STATE OF NEW HAMPSHIRE

BEFORE THE

PUBLIC UTILITIES COMMISSION

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Liberty Utilities (Granite State Electric) Corp. d/b/a Liberty	)	**Docket DE 23-039**
Notice of Intent to File Rate Schedules	)	
	)	

Direct Testimony of

Marc Vatter

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December 1, 2023

Q. Please state your name, position, and business address.

A. My name is Marc H. Vatter. I am the Director of Economics and Finance for the Office of the Consumer Advocate (OCA).

Q. How long have you worked for the OCA?

A. I have been employed by the OCA since August 25th of this year.

Q. Is a summary of your experience attached to this testimony?

A. Yes. Attachment MV-1 is my resume.

Q. Have you previously testified before utility regulatory commissions?

A. Yes, though this is my first time testifying before the New Hampshire Commission. I have also sponsored testimony before the FERC, the Mississippi PSC, the Michigan PSC, and the Energy Facilities Siting Board of the Rhode Island PUC. All of this testimony pertained to the provision of electric service.

Q. What is the purpose of your testimony in this electric rate case?

A. I argue for an adjustment to requested depreciation expenses. The request is derived from a study submitted with the testimony of John J. Spanos on behalf of the utility; Attachment JJS -2 to his direct testimony. I am bringing the perspective of a financial economist to bear on what is conventionally an application of accounting norms and engineering expertise applied when surveying the condition of utility capital. The economic principle that I apply is that of least cost planning, including the cost of raising financial capital. Applying that principle imposes restrictions on the relationship between the cost of financial capital, the net salvage value of utility capital, and, therefore, allowable expenses for depreciation.

Q. Please summarize the OCA's positions on the issues discussed in your testimony.

A. Our position is that allowable annual expenses for depreciation should be reduced from the $11,697,980 requested to $8,131,010.

Q. What is "depreciation"?

A. Depreciation is a monetary measure of the decline in value of a productive asset between when it is acquired and when it is retired. Though the value of an asset may temporarily rise during that time, appreciate, all produced assets are eventually retired because their value has declined.[1] The "service life" of an asset may be a few years, or centuries. The cost of acquiring the asset, referred to as "original cost", is usually taken to equal its value when acquired.

Typically, owners of assets continue to invest in their productive capability while they are in use. Sometimes, we call this "maintenance," though distinguishing between maintenance and improvement of an asset may be arbitrary. Depreciation is generally separated from both.

Depreciation is treated as a cost for purposes of taxing businesses, measuring national income, and, as it is here, for calculating a regulated utility's revenue requirement. Depreciation is normally reported on an annual basis, and should represent the decline in an asset's value during each year, but generally is measured only as that year's contribution to the downward trend in value over the service life of the asset, apart from any transient fluctuation in the value of the asset.

Q. Please describe the "downward trend."

A. Different forms may be imposed on the downward trend when reporting depreciation expenses, and are accepted practice. In straight line full life depreciation, the nominal (not adjusted for inflation) depreciation expense is the same during every year between acquisition

[1] See Shelley, P.B. (1818). "Ozymandias", *The Examiner*, London. Available at **https://www.poetryfoundation.org/poems/46565/ozymandias**, accessed November 1, 2023.

and retirement. In straight line remaining life depreciation, the nominal expense is the same during every year between when depreciation is reported and expected retirement. In declining balance depreciation, the nominal expense declines between acquisition or reporting and expected retirement. In all of these forms, real (adjusted for inflation) expenses decline from year-to-year if general inflation is positive, because the real purchasing power of constant nominal expenses declines over time.

On page II 1072 of his direct testimony, John Spanos writes: "The straight line remaining life method of depreciation allocates the original cost of the property, less accumulated depreciation, less future net salvage, in equal amounts to each year of remaining service life." The depreciation expense for each current and future year is given by

$$D = \frac{I_0 - \left(G_T - C_T\right)}{T} \qquad (1)$$

where I_0 is "the original cost of the property, less accumulated depreciation" in Year 0, which, in this case, is 2022, $G_T - C_T$ is "future net salvage", and T is "remaining service life."

