case No.	Existing	Proposed	Approved	% Increase Requested	% Increase Approved
Alameda Municipal Power (CA)	AMP Board vote June 2015	$9.25	$11.50	$11.50	24%	24%
Ameren (MO)	File No. ER - 2012-0166	$8.00	$12.00	$8.00	50%	0%
Appalachian Power Co (VA)	PUE-2014-00026	$8.35	$16.00	$8.35	92%	0%
Appalachian Power/Wheeling Power (WV)	14-1152-E-42T	$5.00	$10.00	$8.00	100%	60%
Baltimore Gas and Electric (MD)	9355, Order No. 86757	$7.50	$10.50	$7.50	40%	0%
Benton PUD (WA)	Board approved in June 2015	$11.05	$15.60	$15.60	41%	41%
Black Hills Power (WY)	20002-91-ER-14 (Record No. 13788)	$14.00	$17.00	$15.50	21%	11%
Central Hudson Gas & Electric (NY)	14-E-0318	$24.00	$29.00	$24.00	21%	0%
Central Maine Power Company (ME)	2013-00168	$5.71	$10.00	$10.00	75%	75%
City of Whitehall (WI)	6490-ER-106	$8.00	$16.00	$16.00	100%	100%
Columbia River PUD (OR)	CRPUD Board vote September 2015	$8.00	$20.45	$10.00	156%	25%
Colorado Springs Utilities (CO)	City Council Volume No. 5	$12.52	$15.24	$15.24	22%	22%
Connecticut Light & Power (CT)	14-05-06	$16.00	$25.50	$19.25	59%	20%
Consolidated Edison (NY)	15-00270/15-E-0050	$15.76	$18.00	$15.76	14%	0%
Consumers Energy (MI)	U-17735	$7.00	$7.50	$7.00	7%	0%
Choptank Electric Cooperative (MD)	9368, Order No. 86994,	$10.00	$17.00	$11.25	70%	13%
Dawson Public Power (NE)	Announced June 2015	$21.50	$27.00	$27.00	26%	26%
Empire District Electric (MO)	ER-2014-0351	$12.52	$18.75	$12.52	50%	0%
Eugene Water & Electric Board (OR)	Board vote December 2014	$13.50	$20.00	$20.00	48%	48%
Hawaii Electric Light (HI)	2014-0183	$9.00	$61.00	$9.00	578%	0%
Maui Electric Company (HI)	2014-0183	$9.00	$50.00	$9.00	456%	0%
Hawaii Electric Company (HI)	2014-0183	$9.00	$55.00	$9.00	511%	0%
Independence Power & Light Co (MO)	City Council vote September 2015	$4.14	$14.50	$4.14	250%	0%
Indiana Michigan Power (MI)	U-17698	$7.25	$9.10	$7.25	26%	0%
Kansas City Power & Light (KS)	15-KCPE-116-RTS	$10.71	$19.00	$14.50	77%	35%
Kansas City Power & Light (MO)	File No. ER-2014-0370	$9.00	$25.00	$11.88	178%	32%
Kentucky Power (KY)	2014-00396	$8.00	$16.00	$11.00	100%	38%
Kentucky Utilities Company (KY)	2014-00371	$10.75	$18.00	$10.75	67%	0%
Louisville Gas-Electric (KY)	2014-00372	$10.75	$18.00	$10.75	67%	0%
Madison Gas and Electric (WI)	3270-UR-120	$10.29	$22.00	$19.00	114%	85%
Metropolitan Edison (PA)	R-2014-2428745	$8.11	$13.29	$10.25	64%	26%
Nevada Power Co. (NV)	14-05004	$10.00	$15.25	12.75	53%	28%
Northern States Power Company (ND)	PU-12-813	$9.00	$14.00	$14.00	56%	56%
Pacific Gas & Electric Company (CA)	R.12-06-013	$0.00	$10.00	$0.00		0%
PacifiCorp (WA)	UE-140762	$7.75	$14.00	$7.75	81%	0%
Pennsylvania Electric (PA)	R-2014-2428743	$7.98	$11.92	$9.99	49%	25%
Pennsylvania Power (PA)	R-2014-2428744	$8.86	$12.71	$10.85	43%	22%
Redding Electric Utility (CA)	City Council Meeting June 2015	$13.00	$42.00	$13.00	223%	0%
Rocky Mountain Power (UT)	13-035-184	$5.00	$8.00	$6.00	60%	20%
Rocky Mountain Power (WY)	20000-446-ER-14 (Record No. 13816)	$20.00	$22.00	$20.00	10%	0%
Salt River Project (AZ)	SRP Board vote February 2015	$17.00	$20.00	$20.00	18%	18%
San Diego Gas & Electric (CA)	A.14-11-003 & R.12-06-013	$0.00	$10.00	$0.00		0%
Sierra Pacific Power (NV)	13-06002, 13-06003, 13-06004	$9.25	$15.25	$15.25	65%	65%
Southern California Edison (CA)	A.13-11-003 & R.12-06-013	$0.94	$10.00	$0.94	964%	0%
Stoughton Utilities (WI)	5740-ER-108	$7.50	$10.00	$10.00	33%	33%
We Energies (WI)	5-UR-107	$9.13	$16.00	$16.00	75%	75%
West Penn Power (PA)	R-2014-2428742	$5.00	$7.35	$5.81	47%	16%
Westar (KS)	15-WSEE-115-RTS	$12.00	$27.00	$14.50	125%	21%
Wisconsin Public Service (MI)	U-17669	$9.00	$12.00	$12.00	33%	33%
Wisconsin Public Service (WI)	6690-UR-123	$10.40	$25.00	$19.00	140%	83%
Xcel Energy (MN)	E002 / GR-13-868	$8.00	$9.25	$8.00	16%	0%

