BEFORE THE
NEW YORK STATE
PUBLIC SERVICE COMMISSION

Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Electric Service.	)))))	Case Number: 22-E-0064
Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Gas Service.	))))	Case Number: 22-G-0065

DIRECT TESTIMONY TESTIMONY OF BOB WYMAN

May 20, 2022

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1 Introduction

Q. What is your name?

A. I am commonly known as Bob Wyman. My formal name is Robert Mark Wyman.

Q. Mr. Wyman, have you previously testified before the Commission?

A. Yes. I presented direct testimony during the previous ConEd rate case and have also participated in a number of other rate cases, including those of Central Hudson, Orange & Rockland, KEDNY/KEDLI, NYSEG/RGE, and Corning Gas. I have also given verbal testimony at a variety of PSC public hearings, have helped others prepare testimony for a variety of PSC proceedings, and am an active party in a variety of PSC matters.

Q. Do you always participate in PSC matters as an individual, representing only yourself?

A. No. In addition to participating in PSC proceedings as an individual, I have, from time to time, assisted others in preparing for these proceedings or have spoken for them. For instance, I have several times assisted NY-GEO[1] in developing testimony and/or evidence. I also represented NY-GEO as a participant in ConEd's "Peak Gas Collaborative" which had been established as a result of a prior ConEd rate case (16-G-0061).[2].

Q. What is your background?

A. I am a New York City-based advocate for renewable energy and Beneficial Electrification with a focus on clean, sustainable, and efficient geothermal heat pumps. I am a member of the New York Geothermal Energy Organization, (NY-GEO)[3] and the In-

[1] https://ny-geo.org/

[2] 16-G-0061, Proceeding on Motion of the Commission as to the Rates, Charges, Rules and Regulations of Consolidated Edison Company of New York, Inc. for Gas Service.

[3] https://ny-geo.org/

ternational Ground Source Heat Pump Association (IGSHPA)[4]. I am a co-founder and shareholder, but not an employee, of Dandelion Energy[5], the Google X[6] spin-off company that currently installs geothermal heat pump systems in New York and several surrounding states.

Although most of my career was spent in the computer software business, during which I worked for a variety of companies, including Digital Equipment Corporation, Microsoft, Google, Medio Multimedia, and Pubsub Concepts,[7] I have been advocating on energy related issues for almost 50 years, having first given public testimony in hearings concerning Pres. Nixon's "Project Independence"[8] in 1973.

2 Purpose of Testimony

Q. What is your purpose in submitting this testimony?

A. I wish to comment on several aspects of the proposals made by Consolidated Edison of New York, Inc. ("The Company") in the current cases and to advocate for several modifications or additions to those proposals. My testimony is intended to ensure a more complete record of the relevant issues and to advocate for policies that will be more fair, more in the public interest, and more likely than those proposed by the Company to conform to existing State policy goals.

The issues that I wish to discuss include the Company's proposals concerning

- Cost recovery:
  - Depreciation

[4] https://igshpa.org/
[5] https://dandelionenergy.com/
[6] https://x.company/
[7] See my LinkedIn profile for more detail: https://www.linkedin.com/in/bobwyman/
[8] https://en.wikipedia.org/wiki/Project_Independence

    - Equity Ratio (i.e. leverage)
    - Return on Equity (ROE)
- Leak Prone Pipe Replacement
- SC-1 Rate IV
- Home Area Network (HAN) access to AMI Smart Meters
- Seasonal Rate Differentials

In a prior time, the Company's proposals might have been accepted as reasonable, or only somewhat excessive. But, we do not live in the past – when the Company could reasonably assume that demand for its gas service would grow in every future year.

The focus of a rate case should be on current and future conditions and requirements, including those of our State's CLCPA and other laws or policies, as well as New York City's Local Laws and recently passed ban on new gas hookups in most buildings. These requirements of public authorities ensure that gas consumption in the homes and buildings served by the Company will decline dramatically and that it may even be eliminated entirely within the lives of at least some of us.

Given the certain prospect of decades of decline in gas demand, accompanied by increases in the demand for electricity, the Company should have presented a rate proposal that directly and adequately addressed the problem of funding its operations and the recovery of its costs during a time when gas demand will be declining. The Company did not do so. Given the Company's failure to adequately address current and certain future conditions in its proposal, the Commission should either direct the Company to submit a revised and more responsive proposal or it should modify the Company's proposal to better fit the realities of the world we live in.

Q. Please summarize your concerns with the Company's proposal.

A. I am concerned with, at least, the following components of the Company's proposal:

- The Company's proposals for the recovery of the gas rate base cannot be supported:
  - The Company proposes the continued use of "Straight-Line" depreciation for gas assets even though that method of depreciation is intended for use only when demand is either constant or growing. The continued use of Straight-Line depreciation, during a period of demand decline, must inevitably lead to a requirement to dramatically increase gas delivery rates in the future – imposing significant burdens on future ratepayers, many of whom will be Low and Moderate Income (LMI) consumers.
  - The Company proposes expected average service lives (ASL), over which costs are to be recovered, that are excessive given the current requirements of public authorities. When the CLCPA requires an 85% reduction in CO_2e emissions (relative to 1990) before 2050, only 28 years from now, the Company proposes ASLs far in excess of 28 years. Such unrealistic ASLs ensure the accumulation of stranded assets and significant burdens for future ratepayers.
- At a time when it is essential to lower the weighted average cost of capital (WACC), and thus allow the more rapid managed decapitalization of the Company's gas assets without excessively burdening ratepayers, the Company has proposed actions which will, in fact, increase the WACC. They propose:
  - Increasing the gas Equity-Ratio to 50% and thus increasing the portion of the rate base which is financed using the relatively expensive shareholder capital. Given the circumstances, and accepting that all parties should accept some sacrifice in addressing the current conditions, it would be more appropriate to lower WACC by relying more on relatively cheaper debt.

  - Increasing the Return-On-Equity (ROE) for gas investments. This will also increase WACC and make more rapid decapitalization of gas assets even more difficult.

- The new, optional SC-1 Rate IV, introduced in the last rate case has been proven to provide a small number of residential users with significant bill reductions and more equitable rates. However, the adoption of that rate is severely limited since demand-based rates are unfamiliar to more residential customers. In order to ensure further adoption of this rate, the rate should be modified to allow those selecting it an option to switch back to a previously used rate if, in fact, the use of SC-1 Rate IV results in increases to their electric bills.
- The Company proposes to continue the practice of aggressively replacing Leak Prone Pipe (LPP), even when there is no evidence that such pipe is actually leaking to an extent that compromises the safety and reliability of their gas service. While this program might have been appropriate in the past, it ensures the continued growth of the Company's ratebase and thus further complicates the problem of reducing the ratebase as demand falls.
- The Company has long been required by the Commission to provide those customers served by AMI "Smart Meters" with Home Area Network (HAN) access to realtime data provided by those meters. However, such access has not yet been provided. The Company should be required to either begin providing such access or present a plan demonstrating how such access will be provided in the near future.
- Until recently, the Company has failed to update the Seasonal Rate Differentials used in various electric rates to reflect actual conditions. Given that it is reasonable to assume that seasonal demand patterns will change continuously over the next few decades as the adoption of Beneficial Electrification grows, the

Company should be required to regularly update its Seasonal Rate Differentials, and rates with rely on them.

