BEFORE THE
NEW HAMPSHIRE PUBLIC UTILITIES COMMISSION

Liberty Utilities (EnergyNorth Natural Gas) Corp.; Keene Division
d/b/a Liberty

Winter 2024-2025 Cost of Gas

Docket No. DG 24-100

Technical Statement of Marc H. Vatter

October 11, 2024

In this technical statement, I develop the following recommendations:

- An expected carrying charge on undercollections of 4.82% p.a.; and
- An expected carrying charge on overcollections of 8.77% p.a.

Carrying charges

Under the tariff from DG 23-076, the Company would both collect interest from customers on undercollections and pay interest to customers on overcollections at the Prime Rate, which is now 8.00 percent[1] In my judgment, the Commission should reexamine the question of whether this interest rate is just and reasonable.

Undercollections

Regarding undercollections, the Company is effectively lending to customers without their specific consent. The rate on one-month commercial paper is now 4.82% p.a.[2] Using this as the Company's cost of short-term debt, it is collecting interest above cost of 8.00 – 4.82 = 3.18%. According to Fitch Ratings,

> LUCo primarily meets its short-term liquidity needs through the issuance of [commercial paper] under its $500 million CP program. LUCo also has a $1 billion senior unsecured revolving credit facility (RCF) that matures April 29, 2027, and a $500 million short-term senior unsecured RCF that matures Oct. 25, 2025. LUCo requires modest cash on hand to fund its operations.[3]

The last sentence suggests that the Company has the ability to increase its issuance of commercial paper, if needed, to finance undercollections. Figure I shows that rates on commercial paper have generally fallen below the Prime Rate. The objective of minimizing the cost of financial capital going into residential rates, then, justifies an assumed rolling over of one-month nonfinancial commercial paper, rather than the Prime Rate, as a way to finance undercollections through rates. By inspection of Figure I,

[1] https://www.federalreserve.gov/releases/h15/, accessed October 7, 2024.
[2] Ibid.
[3] https://www.fitchratings.com/research/corporate-finance/fitch-rates-liberty-utilities-co-senior-unsecured-notes-bbb-09-01-2024, accessed September 17, 2024.

the prospect of greater volatility in rates on commercial paper should not be of concern; they rise and fall in tandem with the Prime Rate.

Figure I: Rates of interest on prime bank lending and commercial paper

I recommend that undercollections accrue interest at the rate of interest on one-month nonfinancial commercial paper reported by the Board of Governors of the Federal Reserve at https://www.federalreserve.gov/releases/h15/, for the term during which undercollections accrue interest.

Overcollections

Regarding overcollections, the Company is effectively borrowing from customers without their specific consent. It should do so at customers' time value of money, which I denote as r_f and may or may not approximate the Prime Rate. For a consumer to maximize the present value of current and future well-being (typically referred to by economists as "utility"), the rate of decline in the marginal utility[4] of consumption should, as consumption increases, equal the consumer's time value of money. If the former is lower, the consumer would be better of saving more now in order to consume more later; if the former is higher, the consumer would be better off spending more now and consuming less later. I use this principle to derive Equation (9) in the appendix, where g is the rate of growth in i's consumption of private and public goods and σ measures a hypothetical consumer's degree of aversion to volatility in consumption.

$$r_f = g\sigma \qquad (9)$$

(9) is a risk-free discount rate, based on the assumption that customers have accurate expectations regarding inflation and earn or pay the rates of interest that they do with certainty. Poor (rich) consumers have lower (higher) consumption and tend to have higher (lower) growth in consumption, reflecting income mobility, so their time-values of money are higher (lower).

[4] Marginal utility is the well-being a consumer derives from the last unit of a good consumed. Here, that good is the money the customer spends on all private and public goods combined.

The annual rate of growth in real gross state product in New Hampshire from 1997 to 2022 was 2.16%.[5] I show in the appendix that this approximates growth in consumption of private and public goods combined. With $\sigma = 3$ from Hall (1988)[6], this gives a real time value of money of 2.16 x 3 = 6.47%, a central tendency for residential customers. As of June 12, 2024, the Federal Open Market Committee's (FOMC) median projection of core inflation (excluding food and energy) declines from 2.8% p.a. for 2024 as a whole to 2.3% for 2025 and 2.0% for 2026.[7] Using the figure for 2025 gives a nominal time value of money of 6.47 + 2.30 = 8.77%. This is somewhat higher than the Prime Rate. 6.47%, being based on a fairly long history of data, is not expected to change rapidly.

I recommend that residential customers be charged 6.47%, with infrequent adjustment, plus the FOMC's forecast of inflation, reported at https://www.federalreserve.gov/monetarypolicy/fomcprojtabl20240612.htm, for the term during which overcollections accrue interest.