Q Is REC's proposed residential customer charge similar to that in use at other utilities or cooperatives?

A No. The proposed residential customer charge would be higher than that levied by most other mid-Atlantic utilities, including regulated cooperatives. The proposed and current single-phase fixed customer charge is shown relative to other fixed customer charges in the figure below.

Figure 3. Current Residential Customer Charges at Mid-Atlantic Utilities



9. The Cooperative Should Explore Alternative Means to Address Revenue Sufficiency

Q What challenges does the Cooperative face regarding revenue recovery?

A The Cooperative states that it is facing increasing costs, while sales are flat.

Q What mechanisms has the Cooperative proposed to address revenue sufficiency and volatility concerns?

The Cooperative is seeking to address this issue primarily through changing how customers are billed for their energy use. By imposing drastic increases to the

fixed customer charge while making little change (or even decreasing) the energy rate, the Cooperative's rate design will stimulate energy consumption and increase the portion of revenues that are unaffected by sales volumes. Thus, all else equal, higher fixed customer charges would result in greater revenue stability and higher sales (and more revenues) for the Cooperative.

Q Are higher fixed customer charges consistent with traditional ratemaking principles?

A No, high fixed customer charges are generally not consistent with principles of rate design, as discussed in detail above.

Q Has the Cooperative demonstrated that higher fixed charges are necessary to maintain sufficient revenues?

It is important to recognize that REC has not had a rate case for 25 years, an unusually long period of time. During this period, distribution rates were not substantially altered,[19] and yet revenue sufficiency was not enough of a concern to cause the Cooperative to seek a rate increase until now. While I do not dispute that the Cooperative requires an increase in revenues, it has not been demonstrated that an increase to the fixed charge is the only way to address revenue sufficiency concerns. In other words, allocating the revenue increase only to the volumetric rates could result in sufficient revenues for the Cooperative. However, if costs and revenues again become unbalanced, the Cooperative can seek another rate increase through a rate case.

19 Distribution rates have been "rebalanced" in the interim, but have otherwise not changed. *See* Direct Testimony of Matthew A. Faulconer, Case No. PUR-2017-00044, 6-7 (May 23, 2017).

Q Do alternative mechanisms exist for managing revenue sufficiency and volatility?

A Yes. If the Commission finds that the Cooperative provided adequate evidence of revenue sufficiency concerns, there are several alternative approaches that could be used to address these concerns.

First, revenue decoupling mechanisms can address revenue sufficiency and volatility without resulting in significant negative impacts on low-usage customers, or reducing customers' financial incentives to lower their bills through energy efficiency or distributed generation. A revenue decoupling mechanism in combination with the existing rate design would significantly reduce the rate impacts on lower-use customers while providing revenue certainty to the Cooperative.

Q Please describe what you mean by "revenue decoupling."

A Under traditional ratemaking, the utility's revenue requirement is determined through a rate case. Prices are then determined by dividing the utility's revenue requirement by sales. These prices are then held constant until the following rate case, and any change in sales would cause the utility's revenues to increase or decrease proportionally, depending on the direction of the sales.