- Given the compelling need to avoid any but legally required expansions of gas service in the future, the Company should commit to avoid any activities or programs whose effect is to encourage either the increased or continued use of gas. They should expend no ratepayer money on marketing gas, stating that its use is beneficial, or providing incentives for its continued or prospective use.

3 Depreciation

Q. Please summarize what is meant by "Depreciation."

A. Utilities don't immediately recover from ratepayers the cost of installing new infrastructure. Rather, to reduce the volatility of rates and to ensure a more equitable distribution of costs, cost recovery is spread over time using a process known as Depreciation. The goal of depreciation is to assign to each, typically annual, accounting period during which an asset is in use, a dollar amount that reasonably reflects the reduction in worth or value of the asset that occurred during that period. Costs are not recovered when they are incurred, but rather over time and in proportion to the expected use or consumption of the asset.

A variety of depreciation methods may be used, including:

- Straight-Line (SL)
- Unit of Production (UoP)
- Sum of Years Digits (SYD) (A special case of UoP)

Q. What depreciation method has the Company used in the past and proposes for use in the future?

A. ConEd and other utilities have traditionally used *Straight-Line Depreciation*, which allocates capital costs equally to each accounting period during an assets' expected depreciable life (typically the average expected service life or the time until 50% of the asset has been retired from service.). But, as many accounting texts are careful to point out, straight-line depreciation is only appropriately used with assets whose use will either be constant over time or growing. While this method has served utilities well in the past, today we reasonably expect that consumer demand for gas utility service will decline in the future and will eventually be substantially, if not completely, eliminated. This expected decline in use, when combined with a depreciation method best used when demand is not falling, creates a great risk of dramatically negative impacts on consumers including dramatic increases in the per-unit cost of delivered gas whether or not the wholesale cost of the gas commodity increases. The simple arithmetic reality is that if the number of delivered units are reduced, while the cost of the assets required to deliver those units remains constant, the per-unit cost of delivery (i.e. $\frac{\textit{Delivery Cost}}{\textit{Units Delivered}}$) must increase dramatically.

The growing inadequacy of the straight-line method requires that we first do our best to understand that methods' impacts and that we then also explore alternatives that might ensure a more Fair, Reasonable and Non-Discriminatory (FRAND) allocation of gas infrastructure costs.

3.1 Straight-Line Depreciation

Q. Please explain how Straight-Line Deprecation works.

A. Using traditional utility straight-line depreciation, or cost-recovery, if assets of some type are expected to have an *Average Service Life* (ASL) of 55 years, then $\frac{1}{55} = 1.82\%$ of the assets' initial cost will be scheduled for recovery from ratepayers during each of the 55 years following the assets' installation or acquisition. Thus, an asset's full cost will have been recovered from ratepayers once 50% of that asset has been removed from service.

Different classes of assets (e.g. pipes, meters, real estate, vehicles) will typically have different expected average service lives. When rates are set in a rate case, both an asset class' expected average service life and its remaining unrecovered value will used to determine the *Depreciation Expense* that must be recovered from rate payers during each accounting period or *Rate Year*. The sum of all depreciation expense for the rate year is then added to that rate year's *Revenue Requirement*, which is the sum of all expenses that must be recovered from ratepayers during the rate year. The Revenue Requirement will also include the cost of financing, at the utility's *Weighted Average Cost of Capital* (WACC) and an allocation of the assets' expected removal costs – the costs that will be incurred when the assets are eventually taken out of service. (Most utility assets have little or no salvage value.) Just as the expected service lives differ between asset classes, so will the expected removal costs. It costs less to remove a meter than it does to remove a main.

Removal costs are typically calculated as a percentage of the initial cost of installing an asset and, if only because of inflation, those costs tend to rise over time. Removal costs are often more than 50% of the nominal cost of initially installing an asset. In some cases, removal costs actually exceed the initial cost of installation. Table 1 provides a small selection of average service lives and removal costs proposed by ConEd for use in their 2022 rate case (DMM Case 22-G-0065).

Figure 1 illustrates the combined depreciation expense, removal costs, and finance costs over the life of an asset expected to have an average service life of 55 years, financed at 7% WACC, and with an estimated removal cost equal to 70% of the as-

Account	Description	ASL	Removal
376.12	Mains	75	90%
380.10	Services	55	70%
381.00	Meters	30	10%
383.00	House Regulators	40	10%

Table 1: Selected Average Service Life (ASL) and Removal Cost proposed for ConEd Gas Assets

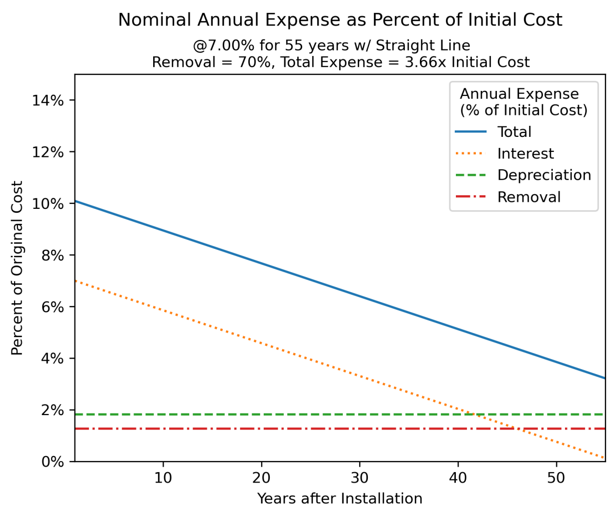

Figure 1: Total annual expense as percent of initial cost when using Straight-Line depreciation

set's initial cost. (i.e. similar to assets in Account 380.10 – Services.) Assuming that Straight-Line depreciation is used, the annual depreciation expense in each year is fixed. Although removal costs are also shown as fixed, it should be understood that removal costs will vary from year to year and will tend to grow greater over time due to the impact of inflation. However, this complexity is omitted in order to simplify the discussion.

