To: The Public Utilities Commission
Attention: Executive Director
(<Executive.Director@puc.nh.gov>)

Reference: Docket DE 16-576 Development of New Alternative Net Metering Tariffs and/or Other Regulatory Mechanisms and Tariffs for Customer-Generators.

Net-Metering Distribution Rate and Apparent Line-Loss-Gain
A suggested Alteration in Rate Structure

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INTRODUCTION

I am a New Hampshire customer of Liberty Utilities and I have come to question the current rate structure of Liberty invoicing concerning the Net-Metering rules – specifically, the Distribution portion of the Received (by the utility) portion of the invoicing, and the need for the extra compensation that it currently provides to the utility.

This document addresses three concepts: The 29% Levy; Apparent Line-Loss-Gain; and Revenue Reduction.

For cost calculation I am using what I call the Two Rate Method described in Appendix A. The method uses one rate for selling power (Delivered), and a lower rate for buying (Received). Using the rates described in Appendix D, there is a 29% difference between the Sell and Buy rates. Since it is the Distribution rate that is different, the lower buy rate benefits just the utility. This amounts to a 75% reduction in the buy price for the utility. I refer to this benefit as the "**29% Levy**".

Apparent Line-Loss-Gain: The absence of the line-loss that is characteristic of locally generated power, being a benefit to the utility, is actually leveraged. Assuming a line loss of 5%, the apparent effect is that of a 13% line-loss benefit. I call this **Apparent Line-Loss-Gain**. This gain is an additional factor in showing that any hardship to the utility that may be occurring is not due to Net-Metering, but rather to conservation of power. This is discussed in Appendix B.

Conservation should be considered a good thing, but it creates a possible problem for the utility – loss of revenue - and, since the cause has nothing to do with Net-Metering, I think that it should be addressed separately. Appendices B and C discusses these two important aspects. I have included a section Long Term Revenue Solution to address the revenue problem.

In that section, I say that the 29% Levy currently being directed to the utility is actually a subsidy to offset the reduction in revenue. I do not think that the utility should be subsidized in order to operate. As a solution I suggest that, without changing the 29% Levy, instead of subsidizing the utility with it, the gain should be used for the public good. This good includes that of the utility, because in this system, its survival is also for the public good.

The most important aspect of this entire issue is the revenue reduction for the utility that is likely occurring and Appendix C discusses this. This seems the crux of it.

The Received Distribution Rate

Currently, the Liberty invoicing lists the Distribution rate portion of the Received power as a fixed number (0.01428). Then it uses a complex method to vary this rate dependent on the ratio of Received versus Delivered KWH. The method appears to be merely a correctional method to fix the old invoicing to fit the new one. (See Appendix A, The Liberty Method)

But digging into this I discovered another method of invoice cost calculation. I call it The Two Rate Method (Appendix A). This is the method that I think is probably described in the PUC's tariff. The Two Rate Method shows that the overall cost calculation is really very simple and reduces to just one of two rates being applied to the Netted power (**Net** defined as Delivered KWH minus Received KWH):

If the Net is negative (more PV power), the Rate is 0.10586;
If the Net is positive (Delivered is More) the Rate is 0.14871
Cost = Net x Rate

Add to this the System Benefits and Stranded costs, along with the Customer charge, and you have the final cost. The two rate numbers above were obtained by adding up the Distribution, Energy & Transmission rates for Received and Delivered, respectively. (see Appendix D) The Two Rate Method is what I use in this document.

A Levy on Buy

To arrive at the **Net** usage, the Received KWH is subtracted from the delivered KWH. The difference is the Net, and it is the Net that is used to determine the cost. That means that, except for the sysben and stranded costs that are applied to Delivered, the Delivered and Received cancel each other until one is more than the other – below this there is an even swap of Received with Delivered. I applaud this and recognize that this a vast improvement over the rate structure that was in place for a while almost two years ago.

So, the cost to the Net-Metered account is based solely on the Netted power that is metered.

When the Delivered KWH is more than the Received KWH, the Net is positive and there is no power to sell and so the Delivered rate is used.