[5] https://fred.stlouisfed.org/series/NHRGSP, accessed September 30, 2024

[6] Hall, R.E. (1988). Intertemporal substitution in consumption. *Journal of Political Economy*, 96(2). https://doi.org/10.1086/261539

[7] https://www.federalreserve.gov/monetarypolicy/fomcprojtabl20240612.htm, accessed August 8, 2024.

Appendix: Residential customers' time value of money

I denote residential customers' time value of money as r_f, which is applicable to sums financed by them. Customer i's well-being derived from consumption of economic goods is quantified with a utility function,

$$U_i\left(C_i\right) = -C_i^{1-\sigma} \tag{1}$$

where C_i is i's consumption of private and public goods and σ measures the degree of relative risk aversion that is implicit in the utility function. The marginal utility of consumption is

$$\frac{\partial U_i}{\partial C_i} = -\left(1-\sigma\right)C_i^{-\sigma} > 0 \tag{2}$$

For a consumer to maximize the present value of current and future utility, the rate of decline in the marginal utility of consumption as consumption grows should equal the rate at which she discounts future consumption. For a discrete time illustration, let U'_{it} be marginal utility of consumption at Time t, then $U'_{it} = U'_{it+1}\left(1+r_f\right)$; if $U'_{it} > U'_{it+1}\left(1+r_f\right)$, the consumer can raise the discounted sum of utility over time by moving consumption from $t+1$ to t (increasing savings or decreasing borrowing at Time t), and vice versa. Therefore,

$$r_f = \frac{U'_{it} - U'_{it+1}}{U'_{it+1}} \tag{3}$$

Again, the rate of decline in the marginal utility of consumption as consumption grows should equal the rate at which a consumer discounts future consumption. Differentiating (2) with respect to time gives

$$\frac{d}{dt}\frac{\partial U_i}{\partial C_i} = \left(1-\sigma\right)C_i^{-\sigma}\frac{\dot{C}_i}{C_i}\sigma \tag{4}$$

and

$$\begin{aligned}\frac{\dfrac{d}{dt}\dfrac{\partial U_i}{\partial C_i}}{\dfrac{\partial U_i}{\partial C_i}} &= \frac{\left(1-\sigma\right)C_i^{-\sigma}\dfrac{\dot{C}_i}{C_i}\sigma}{-\left(1-\sigma\right)C_i^{-\sigma}} \\ &= -\frac{\dot{C}_i}{C_i}\sigma = -r_f\end{aligned} \tag{5}$$

From (3), so[8]

$$r_f = \frac{\dot{C}_i}{C_i}\sigma \tag{6}$$

Define $g \equiv \dot{C}_i / C_i$.

I have defined C_i as i's consumption of both private and public goods. If the government's budget is balanced, then the rate of growth in that metric for a resident of New Hampshire equals the rate of growth in gross state product; I denote GSP as Y. Also, denote private consumption as C_p, private saving as S_p, and taxes paid, which equal government purchases of goods and services, as T.

$$C_p = \left(\sum_i C_i\right) - T .$$

All proceeds from gross state product ultimately accrue to households, and households may privately consume, save, or pay taxes using those proceeds. Therefore,

$$Y = C_p + S_p + T$$
$$Y - S_p = C_p + T$$
$$\dot{Y} - \dot{S}_p = \dot{C}_p + \dot{T}$$
$$\frac{\dot{C}_p + \dot{T}}{C_p + T} = \frac{\dot{Y} - \dot{S}_p}{Y - S_p}$$
$$\frac{\dot{C}_p + \dot{T}}{C_p + T}\frac{Y - S_p}{Y} = \frac{\dot{Y}}{Y} - \frac{\dot{S}_p}{Y}$$
$$\frac{\dot{C}_p + \dot{T}}{C_p + T} = \left(\frac{\dot{Y}}{Y} - \frac{\dot{S}_p}{Y}\right)\frac{Y}{Y - S_p}$$
$$\frac{\dot{C}_p + \dot{T}}{C_p + T} = \left(\frac{\dot{Y}}{Y} - \frac{\dot{S}_p}{S_p}\frac{S_p}{Y}\right)\frac{Y}{Y - S_p}$$

The savings rate in the U.S. is fairly stable, so let

$$\frac{\dot{S}_p}{S_p} = \frac{\dot{Y}}{Y}$$

[8] An adjustment may be made for the effects of global warming, which raises the value of current saving, shown in Equation (29) at https://dx.doi.org/10.2139/ssrn.3821603.

Then

$$\frac{\dot{C}_p + \dot{T}}{C_p + T} = \frac{\dot{Y}}{Y}\left(1 - \frac{S_p}{Y}\right)\frac{Y}{Y - S_p} = \frac{\dot{Y}}{Y}$$

Growth in private and public consumption equals, or, practically speaking, approximates growth in gross state product.