Figure 1 also clearly illustrates that Straight-Line cost-recovery for utility assets is distinctly different from that used for mortgages, consumer loans, and other common loans which usually vary principal payments over the life of the loan in order to ensure a fixed payment per accounting period. Such traditional financing mechanisms typically require very small principal payments, analogous to depreciation expense, early in the loan's life when the interest payments are highest. At the end of a loan's life, after the interest payments have declined, the principal payment will dominate the annual cost recovery.

The fact that total payments decline over the life of an asset under straight-line depreciation challenges the intuitive claim that allocating depreciation expense equally across accounting periods results in an equitable recovery of costs. If we look only at the fixed depreciation expense, it may seem equitable, but if we include, as we should, the cost of financing as-yet-uncovered assets, it is clear that Straight-Line depreciation leads to "front-end loaded" cost recovery. Earlier ratepayers, as a class, pay much more for installed assets than do later ratepayers. Depreciation expense may be allocated equally to all accounting periods, but the total cost of owning the asset is not equally allocated. This is particularly true if we consider that costs are typically recovered over the average expected life of an asset, not the full expected life. Thus, once an asset's costs have been fully recovered over its average expected life, we should expect that about 50% of that asset's useful life will remain.

While Straight-Line depreciation may appear to inequitably frontend load total costs of specific assets, the reduction of each future accounting period's total cost allocation for previously existing investments allows some additional investments to be made without increasing rates. (i.e. If the sum of a new investment's capital, finance, and removal costs is less than or equal to the real costs of retiring investments, rates can remain stable.) This aspect of Straight-Line depreciation has been very important in the past since most utilities have experienced either a constant or growing demand for their service and have thus been able to justify continued investment in assets. They have needed to at least replace retired assets in order to maintain safe and reliable service. Because of these new investments, whose costs are at least initially dominated by finance costs, rates don't decline as older assets' costs are recovered.

However, if usage is declining, and one must assume that gas utility usage will decline, one can anticipate that the need to invest in new gas infrastructure will also decline. Gas utilities should have less need to expand or replace their assets in the future. Unfortunately, a reduction in the rate of investment won't relieve the burden borne by future ratepayers. If gas use declines, an equal allocation of costs across accounting periods means that those equal costs will be recovered from the sale of fewer units of delivered gas. That will force the per-unit cost of gas to rise even if the total costs allocated to each period either don't rise or even if they decline, but decline at a rate slower than the decline in usage.

3.1.1 Per Unit Costs

Q. If Straight-Line depreciation results in falling total costs each year and thus allows additional investment, what's the problem?

A. If demand for gas service was constant or growing, Straight-Line depreciation would not, in fact, cause a problem. It's use would be appropriate, as we have learned over the many previous years of the Company's gas service. However, when demand in not constant or growing, when it is declining, the continued use of Straight-Line depreciation causes the per-unit costs of gas delivery to increase dramatically over time to unacceptably high levels.

This issue is not that there is anything fundamentally wrong with Straight-Line depreciation. The issue is that Straight-Line depreciation is only appropriately used when demand is constant or growing, not when it is declining – as it must decline in the future.

Q. Please explain the impact on per-unit costs of using Straight-Line depreciation when demand is declining.

A. Gas delivery rates are typically "volumetric," thus gas bills are dependent on the volume or number of units of gas delivered to the ratepayer. The per-unit rates that appear on ratepayers' monthly bills (e.g. $/kWh or $/therm) are simply calculated by dividing the revenue requirement by the expected volume of deliveries to all ratepayers during the rate year. Because of this, during rate cases, most of the focus is on determining the revenue requirement and the expected volume of deliveries. The actual rates levied are then the result of a simple calculation which is performed once the rate determinants have been agreed upon. For any given revenue requirement, the greater the expected deliveries, the lower the per-unit delivery rate will be, and, the lower the expected deliveries, the higher the per-unit rates will be.

Given a fixed cost of delivery, the relationship between a per-unit cost recovery and either increased or decreased unit deliveries is illustrated in Figure 2. As shown, if deliveries decline by 50%, then the per-unit cost recovery must be doubled. However, if deliveries double (i.e. a 100% change or Δ), then per-unit cost recovery will decrease by 50%. Rate increases due to demand decline are essentially unlimited while rate decreases due to increased demand are capped at a maximum of 100%. Rates can rise much higher than they can fall.

Just as Straight-Line depreciation can sometimes work to reduce the rate impact of an investment over time, increases in customer demand reduce assets' impact on rates. However, while significant increases in assets' utilization have always been common

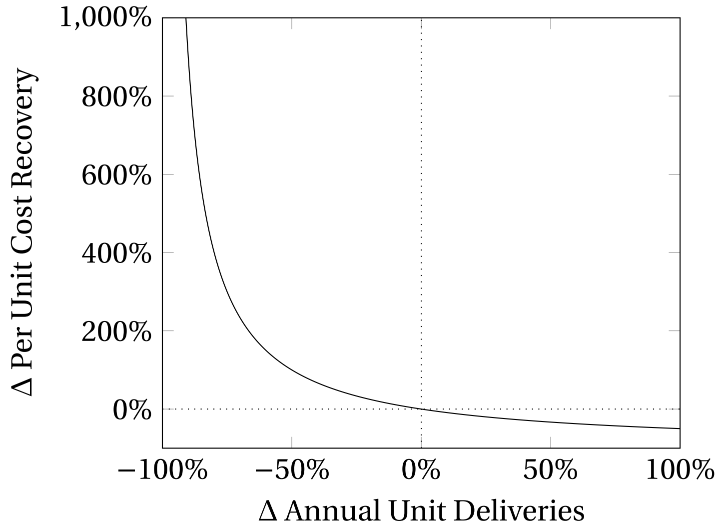

Figure 2: Response of Per Unit Cost Recovery to a change in annual unit deliveries when using Straight-Line Depreciation and volumetric rates.

for both electric and gas utilities, and while such increases will certainly continue to be common for electric utilities, we should expect that the usage of gas assets will decline as customers switch to more sustainable, *Non-Pipe Alternatives (NPAs)* such as heat pumps. Unfortunately, reduced utilization has a much greater impact on rates than increased utilization. Thus, as gas use declines, we can reasonably expect dramatic increases in gas assets' rate impact. In fact, if gas use in New York State is reduced by 85% before 2050, in order to achieve the State's goal of reducing CO_{2e} emissions by 85%, we should expect to see long-lived gas assets' nominal rate impact increase to almost seven times their current level (i.e. $\frac{1}{1-0.85} = \frac{1}{0.15} = 6.67$).