Decoupling removes this fluctuation in revenues, and instead adjusts prices so that the revenues recovered by a utility are more closely aligned with the costs incurred. If sales increase for any reason (for example, due to weather or economic growth), the utility returns the excess revenues to ratepayers in the next decoupling adjustment. Similarly, if sales decline for any reason (for example, due to weather, economic decline, energy efficiency or distributed generation), the utility is permitted to collect the unrecovered revenues in the next decoupling adjustment. In this way, full decoupling actually allows for a utility's revenues to be more closely aligned with costs than under traditional ratemaking.

Q Why do you see revenue decoupling as an alternative to the Cooperative's ratemaking proposals in this docket?

A The Cooperative notes that one of the key reasons why it is requesting a rate increase at this time is because it has experienced flat sales in recent years.[20] However, REC's proposal to increase fixed customer charges in this docket do not adequately or properly address this key issue. The Cooperative's proposal to increase residential and small commercial fixed customer charges will partly help reduce revenue losses from reduced sales by requiring that a greater portion of residential and small commercial revenues will be recovered regardless of sales levels. However, this only affects a small portion of residential and small commercial revenues, as many other components of the rate design are still variable and can still change with fluctuations in sales. In addition, the Cooperative is still subject to revenue losses from all of the other customer classes.

Revenue decoupling, on the other hand, could address the issue of stagnant sales (and sales volatility in general) directly and completely. Revenue decoupling will ensure that the Cooperative recovers its allowed revenues each year, thereby completely eliminating REC's concerns about revenue sufficiency and volatility. In fact, revenue decoupling is more consistent with Bonbright's principles of providing the utility with the opportunity to recover its allowed revenues and revenue stability.

Q Does revenue decoupling affect utility incentives regarding demand-side resources?

A Yes. This is an additional advantage of revenue decoupling. A revenue decoupling mechanism will remove the financial disincentive that the Cooperative experiences regarding demand-side resources. Currently, as customers implement

20 Direct Testimony of David F. Koogler, PUR-017-00044, 12 (May 23, 2017).

demand-side resources (including energy efficiency, demand response, and distributed generation), the Cooperative's sales are reduced, leading to reduced revenues. A revenue decoupling mechanism would eliminate this significant financial disincentive by enabling the Cooperative to earn its allowed revenues regardless of sales levels.

As such, the adoption of a revenue decoupling mechanism can lead to a significant shift in the mindset of utility management, where it becomes much more likely to support (and less likely to oppose) demand-side resources. This shift can help enable a much broader implementation of demand-side resources, potentially leading to significantly reduced electric costs for many customers and empowering customers with the tools to better manage and control their bills.

Q Are there ways that ratepayers can be protected when implementing a decoupling mechanism?

A Yes. Revenue decoupling mechanisms can be designed in many ways, and it is important to design a mechanism that protects customers, and even makes customers better off than under traditional ratemaking. For example, the following customer protection measures can be included in a decoupling mechanism:

1. Allowed revenue targets under a decoupling mechanism can be established through a fully-litigated rate case with active participation from stakeholders. Relatively frequent rate cases can be used to ensure that the utility's allowed revenues remain in line with its actual costs.
2. Decoupling adjustments can be made on a fixed, pre-determined schedule to provide some stability and predictability.
3. Decoupling adjustments can be subject to a cap in order to protect customers from significant rate increases from one period to the next.
4. The utility can be required to make reasonable commitments toward supporting cost-effective demand-side resources, or other measures to support customers, in return for reducing revenue volatility.

Q What other alternatives exist?

A Minimum bills could offer an alternative to fixed charges. They are similar to fixed charges, but with one important distinction: minimum bills only apply when a customer's usage is so low that his or her total monthly bill would otherwise be less than this minimum amount. A key advantage of minimum bills is that it guarantees that the utility will recover a certain amount of revenue from each customer, without significantly distorting price signals for the majority of customers. The threshold that triggers the minimum bill is typically set well below the average electricity usage level, and thus most customers will not be impacted by the minimum bill.

In addition, the Cooperative could encourage beneficial electrification, such as proposing an electric vehicle pilot program, or providing incentives for heat pumps. Such technologies can help to meet energy policy goals, reduce customer bills, and provide the utility with adequate revenues.