G_T is gross salvage in Year T, and C_T is cost of removal in Year T. "Gross salvage" refers to revenues from the sale of scrap, and "cost of removal" refers to the cost of having scrap removed. "Accumulated depreciation" here refers to depreciation expenses incurred before December 31, 2022. I derive Equation (1) in the mathematical appendix, and an equivalent expression appears in a document[2] from the California Public Utilities Commission (CPUC) on page 5.

[2] California Public Utilities Commission Water Division (1961). *Standard practice manual for determination of straight line remaining life depreciation accruals*. Available at **https://docs.cpuc.ca.gov/published/REPORT/22156.htm**, accessed October 25, 2023.

Q. What drives the determinants of annual depreciation expenses?

A. Original cost less past depreciation, I_0, is a sunk cost, and is normally a verifiable historical fact, so there should not be much disagreement about it. Gross salvage, G, changes over time as the market prices of scrap materials change. Cost of removal, C, changes over time as the wages for the labor needed to remove scrap change, so the values G_T and C_T, respectively, depend on the forecast of T. The decision about when to plan to retire a facility, the forecast of T, should depend on expected growth in prices for scrap materials and wage rates. The forecasts of the three numbers, G_T, C_T, and T, which jointly determine annual depreciation expenses in an impending electric rate period, and thereafter, D, should be mutually consistent with cost-minimizing planning of Liberty's distribution system.

Q. How do they determine annual depreciation expenses?

A. By Equation (1), a lower net salvage or a shorter service life implies higher depreciation expenses, and some observations regarding Mr. Spanos' estimates of these metrics for Liberty's distribution system follow.

Q. What are the observations regarding Mr. Spanos' estimates of net salvage?

A. To calculate net salvage, Mr. Spanos applies a net salvage percentage to original cost, like the CPUC. All but one of the net salvage percentages estimated by Mr. Spanos for distribution plant are negative. These are shown in

Table 1.

Table 1: Net salvage of distribution plant estimated by John Spanos

Account		Original cost (USD)	Net salvage percent
361	STRUCTURES AND IMPROVEMENTS	1,965,160	-5
362	STATION EQUIPMENT	42,392,278	-15
364	POLES, TOWERS AND FIXTURES	61,851,834	-70
365	OVERHEAD CONDUCTORS AND DEVICES	87,883,301	-50
366	UNDERGROUND CONDUIT	7,098,394	-10
367	UNDERGROUND CONDUCTORS AND DEVICES	20,580,041	-40
368	LINE TRANSFORMERS	35,203,650	-30
369	SERVICES	17,220,958	-75
370	METERS	6,785,898	-25
371	INSTALLATIONS ON CUSTOMERS' PREMISES	1,489,464	0
373	STREET LIGHTING AND SIGNAL SYSTEMS	6,720,615	-25
Average			-45
Correlation		-0.55	

The correlation of -0.55 between original cost and net salvage percentage indicates that net salvage is more negative for more costly parts of the distribution system, which makes net salvage for distribution plant as a whole more negative. More negative net salvage raises depreciation expenses. The correlation is statistically significantly negative at the 95% level in a one-tailed test[3], so the negative correlation is unlikely to have been the result of pure chance. It is not explained in Mr. Spanos' testimony why this negative correlation should obtain, and his response[4] to Discovery Request OCA 8-9 could just mean that more scrap costs more to remove (which would be true even if the net salvage percentage were the same for every category of

[3] See **https://www.statisticssolutions.com/free-resources/directory-of-statistical-analyses/pearsons-correlation-coefficient/table-of-critical-values-pearson-correlation/**, accessed November 14, 2023.
[4] "Without accepting the premise of this question, the net salvage percentage and in particular cost of removal is the labor expended to retire or remove the asset. Many of the larger assets require more effort to retire but factors such as location and age affect the cost of removal component."

plant) without explaining why net salvage, through its cost of removal component, should represent a more negative *percentage* of original cost when original cost is larger. His wording "factors such as location and age affect the cost of removal component" could help explain a negative correlation resulting from pure chance, but does not describe a relationship that exhibits regularity.

Q. What are the observations regarding Mr. Spanos' estimates of service life?

A. Table 2 shows Mr. Spanos' estimated composite remaining service life for each category of distribution plant in Column C, and his estimated full service life for the categories he selected to report on in his text in Column F. Mr. Spanos also reports the typical service lives shown in Column G.