A more concrete visualization of the impact of declining demand with largely fixed costs can be seen in Figure 3 which uses the same data as in Figure 1 above, but assumes that demand is declining. (For Figure 1, the assumption was that demand was constant over the service life.) To simplify the discussion, I have assumed that the fall in demand will be "straight-line" or equally distributed across all periods, just as

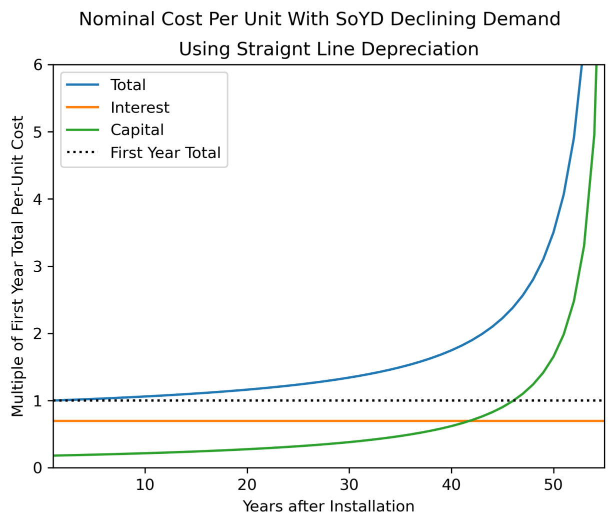

Figure 3: Cost Per Unit over time using Straight-Line Depreciation with SoYD demand decline.

straight-line depreciation distributes capital costs equally between all periods. Such a decline in demand is that which would be the result of a *Sum of Years Digits* calculation.[9]

In Figure 3, because the unrecovered capital cost and the demand are falling at the same rate, the interest per-unit is constant over the full service life. However, the total cost per unit, as a percentage of the total cost in the first year, grows increasingly, to dramatic heights, due to the fact that the depreciation has been allocated equally to each year even though demand is falling. Given the formula $\frac{\textit{Depreciation Expense}}{\textit{Demand}}$, if the numerator, *Depreciation Expense*, is constant, but the denominator, *Demand*, falls, then the resulting value must increase. As shown in Figure 2, after half the service life (i.e. $\frac{55}{2} = 27.5$ years) the Depreciation Expense per unit will have doubled, relative to its level in the first year, and, as each year passes, the rate of increase in Total cost per unit will increase. Thus, the impact of straight-line depreciation is relatively mild in

[9] Using SoYD, for any year of an asset's full Service Life, the demand decline during that year, as a percentage of the full Service Life, is defined as: $\frac{(\textit{Service Life} - \textit{Year} + 1) * 100}{\textit{Service Life} * \frac{\textit{Service Life}+1}{2}}$.

the early years, but it becomes dramatically higher in the later years.

A significant difference between Figure 1 and Figure 3 is that the cost per unit increases over time even though the total expense falls. This implies that any additional investment in capital assets will result in increased rates and thus increased burden on ratepayers. When demand is either constant or growing, the gradual reduction of the ratebase will always afford the opportunity to make at least some new investments without raising rates. Unfortunately, this is not the case when demand is falling.

3.1.2 The Coming Death Spiral

Q. What will be the impact of increased future per-unit costs as demand declines?

A. The dynamics described above are the definition of the often invoked idea of a *Utility Death Spiral*. The key factor limiting the rate at which gas customers abandon gas service and adopt alternatives, such as heat pumps, is the high relative cost of paying for the conversion. However, while the conversion cost may be perceived as relatively high today, if there is any reduction in demand, with its attendant increases in gas rates, the result will a reduction in gas' cost advantage. As per-unit rates rise, more and more customers will decide to abandon gas. Their abandonment will cause further rate increases which will then motivate even more customers to abandon gas. This positive feedback creates the feared Death Spiral – an ever-accelerating rate of service abandonment.

Of course, customers' differing financial circumstances will make them more or less sensitive to increases in the per unit cost of gas delivery. Customers who are fortunate enough to have either the wealth or access to capital required to fund the up-front costs of converting to heat pumps will be the first to abandon their gas service since they will be the first who can afford the cheaper, more sustainable alternatives to legacy gas service. But, less fortunate customers, with lesser financial capacity, will tend to tolerate even significant increases in per-unit costs before they finally find the cost of maintaining gas service to be unacceptable. Thus, we're likely to see that *Low and Moderate Income (LMI)* customers will be the last to abandon gas service. Over time, as the wealthier customers leave behind the LMI customers, gas will become increasingly viewed as a "poor man's fuel." LMI customers, who can least afford to pay high per unit rates, and who would benefit most from the then cheaper and more sustainable alternatives to gas, will be the ones who will bear the full burden of paying for assets abandoned earlier by the wealthier ex-customers.

Q. What should be done to address these issues?

A. Given that the impact of continued use of Straight-Line depreciation during a period of demand decline is so clear, it is essential that the Company adopt a plan which limits the systemic economic discrimination and inequity that will be created by an otherwise obscure technical decision to continue the use of Straight-Line Depreciation in the face of certain demand decline.

The Company should consider alternative depreciation methods, such as Unit of Production (UoP), which are intended for use in cases where demand is declining. Additionally, the Company should pursue a course that lowers the weighted average cost of capital and limit, to the greatest degree possible, programs, such as LPP replacment, which increase the gas ratebase, or speculative research programs, such as RNG or Hydrogen development, that increase near-term ratepayers' costs without a certainty of providing long-term benefit.

4 Equity Ratio

Q. Please explain what is meant by Equity-Ratio and why it matters.

A. In New York, it is common for utilities' capital structure to be split roughly equally between debt and shareholder equity, with some small amount of capital provided by customer deposits. The Equity-Ratio is a metric that shows what portion of the ratebase has been funded by equity, rather than other sources.

The allowed equity ratio ($\frac{Equity}{Total\ Capital}$) is reviewed and set during each rate case. Given a 50% equity ratio, or a equity-to-debt ratio ($\frac{Debt}{Equity}$) of 1.0x, one half of the utility's capital will consist of loans and other obligations to external capital sources such as banks, bond holders, etc., while the remaining half of its capital is funded by shareholder equity.

Because debt is much cheaper than equity, the *Equity Ratio* is a key determinant of the WACC. The lower the equity-ratio, and thus the smaller the share of capital provided by shareholders, the lower is the WACC. Thus, ratepayers would normally prefer that the equity-ratio be as low as possible since that would reduce WACC, and thus, their rates. On the other hand, the equity-ratio determines how much of the utility's capital structure is able to generate the relatively expensive shareholder returns. As a result, utilities often seek to increase the allowed equity-ratio. The need to manage this conflict between the interests of ratepayers and shareholders is why setting the equity-ratio is an important, and often hotly contested, part of every rate case.