10. RECOMMENDATIONS

Q What do you recommend with regard to the Cooperative's proposed rate design for residential customers?

A I recommend that the Commission reject the Cooperative's proposal to drastically increase the fixed customer charge for residential customers and small commercial customers. Such a change would represent a dramatic departure from REC's current rate design, and would not adhere to the fundamental principles of equity, efficiency, or rate stability. Instead, I recommend that the revenue increase be recovered through volumetric rates.

Q What do you recommend for addressing revenue sufficiency concerns?

A The Cooperative has not adequately demonstrated that volumetric rates result in revenue deficiencies. However, if revenue sufficiency becomes a concern, then I recommend the following:

- Revenue decoupling should be investigated, as it ensures revenue stability and sufficiency and can also help align the Cooperative's financial incentives for promoting energy efficiency. Any such investigation should consider revenue-decoupling options that adhere to fundamental ratemaking principles and are generally in customers' best interest.
- Minimum bills could provide a mechanism by which very low-usage customers are required to contribute a minimum amount to the system each month.
- Options for beneficial electrification (such as electric vehicle pilots and incentives for heat pumps) can help to achieve state energy policy goals, reduce customers' bills, and provide additional revenues to the Cooperative.

Q Does this conclude your direct testimony?

A It does.

SCHEDULE MW-1

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PROFESSIONAL EXPERIENCE

Synapse Energy Economics, Cambridge MA. *Principal Associate,* 2017 – present*, Senior Associate,* 2015 – 2017*, Associate*, 2012 – 2015

Conduct research, author reports, and assist in preparation of expert testimony. Consult on issues related to distributed energy resources, rate design, cost-benefit analysis, integrated resource planning, utility regulation, water use and conservation, and market power.

University of Wisconsin - Madison, Department of Agricultural and Applied Economics, Madison, WI. *Teaching Assistant – Environmental Economics*, 2011 – 2012

Developed teaching materials and led discussions on cost-benefit analysis, carbon taxes and cap-and-trade programs, management of renewable and non-renewable resources, and other topics.

Public Service Commission of Wisconsin, Water Division, Madison, WI. *Program and Policy Analyst - Intern*, Summer 2009

Researched water conservation programs nationwide to develop a proposal for Wisconsin's state conservation program. Developed spreadsheet model to calculate avoided costs of water conservation in terms of energy savings and avoided emissions.

Synapse Energy Economics, Cambridge, MA. *Communications Manager*, 2005 – 2008

Developed technical proposals for state and federal agencies, environmental and public interest groups, and businesses. Edited reports on energy efficiency, integrated resource planning, greenhouse gas regulations, renewable resources, and other topics.

EDUCATION

University of Wisconsin, Madison, WI
Master of Arts in Agricultural and Applied Economics, 2012.
Certificate in Energy Analysis and Policy.
National Science Foundation Fellow.

University of Wisconsin, Madison, WI
Master of Science in Environment and Resources, 2010.
Certificate in Humans and the Global Environment (CHANGE).
Nelson Distinguished Fellowship.

Southwestern University, Georgetown, TX
Bachelor of Arts in International Studies, *Magna cum laude,* 2003.

ADDITIONAL SKILLS

- Econometric Modeling – Linear and nonlinear modeling including time-series, panel data, logit, probit, and discrete choice regression analysis
- Nonmarket Valuation Methods for Environmental Goods – Hedonic valuation, travel cost method, and contingent valuation
- Cost-Benefit Analysis
- Input-Output Modeling for Regional Economic Analysis

FELLOWSHIPS AND AWARDS

- Winner, M. Jarvin Emerson Student Paper Competition, Journal of Regional Analysis and Policy, 2010
- Fellowship, National Science Foundation Integrative Graduate Education and Research Traineeship (IGERT), University of Wisconsin – Madison, 2009
- Nelson Distinguished Fellowship, University of Wisconsin – Madison, 2008

PUBLICATIONS

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and (c) Distributed System Implementation Plan guide. Prepared by Synapse Energy Economics on behalf of Natural Resources Defense Council and Pace Energy and Climate Center.

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Wilson, R., M. Whited, S. Jackson, B. Biewald, E. A. Stanton. 2015. *Best Practices in Planning for Clean Power Plan Compliance.* Synapse Energy Economics for the National Association of State Utility Consumer Advocates.