When the Delivered is less than the Received, the Net is negative, and therefore the utility is purchasing power. A lower rate is then used (the Received rates). By paying less for the power than what it will be sold for, a levy has been placed on the generated power. Appendix D shows the rates used in my examples, and using those rates, there is a 29% difference between the Delivered and Received rates. I refer to this as the **29% Levy**.

To the seller (PV producer) 29% seems like hefty reduction. But to the utility, it's Christmas! Because only the Distribution portion of the rates is different, neither the Energy nor Transmission outfits benefit and all of the 29% buy rate reduction is funneled to the utility. As the rate difference shows, there is a 75% reduction in the Distribution buy rate, and so when the utility sells that power it makes more than the 29% implies – one kwh seems like four to the utility. (0.5713 / 0.01428 = 4.0) The 29% has been leveraged so that the utility sees four times as much power (29 x 2.6 = 75, as done in Appendix B for leveraging the Line-Loss-Gain; or just by dividing the two Distribution rates as done above.)

The Effect of Assumed Line-Loss

I recognize that the Distribution portion of the invoice covers the utility's operation, infrastructure and its maintenance. This must be financed.

The lack of line-loss inherent in a Net-Metered account offsets this cost: PV generated power gets used by an immediate neighbor and thus there is negligible line loss – yet the power is bought from the utility by that neighbor as if the line-loss existed. I gather that the average line loss for the state is around 5%. Therefore it is selling that 5% of power as power that was at no cost to the utility. (see Appendix B for explanation of "no cost")

Further, because the utility is collecting the entire rate on this non-existent loss – not just the Distribution portion - the effect is the same as collecting Distribution charges on, not 5%, but 13% of Delivered KWH of power that is free to the utility (see Appendix B). I call this "**Apparent Line-Loss-Gain**". Note that this 13% is independent of the Net and is applied to all Received power – not just Netted. This 13% apparent line loss profit to the utility seems a pretty good deal for them. And this is before any possible 29% Levy is applied. So even the "swap" is pretty good for the utility.

We're Fixing The Wrong Problem

However, I am sure that the Net-Metered local generation of power does cause hardship to utilities, and that hardship is in the form of loss of revenue. But I maintain that that loss is not due to Net-Metering, but rather to the fact that less power is being consumed – some is being made locally. (see Appendix C)

Do not misunderstand, I would be glad to pay a 29% tax on the Netted power – provided that that money went to some good public cause. Ideally that cause would relate to furthering the pursuit of non-carbon based energy, or perhaps conservation to reduce fossil fuel use.

My objection is that the levy is doing no such thing: it is instead being used to shore-up a utility company. And that utility company is crying poor to justify the need for the windfall. However, hardship to the utility comes not from Net-Metering, but from a reduction in electricity consumed – the same as would occur if everyone switched to using LED light bulbs. That should be considered a good thing. I feel it is wrong to use Net-Metering as the hardship excuse when the cause is actually that people are conserving energy. (see Appendix C for the reasoning)

Think how much worse the revenue problem would become if Net-Metered sellers were to go off-grid entirely and keep their power. Not only would all of that power become dark power, but then excess power would be dumped which is certainly headed in the wrong direction. The utility would not even benefit from their Apparent Line-Loss-Gain, making the revenue problem even worse. I say this to further point out that conservation is the problem, and including the distribution system in the solution is imperative.

Let's fix the real problem – revenue loss. Levying a 29% tax on the Netted energy and giving it to the utility is not a long term solution. Instead, it is perpetuating the problem.

A Long Term Revenue Solution

Since conservation (including PV production) causes a revenue drop, and conservation should be considered a very important goal, it would be good if an attempt to shore up the utility's revenue drop also helped with conservation.

The current method of directing the Levy to the utility indicates that the utility is increasingly unable to sustain itself financially through its fixed rates. If we are to continue to conserve, the only way that I can think of to solve the revenue problem is through rate increase – or actually, rate correction. But such an increase would seem impossible in our current political environment. The current method of correction, a 29% Levy on purchased Net-Metered power, is using a small group of people who are furthering a good long term solution, to try to solve a large problem that their goal has exposed.

Some would say that this is perfect – the ones who are responsible for the damage are paying for it. But that logic is far too simplistic and misses the overall picture: the system will soon collapse (Appendix C).