He calculates composite remaining service life for each category as the quotient of all future depreciation and proposed annual depreciation. Table 2 also shows composite preceding lives, which I have calculated, correspondingly, as the quotient of all past depreciation (book depreciation reserve) and proposed annual depreciation. This is an approximation because book depreciation reserve was accumulated using different values for net salvage and service life than Mr. Spanos has used in his study. However, for the two large categories he selected to report on, composite full life comes close to Mr. Spanos' estimates. My calculation of preceding life essentially extends full life depreciation at Mr. Spanos' proposed annual expense into the past. That the resulting composite full lives for the large categories of plant are close to Mr. Spanos' estimates suggests that the effect on rates of his use of the remaining life method, rather than the full life method, which The Commission has approved in the past, is not necessarily large.

For the small selected category, meters, my calculation results in a shorter composite total life, but this likely results from unanticipated deployment of advanced metering that caused depreciation of meters in the past to be underestimated. This also highlights the value of the remaining life method, whose updates serve as corrections to course, as pointed out by the CPUC (Ibid, p. 5) over sixty years ago.

Table 2: Service life of distribution plant estimated by John Spanos

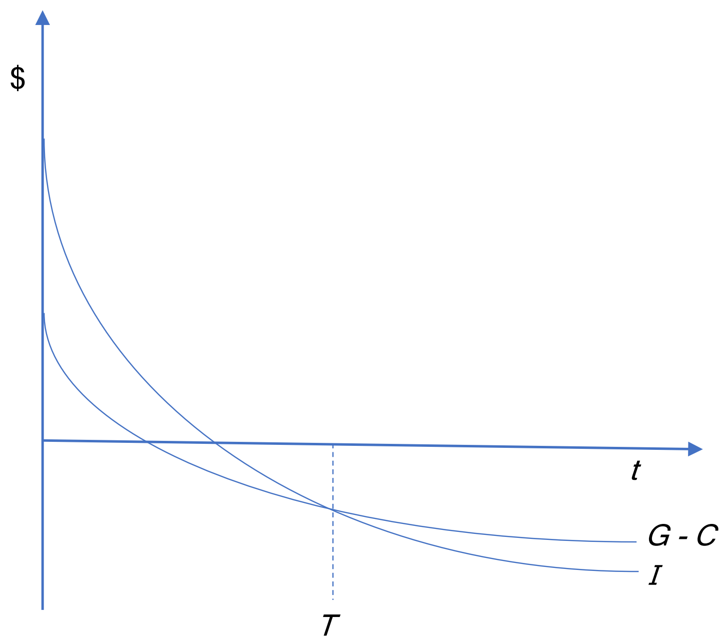
A	B	C	D	E	F	G
Account		Composite remaining life	Composite preceding life	Composite full life	Estimated full service life	Typical service life
361	STRUCTURES AND IMPROVEMENTS	49.4	21.5	70.9		
362	STATION EQUIPMENT	51.6	18.3	69.9		
364	POLES, TOWERS AND FIXTURES	45.6	14.1	59.7	55.0	45-60
365	OVERHEAD CONDUCTORS AND DEVICES	39.5	9.8	49.3	50.0	45-65
366	UNDERGROUND CONDUIT	48.3	18.8	67.1		
367	UNDERGROUND CONDUCTORS AND DEVICES	42.2	12.7	54.9		
368	LINE TRANSFORMERS	20.7	13.3	34.0		
369	SERVICES	42.4	13.0	55.4		
370	METERS	9.1	2.7	11.8	15.0	15-30
371	INSTALLATIONS ON CUSTOMERS' PREMISES	12.6	2.1	14.7		
373	STREET LIGHTING AND SIGNAL SYSTEMS	24.8	18.4	43.2		
Average		36.2	12.0	48.1		
Total depreciable plant		30.1	10.5	40.6		

Q. How should cost-minimization drive the determinants of annual depreciation expenses?

A. As noted, expected remaining service life should be consistent with cost-minimizing planning of a distribution system, and depend on expected growth in net salvage. Figure 1 illustrates cost-minimizing timing of retirement, in Year T. I is the value of a distribution facility, which declines over time t, measured in years, as the facility depreciates. When the value of the facility equals net salvage, it should be retired.