Whited, M., T. Woolf, A. Napoleon. 2015. *Utility Performance Incentive Mechanisms: A Handbook for Regulators*. Synapse Energy Economics for the Western Interstate Energy Board.

Stanton, E. A., S. Jackson, B. Biewald, M. Whited. 2014. *Final Report: Implications of EPA's Proposed "Clean Power Plan."* Synapse Energy Economics for the National Association of State Utility Consumer Advocates.

Peterson, P., S. Fields, M. Whited. 2014. *Balancing Market Opportunities in the West: How participation in an expanded balancing market could save customers hundreds of millions of dollars.* Synapse Energy Economics for the Western Grid Group.

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Stanton, E. A., M. Whited, F. Ackerman. 2014. *Estimating the Cost of Saved Energy in Utility Efficiency Programs.* Synapse Energy Economics for the U.S Environmental Protection Agency.

Ackerman, F., M. Whited, P. Knight. 2014. "Would banning atrazine benefit farmers?" *International Journal of Occupational and Environmental Health* 20 (1): 61–70.

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Hurley, D., P. Peterson, M. Whited. 2013. *Demand Response as a Power System Resource: Program Designs, Performance, and Lessons Learned in the United States.* Synapse Energy Economics for Regulatory Assistance Project.

Whited, M., D. White, S. Jackson, P. Knight, E.A. Stanton. 2013. *Declining Markets for Montana Coal*. Synapse Energy Economics for Northern Plains Resource Council.

Woolf, T., M. Whited, T. Vitolo, K. Takahashi, D. White. 2012. *Indian Point Energy Center Replacement Analysis: A Plan for Replacing the Nuclear Plant with Clean, Sustainable, Energy Resources.* Synapse Energy Economics for National Resources Defense Council and Riverkeeper.

Whited, M., K. Charipar, G. Brown. *Demand Response Potential in Wisconsin.* Nelson Institute for Environmental Studies, Energy Analysis & Policy Capstone for the Wisconsin Public Service Commission.

Whited, M. 2010. "Economic Impacts of Irrigation Water Transfers in Uvalde County, Texas." *Journal of Regional Analysis and Policy* 40 (2): 160–170.

Grabow, M., M. Hahn and M. Whited. 2010. *Valuing Bicycling's Economic and Health Impacts in Wisconsin*. Nelson Institute for Environmental Studies, Center for Sustainability and the Global Environment (SAGE) for State Representative Spencer Black.

Whited, M., D. Bernhardt, R. Deitchman, C. Fuchsteiner, M. Kirby, M. Krueger, S. Locke, M. Mcmillen, H. Moussavi, T. Robinson, E. Schmitz, Z. Schuster, R. Smail, E. Stone, S. Van Egeren, H. Yoshida, Z. Zopp. 2009. *Implementing the Great Lakes Compact: Wisconsin Conservation and Efficiency Measures Report.* Department of Urban and Regional Planning, University of Wisconsin-Madison, Extension Report 2009-01.

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TESTIMONY

California Public Utilities Commission (Application 17-01-020, 17-01-021, and 17-01-022): Joint opening testimony with Max Baumhefner and Katherine Stainken on fast charging infrastructure and rates; joint opening testimony with Max Baumhefner and Joel Espino on medium and heavy-duty and fleet charging infrastructure and commercial EV rates; joint opening testimony with Max Baumhefner and Chris King on residential charging infrastructure and rates. Rebuttal testimony on public fast charging rate design, commercial EV rate design, and residential EV rate design. On behalf of Natural Resources Defense Council, the Greenlining Institute, Plug In America, the Coalition of California Utility Employees, Sierra Club, and the Environmental Defense Fund. July 25, August 1, August 7, and September 5, 2017.

New York Public Service Commission (Case 17-E-0238): Direct and rebuttal testimony of Tim Woolf and Melissa Whited regarding Earnings Adjustment Mechanisms proposed by National Grid. On behalf of Advanced Energy Economy Institute. August 25 and September 15, 2017.

Utah Public Service Commission (Docket No. 14-035-114): Direct testimony of Melissa Whited regarding Pacificorp's proposed rates for customers with distributed generation. On behalf of Utah Clean Energy. June 8, 2017.

Texas Public Utilities Commission (SOAH Docket No. 473-17-1764, PUC Docket No. 46449): Cross-rebuttal testimony evaluating Southwestern Electric Power Company's proposed revisions to its Distributed Renewable Generation tariff. On behalf of Sierra Club and Dr. Lawrence Brough. May 19, 2017.