A Reverse-Subsidy is funding a Subsidy

Since the Net-Metered accounts are paying their way due to the Apparent Line-Loss-Gain, and yet the utility is still loosing ground, the 29% Levy becomes a Reverse-Subsidy to the Net-Metered producers, which is used to fund a subsidy to the utility.

It is a subsidy to the utility because the new normal is that conservation is reducing the utility's revenue, a condition which will certainly get worse. Because of conservation, under the current rates, the utility is unsustainable and thus must be subsidized to operate.   (Appendix C)

A subsidy can be used to help start something that needs help getting started.   Subsidies aren't always public, but when they are, in order to warrant this help, it is best if that help went to a societally good cause.

Or, a subsidy could be used to do the opposite - sustain an operation that is no longer profitable, or never was, but that we want to keep going without making any real changes. Some of these are considered for the public good, like mass transit, or airports. But some are not. Examples of the latter type of subsidy abound in our society - fossil fuels being both obvious and relevant. I think that the utility subsidy is such an example. Why not, as a business, allow it adequate rate collection to cover its costs?

So, I suggest that the current 29% Levy is a subsidy to the utility, and that instead of this, we should make the utility sustainable on its own. Conservation is causing the revenue to drop making the utility unprofitable, and we are nowhere near the expected level of drop yet. We need to do something constructive to meet this new normal. This means raising the utility rate – the Distribution.   (Appendix C)

The Proposal

What I am about to suggest relies on the following two points:

a) The largest hurtle to getting solar panels for most homes is that they cannot afford to pay up front (now), their electric bill for the next 9 years. In the 1930's the Rural Electrification Project helped with a similar problem, running electric lines that were in far flung places and thus costly to install.

b) Practically and financially, solar panels are like paying for a home's insulation because it is more productive than paying the home's winter fuel bill each year. It means that next year and those that follow, the fuel requirements will be less. This is a wise choice – especially if an additional goal is to reduce energy usage and keep the saved money within the state of New Hampshire, not Texas. In the same way, I suggest that we use the 29% Levy not toward shoring up a failing utility rate, but toward preparing the utility to stand on its own feet by investing in its future.

In my view, the above would mean directing an increasingly smaller portion of the 29% Levy to the utility as a subsidy, while the rest of the Levy would go toward paying for something that helps us attain a sustainable future.

I suggest that there be a fund created with the Levy that would be used to install solar panels on New Hampshire homes and businesses. At the same time, as the utility subsidy declined, the Distribution rate for all Delivered power would rise to keep the utility up to date with conditions and thus profitable. In the beginning this rise would be very small because the current installations that have power to sell is small when compared to the vast majority of accounts who do not, and so the 29% levy provides a relatively small amount. As the installations increase we will have a plan in place and be ready for them. The system as it is now is like paying for the fuel each year rather than the insulation.

How does this benefit the utility?

One interesting aspect of this idea is that if the utility retained ownership of the PV panels that the 29% Levy installed, all of the 29% would still be going to the utility - just that some of it would be in the form of assets. The utility would collect revenue from the panels in the form of assumed line-loss; The Net producers would be funding this, and it would have a positive effect on our society. It would also be helping utilities prepare for the new normal by making their rates reflect reality. Customers could elect to pay for those panels over time, thus turning the assets into cash for the utilities. Further, if customers had solar panels, perhaps they would not mind the higher rate because they needed to spend less on power. I also suspect that the rate increase required at present would be quite small. And last but not least, the utilities would be able to stand on their own without a subsidy. It still seems like Christmas.

Of course, not all homes and outfits are suitable for solar installations. And some businesses use so much power that they would have difficulty making a dent in their usage with their own PV power. But I believe that the suggestion would head us in the right direction.

While there may be better ways to offset the revenue loss, this one seems a good starting place for consideration. There may also be problems that I have not foreseen in the above plan, but I think we need to try to save the utilities and this is one suggestion.

Conclusion

Because of the **Apparent Line-Loss-Gain,** the utility is making some profit from its Net-Metered accounts. The reduction in purchase rate that is applied to power sold to the utility is being used to subsidize the utility because there is a burden on the utility in the form of reduced revenue. I suggest that the reduced purchase rate be kept in place but the proceeds be directed to a more carbon friendly cause. In the plan that I suggest, that more friendly cause benefits the utility, as well.