The WACC assumed in Figure 1 is 7%. That WACC is based on an assumption that debt capital will be available at an annual cost of about 4% while equity capital will be much more expensive, costing ratepayers 10% per year, as per the Company's proposal, or 2.5 times more than debt. Given these assumptions, and assuming an equity ratio of 50%, the weighted average cost of capital is calculated as $WACC = (4\% * 50\%) + (10\% * 50\%) = 2\% + 5\% = 7\%$. Anything which works to lower the return requirements of either debt of equity, or that would reduce the Equity Ratio, will result in a lower WACC and thus lower rates.

Q. How is the Equity-Ratio set?

A. The equity-ratio is set or adjusted in each rate case, often as a result of negotiations leading to a settlement agreement.

There is no rule of finance that requires that the equity ratio be set at 50%. It is simply a matter of tradition and precedent; the cumulative result of many negotiated settlements. One can argue that lowering the equity ratio excessively would expose equity investors to greater risks, since debt has a superior claim on revenues, however, one can reasonably argue about the correct level for the equity ratio. Certainly, 50% is higher than “too low.”

While utilities have often argued for increasing the equity ratio, it is quite likely that shareholders will soon see value in its reduction. They will want to reduce the equity ratio in order to reduce their own exposure to the growth of gas utility stranded assets and, by supplanting their current investments in legacy gas infrastructure, to enable them to shift their capital to more long-term, sustainable investments such as GeoGrids which provide thermal service rather than gas service. Given that reducing the equity ratio serves the interests of both shareholders and ratepayers, this option should be aggressively pursued.

In any case, it must be recognized that the higher the equity ratio, the higher the burden on ratepayers. Thus, the rate making process should seek to reduce the equity ratio to the lowest level which allows the proper operation of the utility’s services.

If additional, cheaper debt capital is available, then it should be used to reduce the burden of expensive equity. The utility exists first to provide safe, reliable, fair, and reasonably priced service to ratepayers – it is only secondarily a source of profits for shareholders and it only earns its numerous risk-limiting protections from competition, its preferred access to municipal property, and other benefits when it fulfills its obligation to efficiently and effectively provide services which are in the public interest. That is the “Regulatory Compact.”

Q. What can, or should, be done to reduce the Equity-Ratio?

A. The Company’s request to increase the Equity-Ratio should be denied and the Equity-Ratio should be reduced with a target of reaching a 30% ratio before the commencement of next rate case or within three years. In order to ensure that the Company is motivated to take the actions necessary to increase leverage, a negative performance based Earning Adjustment Mechanism should be negotiated during settlement that sets waypoint targets for each rate year, penalities for failure to achieve those targets, and rewards if the targets are exceeded. If no settlement agreement is made, then the Commission should define an appproriate EAM.

It is recognized that in order to attract additional non-equity capital, actions may need to be taken to reduce the apparent risk of the Company’s debt. These could include an acceleration of depreciation which would increase positive cash flow while also reducing the long-term risk of standed asset accumulation.

5 Return on Equity

Q. How is return on equity set?

A. In every rate case, the return that the utility will be allowed to earn on its investments in assets is hotly and long debated. Utilities don't make money by marking up the cost of the commodity (electricity or gas) that they deliver and they don't make any money by marking up their operational expenses. The source of almost all their profits is the return on the equity (ROE) that they have invested in assets. During rate cases, the maximum ROE that the utility will be allowed to earn in future years is determined. That maximum ROE is just that, a maximum, it is not a guaranteed return. Actual returns may exceed the ROE limit, in which case the excess earnings might either be returned to or shared with ratepayers. If the actual ROE is below the maximum allowed, ratepayers are in no way obligated to "true up" the shareholder's returns.

Q. Are utilities' and ratepayers' interests in ROE aligned?

A. Given that profits come only from ROE, it is very much in the utilities' interest to receive the highest ROE allowance that their regulators will permit. It is also in the utilities' interest to increase, as much as possible, the value of assets whose costs have not been recovered. As a result, utilities normally press hard for a higher ROE, for greater investments in assets, and for longer asset service lives and thus slower depreciation. If they are successful, their return, their profits, and their stock price will all increase. A utility's financial incentives do not necessarily align with the interests of ratepayers.

Q. What impact does ROE have on WACC?

A. The higher is the utility's allowed ROE, and the greater the equity premium over debt's return, the higher will be the weighted average cost of capital. So, lowering the allowed ROE will lower the WACC and reduce the difference between the cost of debt and the cost of equity finance. As shown in Figure 4, anything done to reduce the WACC will reduce ratepayers' costs.

Lowering the allowed ROE seems simple enough. Assuming that the equity ratio re-

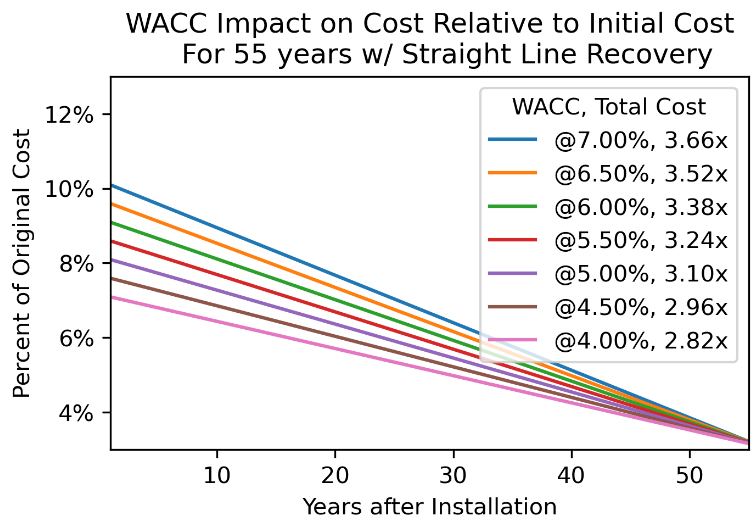

Figure 4: WACC Impact on Annual and Total Cost

mains unchanged at 50%, the Public Service Commission (PSC) can reduce the WACC by 1% for every 2% reduction in the ROE by, for instance, reducing the ROE from the proposed 10% to 8%. Lowering both the ROE and the Equity-Ratio would provide even more benefit and, by reducing the rate impact of the necessary more rapid depreciation of assets, would reduce the long-term risk or severity of a Death Spiral. However, it is reasonable to expect that such an action would be vigorously opposed by the Company.

Q. Does the utility have some legal right to a high ROE?

A. Even though reducing the ROE might greatly reduce ratepayers' burdens, utilities often point out that the US Supreme Court, in its Bluefield[10] decision, set a standard that constrains regulators' ability to limit ROE. The Court wrote:

> A public utility is entitled to such rates as will permit it to earn a return on the value of property which it employs for the convenience of the public equal to that generally being made at the same time and in the same

[10] See: Bluefield Water Works Co. v. Public Service Commission., 262 U.S. 679 (1923). See also: Federal Power Commission. v. Hope Natural Gas Co., 320 U.S. 591 (1944).