Massachusetts Department of Public Utilities (Docket No. 17-05): Direct and surrebuttal testimony of Tim Woolf and Melissa Whited regarding performance-based regulation, the monthly minimum reliability contribution, storage pilots, and rate design in Eversource's petition for approval of rate increases and a performance-based ratemaking mechanism. On behalf of Sunrun and the Energy Freedom Coalition of America, LLC. April 28, 2017 and May 26, 2017.

Public Utilities Commission of Hawaii (Docket No. 2015-0170): Direct testimony regarding Hawaiian Electric Light Company's proposed performance incentive mechanisms. On behalf of the Division of Consumer Advocacy. April 28, 2017.

Massachusetts Department of Public Utilities (Docket No. 15-155): Joint direct and rebuttal testimony with T. Woolf regarding National Grid's rate design proposal. On behalf of Energy Freedom Coalition of America, LLC. March 18, 2016 and April 28, 2016.

Federal Energy Regulatory Commission (Docket No. EC13-93-000): Affidavit regarding potential market power resulting from the acquisition of Ameren generation by Dynegy. On behalf of Sierra Club. August 16, 2013.

Wisconsin Senate Committee on Clean Energy: Joint testimony with M. Grabow regarding the importance of clean transportation to Wisconsin's public health and economy. February 2010.

TESTIMONY ASSISTANCE

Colorado Public Utilities Commission (Proceeding No. 16AL-0048E): Answer testimony of Tim Woolf regarding Public Service Company of Colorado's rate design proposal. On behalf of Energy Outreach Colorado. June 6, 2016.

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Wisconsin Public Service Commission (Docket No. 05-UR-107): Direct and surrebuttal testimony of Rick Hornby regarding Wisconsin Electric Power Company rate case. On behalf of The Alliance for Solar Choice. August 28, 2014 and September 22, 2014.

Maine Public Utilities Commission (Docket No. 2013-00519): Direct testimony of Richard Hornby and Martin R. Cohen on GridSolar's smart grid coordinator petition. On behalf of the Maine Office of the Public Advocate. August 28, 2014.

Maine Public Utilities Commission (Docket No. 2013-00168): Direct and surrebuttal testimony of Tim Woolf regarding Central Maine Power's request for an alternative rate plan. December 12, 2013 and March 21, 2014.

Massachusetts Department of Public Utilities (Docket No. 14-04): Comments of Massachusetts Department of Energy Resources on investigation into time varying rates. On behalf of the Massachusetts Department of Energy Resources. March 10, 2014.

State of Nevada, Public Utilities Commission of Nevada (Docket No. 13-07021): Direct testimony of Frank Ackerman regarding the proposed merger of NV Energy, Inc. and MidAmerican Energy Holdings Company. On behalf of the Sierra Club. October 24, 2013.

PRESENTATIONS

Whited, M. 2016. "Energy Policy for the Future: Trends and Overview." Presentation to the National Conference of State Legislators' Capitol Forum, Washington, DC, December 8.

Whited, M. 2016. "Ratemaking for the Future: Trends and Considerations." Presentation to the Midwest Governors' Association, St. Paul, MN, July 14.

Whited, M. 2016. "Performance Based Regulation." Presentation to the NARUC Rate Design Subcommittee. September 12.

Whited, M. 2016. "Demand Charges: Impacts and Alternatives (A Skeptic's View)." EUCI 2nd Annual Residential Demand Charges Summit, Phoenix, AZ, June 7.

Whited, M. 2016. "Performance Incentive Mechanisms." Presentation to the National Governors Association, Wisconsin Workshop, Madison WI, March 29.

Whited, M., T. Woolf. 2016. "Caught in a Fix: The Problem with Fixed Charges for Electricity." Webinar presentation sponsored by Consumers Union, February.

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Whited, M. 2015. “Rate Design: Options for Addressing NEM Impacts.” Presentation to the Utah Net Energy Metering Workgroup, Workshop 4, Salt Lake City, UT, July 8.

Whited, M. 2015. “Performance Incentive Mechanisms.” Presentation to the e21 Initiative, St. Paul, MN, May 29.

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Whited, M., M. Grabow, M. Hahn.2009. “Valuing Bicycling’s Economic and Health Impacts in Wisconsin.” Presentation before the Governor’s Coordinating Council on Bicycling, December.