I also think that there needs to be a discussion on how to deal with reductions in power usage. If we are to make progress in conservation and lowering CO2 output, this reduction in revenue is sure to increase unless rates are used to keep up with it. Hiding this under the rug with a subsidy gets us no closer to a solution. And punishing producers who try to conserve is counter productive to the goal and may cause them to flee the system.

I realize that the PUC probably has no authority to collect money and allocate it to a good community cause. But they do have large sway with the legislature on matters under their regulatory control – such as electricity. I urge the PUC to use that power for the good of the public – not just for the good of the utilities.

Keeping the utilities alive and profitable is part of the PUC’s job. But it is my understanding that the PUC is in place as a regulatory agency who’s job is ultimately for the good of the public. Otherwise why would they exist at all? Just let the utilities run rampant. Instead, as I see it, their job should be to insure that both the public and the utility are treated in beneficial manners.

One more thing: One of the problems I am trying to address, the 29% levy, applies only to Net-Metered accounts when the utility is purchasing power (the Net is negative). This means that families with smaller arrays will likely never hit this threshold - they will never have any Net power to be purchased. It also likely means two other things: 1) That maybe the account is trying to achieve “Net Zero” so that they are not contributing to CO2 accumulation; 2) That they are wealthy enough to be able to set their priorities to do so.

This is a unique group of people and they are better positioned to pay a tax on the excess power they make. And I think that their resistance to doing so would be much less if they thought that the tax were going toward furthering their own goal of reducing CO2. As it is now, you have people like me who are annouyed, and pay that levy begrudgingly. Maybe I am naive, but it is my hope that explaining the issue honestly would bring resistors along with you. Honesty may not seem in fashion these days, but I still believe it can be very effective.

Thank you for considering this matter.

Sincerely,
Rees Acheson

Appendix A: Cost Calculation Methods

I know of three methods for calculating the final costs in a Liberty Utilities invoice:

1) **The liberty method**, which I also call the MiscChrg Method, because it calculates a MiscCharge adjustment figure that is applied as a correction to the costs obtained by using their published rates. The entire Delivered and Received KWH are considered, not just the Net. In effect, this method ends up varying the Received Distribution rate, which is the utility's portion of the rates. This rate variation only occurs if the Received is greater than the Delivered.

2) **The Two Rate Method**, which just applies either the Delivered or Received rates to the Netted KWH, depending on whether it is a buy or a sell. This method appears to be the most direct of the three methods, and I think is the method that the PUC intended be used.

3) **The Ratio Method,** which uses the ratio between Received and Delivered KWH to calculate the Received Distribution Rate. This is basically how The Liberty Method works, but it leaves out the confusion. I will not describe this method because it is irrelevant to the discussion of this letter.

The last two I devised in order to better understand the rate structure. All three produce the same results. The Two Rate Method is the one I am using in this document.

The Liberty Method:

I obtained this method from Dennis Gray at Liberty Utilities after I had requested clarification about their invoicing. It is a very convoluted method that is difficult to follow. Mr. Gray seemed to imply in his letter that this method was kludge to fix their invoicing.

First calculate the cost of both Delivered and Received kwh using the published rates.
Add these costs together. (Received being negative)
(Received is power received by the utility.)

The adjustment MiscChrg:
Then Net the kwh of Delivered and Received and multiply by the Received Dist rate.
Add this Adjustment to the added cost. This will be the Misc Charge credit that is subtracted from the previously calculated Amount Due.

There is also a requirement that the MiscChrg correction can never be greater than the Delivered Distribution Rate would have produced.

I had assumed that all New Hampshire utilities use the same rate structure that Liberty does. But I came to the realize that the Liberty Method led me into the pucker-brush and that the Two Rate Method (see below) is what matters. The Two Rate Method is how I now think the rate tariff is supposed to work.

The Two Rate Method:

The Two Rate Method merely applies one of the two published rates to the Netted KWH, and then adds to that the systems benefits, Stranded and Customer Charges. This is the method I have used in this document, and I suspect what the PUC intended. Starting with the Liberty Method, it took me an embarrassingly long time to see this Method.