> general part of the country on investments in other business undertakings which are attended by corresponding risks and uncertainties; but it has no constitutional right to profits such as are realized or anticipated in highly profitable enterprises or speculative ventures.

Given this, utilities unerringly argue that the ROE they enjoy must, at least, equal that of other “comparable” companies. (With the understanding that the utilty’s ROE should normally be lower than the usually higher ROE earned by unregulated ventures that experience much greater risk than regulated utilities do.)

However, the very next sentence in the Supreme Court’s decision, a sentence rarely quoted by utilities in their rate filings pleading for higher ROE allowances, defines a second standard whose application will often lead to lower than “comparable” ROE. That second standard reads:

> The return should be reasonably sufficient to assure confidence in the financial soundness of the utility, and should be adequate, under efficient and economical management, to maintain and support its credit and enable it to raise the money necessary for the proper discharge of its public duties. A rate of return may be reasonable at one time and become too high or too low by changes affecting opportunities for investment, the money market, and business conditions generally.

While the utilities stress the first of these two standards for a fair rate of return, the Supreme Court actually established two standards that should be applied. The apparent conflict between these two standards was addressed as long ago as 1961 by James Bonbright on page 257 of his famous text, *Principles of Public Utility Rates*. Bonbright wrote about the *Bluefield* decision:

> Here, as in the *Hope* case, are suggested not just one standard of a fair rate

> of return but two. In the first place, the rate must be equal to that currently earned on "investments" in other equally risky business enterprises. But, in the second place, it must also suffice to maintain the credit and capital-attracting ability of the very company whose case is at bar. And the question arises what should be done in the likely event that the rate indicated by the one test is higher or lower than the rate indicated by the other. **A severely literal construction of the *Bluefield* opinion would seem to require the acceptance of whichever rate of return happens to be higher in any given case. But, this interpretation would run so contrary to common sense that it has not won acceptance.**
>
> Faced with this problem of judicial interpretation, my own preferred interpretation has been that the courts have not intended to set up two conflicting standards of reasonable utility rates. Instead, **the credit-maintenance or capital-attraction standard is primary, while the comparable-risk standard is secondary and ancillary.** (Emphasis added.)

The primary determinant of a corporation's ability to maintain its credit ratings, and thus keep borrowing expenses low, is the rate and reliability with which the company generates positive cash flow that can be used to pay loans' principal and interest. Similarly, potential equity investors are primarily focused on the the company's cash flow – not the detailed decisions, such as ROE allowances, that are part of generating that cash flow. Thus, it isn't ROE itself that determines the credit- and investment-worthiness of the company, but rather the determinant is the end result of all factors that contribute to the company's expected cash flow over time.

Actions which increase the "efficient and economical management" of a company may reduce that company's new capital requirements and perceived risk while increasing cash flow and thus allowing the company to attract both credit and capital at lower rates than otherwise – even if no other "comparable" company were so efficiently and economically operated.

To insist that a company's ROE must be equal to that of comparable companies, which may be less well run, would risk burdening the ratepayers of a well-run company with an obligation to provide unnecessarily generous returns to its investors. Such a result would be nonsensical and could not have been what the US Supreme Court intended in its opinion.

Q. Could reducing the ROE impact the Company's ability to raise new equity investments?

A. Yes. However, actions can be taken to compensate for that risk.

Attenuation of the ability to raise new equity investment could have a significant future impact on an electric utility that must anticipate the need to make substantial new capital investments in order to address the expected dramatic increases in electricity distribution capacity that will be the result of Beneficial Electrification and the many policies and programs that encourage "Electrify Everything!." But, a reduced ability to raise new equity may have less impact on a gas utility that should anticipate a reduced requirement to expand gas infrastructure investments as demand for utility gas declines. Of course, even a gas utility in decline will need to fund investments which are necessary to ensure the safety and reliability of their system's use.

Nonetheless, gas utilities' need for new gas capital should diminish in the future as their need to invest is reduced by declining demand. As a result, some reduction in ROE allowance should be achievable without unacceptably negative consequences particularly if there is a simultaneous increase in the rate of cashflow generation from depreciation. We must also expect that existing gas utilities will eventually not only be allowed, but encouraged, to focus less on gas infrastructure and more on the GeoGrids (distributed geothermal district heating) which will replace existing gas infrastructure. (Gas utilities are likely to soon learn that they should **"Pump Heat, Not Gas!,"** if only as a "business continuation" strategy.) The transition to sustainable, long-term investments in GeoGrids will require that utilities, and others who participate in that soon to be growing market, have access to substantial quantities of capital. The recycling of capital recovered through the depreciation of legacy gas infrastructure may be a good source for that capital.

Costs recovered from previous investments provide utilities with essentially fresh capital that can be reinvested to meet new needs. If the rate at which cost-recovery for previous investments generates re-investable capital is less than or equal to the rate at which new investments must be made, then a utility would not need to pull new capital from the market. However, it appears that cost-recovery doesn't normally provide sufficient capital to cover investment needs. As an example, ConEd says that cost-recovery from existing assets only funded 47% of its capital investments during 2020[11] and that, in 2019, the average ratio of depreciation to capital expense for what they consider a representative set of utilities was only 62.3%[12]. Nonetheless, it should be recognized that one important reason that ConEd's current gas cost recovery covers so little of the cost of new investments is that the Company estimates the average service life of its assets to be much longer than those of many other similar utilities. If service life expectations were reduced, as they must be in response to CLCPA requirements, the result would be more rapid cost recovery and thus more capital that can

[11] ConEd Cost of Capital Panel Testimony, page 54.
[12] ConEd Cost of Capital Panel Testimony, Exhibit YS-17

be recycled into new uses providing higher ROE, such as GeoGrids.

Q. What ROE would be set in this rate case?

A. The Company's ROE on at least its gas investments should be reduced to no more than 8%, or a premium of between 350 and 500 basis points above the cost of commonly available debt capital. Given that the Company, as a regulated business, is protected from most market forces, and is thus able to run a largely risk-free enterprise, any higher premium is unwarranted. In fact, many would argue that an even lower premium would be easily justified.

If the Company finds that the allowed ROE restricts its ability to obtain sufficient new equity capital for investment in its gas assets, it should either work to reduce the Equity Ratio or acclerate depreciation.