The level at which they are equal may be negative because the facility should continue to operate at some loss in order to defer negative net salvage, so long as the present value of current and future losses, including deferred negative net salvage, is smaller, in absolute terms, than current negative net salvage. The lower operating and maintenance costs are, the lower the losses associated with continued operation. On utility distribution systems, variable operating costs are low, and maintenance, both fixed and variable, should be low as retirement nears. (I will not replace the belts and hoses in the engine of a car that I am about to junk.) Note that "fixed" is with respect to load, not necessarily over time.

Figure 1: Cost-minimizing retirement of a distribution facility



The value of an asset at any time, here, I, equals the present discounted value of its current and future contribution to a firm's profits, or losses. Since net salvage is cash, it can be thought of as the present value of the stream of earnings that the cash could generate if invested, or, if negative, the present value of amortization of a liability of that amount. As the present value of operating a facility falls to (the present value of) its net salvage, it is the profit-maximizing, and, therefore, cost-minimizing[5], time to retire the facility.

[5] Cost-minimization and profit-maximization reduce to the same problem for a competitive firm, which takes the market price for its output as given, and for a monopoly subject to regulation of price, like Liberty. Under optimal regulation, a firm cannot raise price above the level at which "excess" profits are zero, as is the case for a competitive firm. Taking price as given, profit-maximization and cost-minimization reduce to the same "problem", so a regulated monopoly maximizes profits, subject to a rate cap at the intersection of demand and long run average total cost. Any addition to revenues that would otherwise go into excess profits are, instead, used to minimize average total costs and, therefore, rates. "Power at cost" means power at *minimum* cost.

Equation (2) is derived in the mathematical appendix from the condition that the value of an asset at the time of retirement equals net salvage. Again, that condition is necessary for minimization of the cost of serving load. Equation (2) relates annual straight line depreciation expenses, D, to net salvage, $G_T - C_T$, at the cost-minimizing time of retirement, T, and a utility's long run weighted average cost of capital, assumed to obtain at T, and denoted by $WACC_T$.

$$D = -\left(G_T - C_T\right) WACC_T \qquad (2)$$

At the time of retirement, expenses for depreciation come to an end, and expenses for amortization of negative net salvage begin, and the rate at which that amortization proceeds is given by the rate the utility must pay for funds, its weighted average cost of capital. One may also think of incurring the cost of negative net salvage as diverting capital raised through sales of stocks and bonds away from other investments, which would pay stock- and bondholders, and other creditors, a rate equal to the WACC. In the optimal year for retirement, a utility is indifferent between the two sources of annual expense, depreciation and amortization of negative net salvage, because their values are equal.

Cost-minimizing retirement of distribution facilities, and other assets, implies that straight line depreciation equals the negative of net salvage times the long-run WACC, in Year T, which, in Mr. Spanos' study, is 30.1 years hence. Looking at depreciable plant as a whole, and taking Mr. Spanos' net salvage of -\$130,262,675 as given, his annual depreciation expenses of \$11,697,980 imply a long-run WACC of 8.98 percent. Alternatively, a WACC of 6.24 percent implies annual depreciation expenses of \$8,131,010. That is, if Liberty's long-run WACC is much below nine percent, the depreciation model offered by Mr. Spanos for adoption here results in depreciation expenses that are not consistent with planning for cost-minimization.

Q. What is the OCA's position on the Company's calculation of annual depreciation expenses?

A. In light of the unexplained negative correlation between net salvage percent and the cost for each category of distribution plant, and based on our estimated long term weighted average cost of capital in 2053, at the end of Mr. Spanos' estimated composite service life of depreciable capital, of 6.24 percent, provided that Mr. Spanos' estimated net salvage of -$130,262,675 is correct, we recommend that The Commission allow annual depreciation expenses of $8,131,010.[6]

Q. Does this conclude your testimony?

A. Yes.

[6] According to data from the Saint Louis Federal Reserve Bank, investors' expectations of inflation over the coming thirty years is hardly lower than over the coming two years, so I make no adjustment to Mr. Rothschild's estimated WACC for changing inflation between the impending rate period and the end of Mr. Spanos' composite remaining life. See **https://fred.stlouisfed.org/series/EXPINF2YR** and **https://fred.stlouisfed.org/series/EXPINF30YR**, accessed November 13, 2023.