Whited, M., D. Sheard. 2009. “Water Conservation Initiatives in Wisconsin.” Presentation before the Waukesha County Water Conservation Coalition Municipal Water Conservation Subgroup, July.

Resume dated September 2017

SCHEDULE MW-2

of principles, these chapters are mere essays on the nature of the more controversial, largely unresolved, problems rather than attempts at systematic development. All of them have one theme in common: the thesis that the most formidable obstacles to further progress in the theory of public utility rates are those raised by conflicting goals of rate-making policy.

CRITERIA OF A DESIRABLE RATE STRUCTURE

Throughout this study we have stressed the point that, while the ultimate purpose of rate theory is that of suggesting feasible *measures* of reasonable rates and rate relationships, an intelligent choice of these measures depends primarily on the accepted *objectives* of rate-making policy and secondarily on the need to minimize undesirable side effects of rates otherwise best designed to attain these objectives. No rational discussion, for example, of the relative merits of "cost of service" and "value of service" as measures of proper rates or rate relationships is possible without reference to the question what desirable results the rate maker hopes to secure, and what undesirable results he hopes to minimize, by a choice between or mixture of the two standards of measurement. Not only this: the very *meaning* to be attached to ambiguous, proposed measures such as those of "cost" or "value"—an ambiguity not completely removed by the addition of familiar adjuncts, such as "out-of-pocket" costs, or "marginal costs," or "average costs"—must be determined in the light of the purposes to be served by the public utility rates as instruments of economic policy. This is a commonplace; but it is a commonplace which, so far from being taken for granted, needs repeated emphasis.

What then, are the good attributes to be sought and the bad attributes to be avoided or minimized in the development of a sound rate structure? Many different answers have been suggested in the technical literature and in the reported opinions by courts and commissions; and a number of writers have summarized their answers in the form of a list of desirable attributes of a rate structure, comparable to the "canons of taxation" found in the treatises on public finance. The list that follows is fairly typical, although I have derived it from a variety of sources instead of relying on any

one presentation. The sequence of the eight items is not meant to suggest any order of relative importance.

1. The related, "practical" attributes of simplicity, understandability, public acceptability, and feasibility of application.
2. Freedom from controversies as to proper interpretation.
3. Effectiveness in yielding total revenue requirements under the fair-return standard.
4. Revenue stability from year to year.
5. Stability of the rates themselves, with a minimum of unexpected changes seriously adverse to existing customers. (Compare "The best tax is an old tax.")
6. Fairness of the specific rates in the apportionment of total costs of service among the different consumers.
7. Avoidance of "undue discrimination" in rate relationships.
8. Efficiency of the rate classes and rate blocks in discouraging wasteful use of service while promoting all justified types and amounts of use:
   (a) in the control of the total amounts of service supplied by the company:
   (b) in the control of the relative uses of alternative types of service (on-peak versus off-peak electricity, Pullman travel versus coach travel, single-party telephone service versus service from a multi-party line, etc.).

Lists of this nature are useful in reminding the rate maker of considerations that might otherwise escape his attention, and also useful in suggesting one important reason why problems of practical rate design do not readily yield to "scientific" principles of optimum pricing. But they are unqualified to serve as a base on which to build these principles because of their ambiguities (how, for example, does one define "undue discrimination"?), their overlapping character, and their failure to offer any rules of priority in the event of a conflict. For such a base, we must start with a simpler and more fundamental classification of rate-making objectives.

THREE PRIMARY CRITERIA

General principles of public utility rates and rate differentials are necessarily based on simplified assumptions both as to the objectives of rate-making policy and as to the factual circumstances un-

CERTIFICATE OF SERVICE

I, Evan D. Johns, certify that, on September 19, 2017, I deposited true copies of the Sierra Club's Motion for Leave to File Notice of Participation Out-of-Time, the Sierra Club's Notice of Participation as Respondent, and the Direct Pre-Filed Testimony of Melissa Whited on Behalf of Sierra Club into the United States Mail, addressed to the following:

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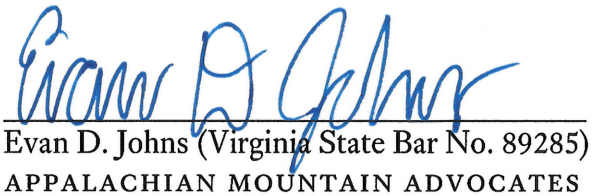

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