6 Leak Prone Pipe (LPP) Replacement

Q. Why is it appropriate to end the Leak Prone Pipe Replacement Program?

A. While replacing LPP made sense when the Company could expect that its gas infrastructure would continue to be used, at current or higher demand levels, for at least the full technically expected life of replacement pipes, the current reality is that the CLCPA, New York City Local Laws, and other laws, regulations, or policies, now make it inevitable that gas demand will decline significantly in the future. Thus, new pipe, installed to replace LPP, bears a significant risk, if not a certainty, of becoming stranded assets.

Rather than continuing to install new, long-lived, gas infrastructure, the priority of the Company should be to pursue a process of the managed decapitalization of its gas infrastructure and on preparing the additional electric infrastructure that will be required to servce customers who will abandon the use of oil, gas, and other combustibles in favor of Beneficial Electrification technologies, such as heat pumps.

Q. Won't ending LPP replacement increase risks?

A. Perhaps, but not significantly. We should remember that "leak prone pipe" is not actually "leaking" pipe. While LPP is prone to leak, many of the pipes that are now scheduled for replacement, at the cost of many 10's of billions of dollars before they are all replaced, have been in place for many decades without presenting safety problems. While slow leaks from these pipes clearly increase methane emissions, we would be better served by abandoning those pipes, without replacement, rather than investing massive amounts of money in new infrastructure that will have a short life.

Q. What should be done instead of LPP replacement?

A. The Company should focus its efforts on the replacement of pipe which is actually leaking and presenting safety or reliability dangers, rather than replacing pipe which is merely prone to leak. In pursuing this focus, they should invigorate and expand their efforts to detect and monitor leaks so that leaking pipes may be more readily and rapidly identified.

Additionally, the Company should aggressively seek Non-Pipe Alternatives (NPA) that can be employed to allow the abandonment, without replacement, of existing LPP and of any leaking pipe that may be discovered.

7 Changes to SC-1 Rate IV

Q. Why should SC-1 Rate IV be modified?

A. While it is little used, the recently adopted SC-1 Rate IV optional, demand-based, three-part rate has been proven to provide substantial rate reductions for those few residential consumers who have been adventurous enough to select it. However, it has also become apparent that the primary reason that this rate has not been adopted by more residential customers is that most of them are unfamiliar with the idea and implications of demand-based rates. Residential rates have always been volumetric in the past. Consumers are afraid that adoption of SC-1 Rate IV could result in higher electric bills, rather than lower bills.

Given that SC-1 Rate IV promises to provide more equitable rates for a growing number of residential customers as adoption of Beneficial Electrification grows, efforts should be made to adjust the rate's terms to reduce consumer's hesitancy to try this rate.

Q. What should be done to reduce consumer's hesitancy?

A. As with other optional or experimental rates which are a departure from established practice, those who select SC-1 Rate IV should be allowed a period, of at least one full year, but ideally two, during which their adoption is provisional. During the provisional period, consumers who find that the use of SC-1 Rate IV creates unacceptable bill impacts should be permitted to switch back to whatever rate they had been using earlier, or to some other SC-1 rate if they are new customers. If a consumer switches back during the provisional period, they should receive a bill credit for the difference between what they were billed under SC-1 Rate IV and what they would have been billed under their prior rate.

Q. Anything else?

A. Yes. For at least the next five years, the Company should be required to continue to provide reports on the adoption and use of SC-1 Rate IV. Those reports should, without exposing personally identified information, provide those data elements reported in response to the requirements of the last rate case. However, future reports should record the number of customers who abandon the SC-1 Rate IV, the quantity of bill credits provided, and some discussion of any reasons given by customers for their abandonment decisions.

8 Home Area Network (HAN) Access to AMI Smart Meters

Q. What do you have to say about HAN access to Smart Meters?

A. HAN Access to AMI Smart Meters must be provided.

The Commission has clearly ordered that utilities who install AMI Smart Meters must provide "customers direct, real-time access to electric meter data." and that AMI systems must "connect with a home area network (HAN)."[13] Additionally, the Company's AMI Business plan was adopted by the Commission based, in part, on the expectation that the Company would satisfy the before-mentioned minimum requirements by installing and enabling ZigBee® chips in each AMI Smart Meter.[14] It should also be noted that representatives of the Company, including its President,[15] have regu-

[13]In Appendix 1 of its 13-Feb-2009 *Order Adopting Minimum Functional Requirements for Advanced Metering Infrastructure Systems and Initiating an Inquiry into Benefit-Cost Methodologies*, the PSC established "Advanced Metering Infrastructure Minimum Functional Requirements." Those minimum requirements include, in part, the following:

(f) AMI systems must have the ability to provide customers direct, real-time access to electric meter data. The data access must be provided in an open non proprietary format.
(h) At the point where the customer or the customer's agent interfaces with the AMI system, the data exchange must be in an open, standard, non-proprietary format.
(j) AMI systems must have the ability to send signals to customer equipment to trigger demand response functions and connect with a home area network (HAN) to provide direct or customer-activated load control.
(l) AMI systems must have the following security capabilities
[Note: list of capabilities omitted for brevity]

[14]On page 34 of its March 17, 2016 *Order Approving Advanced Metering Infrastructure Business Plan Subject to Conditions*, the PSC wrote:

> "To allow the AMI meters to communicate with customers who wish to install a HAN, BAN or similar systems, a ZigBee® chip will be installed in each AMI meter."

[15]During his address to the NY-GEO Annual Conference on April 10, 2019, Timothy P. Cawley, President of Consolidated Edison Company of New York, briefly described ConEd's plans for Smart Meters. In re-

larly promised that these minimum requirement would be met. In fact, this ability has been said to be one of the most compelling reasons for rate payers to carry the substantial financial burden of installing AMI Smart Meters.

Nonetheless, the Company has, without formal authorization from the Commission, chosen to disable HAN access and has no plans to enable such access.

Q. Why has the Company disabled HAN access?

A. In responses to discovery requests in this and the previous rate case, as well as in a variety of other forms, the Company argues that it is not comfortable with the potential "security risks" that might result from providing HAN access via the equipment that they have chosen to install in customer's buildings. Thus, although numerous other utilities have found that they can provide such access to their ratepayers without significant security risks, the Company claims that its own decisions and equipment have created a situation of such significant security risk that satisfying the Commission's order, and its own committments, would not be reasonable at this time.

The Company also claims that the provision of delayed access to data, provided via their remote website or on monthly bills, is a reasonable substitute for realtime data access via home area network. They appear to argue that data which is delayed at least by hours, often 24-hours, can be described as "near realtime" and should be considered just as useful as data which is actually "realtime." (No, I'm not making this up.)

Q. Why is HAN access to Smart Meters important?

A. While there are many reasons for providing such access, I am particularly interested

sponse to an audience question, immediately following his formal presentation, Mr. Cawley expanded on his prepared statements, saying that ConEd "will allow these meters to speak to appliances through home area networks and so you'll be able to sort of have a smart home in part enabled by the data."

in ensuring that residential customers who adopt either Rider-Z or SC-1 Rate IV, and thus switch from volumetric to demand-based rates, are able to receive, in real time, the information they need in order to optimize their use of electric system capacity. The ability to monitor a home or building's aggregate demand (kW) is extremely important to any customer using demand-based rates. Such an ability would also allow the providers of devices, such as heat pumps, the ability to modify their control software so that the devices not only attempt to optimize the consumption of electricity (kWh) but also the size and timing of demand (kW) presented by such devices.

Q. Can you provide an example for how a heat pump might respond to demand data?

A. Yes. Imagine that someone in a home begins to use a hair dryer. The use of that hair dryer might increase the home's demand by 1.5kW. In theory, a heat pump or other device that was monitoring whole-house demand, as reported by the Smart Meter through the HAN, could choose to switch to a lower demand level in order to trim the hair dryer's 1.5kW demand increase to something less than 1.5kW. If appropriately timed, this shifting of the device's demand could result in significant savings for the home owner as well as a smoothing of aggregate system demand and thus a benefit for all rate payers.

Q. Do heat pumps currently exist that provide the kind of dynamic demand management that you describe above?

A. No. Nor do other other devices intended for the residential market – although energy management systems that do pay attention to "whole building" demand are becoming more common commercial buildings which often use demand-based electricity rates. This current absence of such demand-responsive equipment intended for use in homes is, of course, because demand-based rates are rarely provide to residential home owners. Thus, homeowners, and their equipment providers have never before had a financial motivation to optimize whole-house kW demand in ways that benefits the electric grid. The focus of consumer and manufacturer optimization efforts has been exclusively on providing greater efficiency through reduced kWh consumption rather than the beneficial reduction of kW demand.

With the introduction of Rider-Z and SC-1 Rate IV, which are both demand-based rates intended for home use, we can expect that the number of homes using such rates will increase in the future.

Q. Are heat pumps the only devices that might exploit realtime data on “whole-house” demand?

A. No. Any device that contains a reasonably flexible control logic, presents significant demand while operating, and is able to connected to a HAN could exploit such data. For instance, electric vehicle chargers, water heaters, clothes dryers, etc. could all reasonably adjust their operation to minimize peak whole-house demand while they operate. Also, there is no reason why we should not expect the home market to be able to exploit “Building Energy Management (BEM)” technologies in the same way that commercial buildings already do.

Q. What evidence, if any, is there that device manufacturers would use real-time data in their device control logic?

A. Over the last several years, I have engaged in numerous and detailed discussions with all major providers of geothermal heat pumps in the United States and have been assured by them that if access to realtime whole-house demand were be provided to a substantial number of customers by AMI Smart Meters, they would pursue the opportunity to provide value to those customers, and to the electric grid, by upgrading their control software to use realtime data in optimizing both kW demand as well as kWh consumption.

Q. What should be done in this rate case?

A. Many years ago, the Company was ordered by the Commission to provide realtime HAN access to Smart Meters. The Company accepted its responsibilty to do so and its officers have, from time to time, promised to do so. Additionally, the Company continues to install Smart Meters which include optional chips, at ratepayers' expense, so that HAN access can be provided. At present, none of those chips are "used and useful..."

While the Company may have, since 2013, discovered some security issue which results from their past decisions concerning which Smart Meter technology to adopt, they should now accept the responsbility to correct their earlier mistakes and provide Smart Meters which can satisfacorily provide the required capabilities, including HAN access.

While explanations for why the Company has yet to meet the Commission's requirements, and its own commitments, are informative, the Company should nonetheless be required to correct its mistakes, find a satisfactory solution, and provide the required HAN access to realtime Smart Meter data, for those customers who request it, without further delay.

9 Seasonal Rate Differentials

Q. What are “Seasonal Rate Differentials?”

A. Seasonal rate differentials quantify the seasonal differences in the use of the electric grid. For instance, today, the grid is more heavily used during the summer months, due to the widespread and growing use of air conditioning equipment. Grid use is lower during the winter when air conditioners are used less, or not at all, and space conditioning is typically provided by fossil fuel burning equipment such as oil or gas furnaces.

Q. Why do Seasonal Rate Differentials matter?

A. If the costs of grid use are to be fairly and equitably allocated, the allocation of those costs should reflect a reasonable assessment of “cost causation.” Given that the grid’s transmission and distribution costs are driven by annual peak demand, rather than consumption, it is fair and equitable to charge more for electricity during periods of high demand than during periods of low demand.

The Seasonal Rate Differentials, by providing a measure of grid use during various seasons, allows rates to be designed that more equitably reflect cost-causation. Today, that means that rates will be higher during the summer months and lower during the winter months. However, while that is reasonable today, as more and more consumers adopt Beneficial Electrification technologies while abandoning fossil fueled devices, such as furnaces, we are seeing a slow shift from a summer peak to a winter peak. The rate of this shifting is likely to accelerate significantly in future years until, eventually, it becomes as common to expect a winter peak as it is to expect a summer peak today.

Q. Will Seasonal Rate Differentials change more rapidly in the future?

A. Yes, while the general pattern of electricity usage has been relatively stable in the past (e.g. summer peaks), we can reasonably expect that the adoption of Beneficial Electrification will tend to shift the annual peak to the winter and, particularly as electric vehicles become more popular, to shift demand from the day and evening into later hours of the night. So, while it may not have been necessary to update Seasonal Rate Differentials frequently in the past, we can anticipate that the shifts that occur between future rates cases will be significant enough to justify recalculation and adjustment of the differentials.

Q. Has the Company updated its Seasonal Rate Differentials recently?

A. Yes. As ordered in the last rate case, the Company, after many years of not doing so, recalculated and updated its Seasonal Rate Differentials. It then further updated the differentials as part of this rate case. Those updated differentials have been applied to the Company's rate proposals in this rate case.

Q. What do you propose?

A. While the Company has communicated its willingness and intention to more diligently maintain up-to-date and accurate Seasonal Rate Differentials in the future, these differentials are important enough to the maintenance of fair and equitable rates that we should not rely soley on the Company's goodwill, or the memory of its employees, to ensure that we never see the kind of long delay in updating the differentials that was allowed to continue for so long. Thus, I recommend that the Commission's order in this case should explictly require that Seasonal Rate Differentials must be recalculated, adjusted, and reflected in rate proposals at least as part of every future rate case and at the time of any rate modification or creation proposal that might be made in between rate cases.

Q. Does that conclude your direct testimony in this case?

A. Yes.