Add up the two sets of rates (Distribution, Energy, Transmission):

```
DeliveredRate = 0.05713 + 0.06426 + 0.02732 = 0.14871
ReceivedRate  = 0.01428 + 0.06426 + 0.02732 = 0.10586
```

Find the Net:

```
Net = DeliveredKwh – ReceivedKwh
```

If Net is positive, then multiply Net by the rates for Delivered (0.14871);
If negative, use rates for Received (0.10586).

Add to this the SysBen & Stranded rates (0.00678) times Delivered.

So,

```
if (delv >= Recv)
  cost = (net * 0.14871) + (Delv * 0.00678) + CustChrg
else
  cost = (net * 0.10586) + (Delv * 0.00678) + CustChrg
```

Mr. Gray’s letter implied this method, but I missed it until much later. It is too bad that I didn’t realize at the time as it would have saved my a great deal of time.

Appendix B: Apparent Line-Loss-Gain

All electric power distribution involves losses – resistance, power factor, etc. These line losses are accounted for when the utility sets its rates – some of the power produced never reaches a customer and this lost power is paid for by assuming the loss and building that loss into the rate.

In the context of this discussion, **Line-Loss-Gain** is power assumed to have been lost in distribution (and billed for through the factored in rate) but, in actuality, the power was not lost - it was produced next-door and so all of it was used and metered as sold. Though the utility needed to pay the local producer for that power, it had already been compensated for it due to assumed line-loss.

The effect is that the power was sold but that it had been at **no cost** to the utility. The Line-Loss assumption becomes a bonus to the utility for any power that comes from a locally produced source such as a PV array. This fact should be considered a benefit to the utility.

But the benefit gets leveraged.

Apparent Line-Loss-Gain is what the above **Line-Loss-Gain** looks like to the utility. The assumed-loss charge to the customer is used to pay the Energy, Transmission and the Distribution fees for the "lost" power. But when the power actually existed, the utility did not get invoiced from the power plant or the transmission outfits because the power was not metered as coming from either. So there is no need, or even the mechanism, to compensate these outfits. So all three charges are kept by the utility, thus amplifying the assumed loss. This is a case of leveraging, where the funds for all three are funneled to the utility.

The effect is an amplification of the Line-Loss-Gain to the utility because the utility normally gets to keep only the Distribution portion. **Apparent Line-Loss-Gain** is the multiplication of the Line-Loss-Gain by 2.6.   For example, if line-loss were 5% then the **Apparent Line-Loss-Gain** would be 13%. (5% x 2.603 = 13%, see below for a 2.6 explanation) Therefore this lossless power is worth 2.6 times more to the utility than just the KWH would suggest.

All PV power that the utility knows about (that which enters the grid) is included in this lack of Line-Loss argument – even power that the generator of the PV power later draws back to use as Delivered power. Once again, this includes all Received power – not just Netted power. So any local power that enters the grid becomes a 13% bonus to the utility.   I argue that 13% is a good return in the power business. Given a 0.05713 Distribution rate, that amounts to an extra 0.0074 on all the Received power - swapped or not (0.05713 x 13%).

Calculating Apparent Line-Loss-Gain:

Add up the Delivered rate:

```
               Dist     Energy  Transmission   Rate
Delivered:   0.05713  + 0.06426  + 0.02732  = 0.14871
```

Find proportion of Distribution in the Rate:

```
  0.05713 / 0.14871 = 0.38417    (38.4%)
or,
  0.14871 / 0.05713 = 2.603
```

Find Apparent Line-Loss-Gain for a five percent loss:

```
  5% x  2.603  = 13.02%
```

Appendix C: PV Arrays Reduce Revenue

The hardship that a Net-Metered account imposes on a utility is loss of revenue. That loss is because the requirements for power from the utility for that account have diminished – a portion of the their demand is being met by PV generation, and so their apparent usage has dropped. Switching from using electric heat to a heat pump would produce a similar effect. But, being at least twice as efficient, such would obviously be a good switch to make.

But this a thorny problem: The Net-Metered account is using the utility to distribute its excess power and thus its equipment and services. Distributing that power uses a trivial portion of the system – just the lines to the neighbor, and so can be ignored. But the account still needs to use the utility to satisfy its supplementary power requirement, which could be considerable at times – perhaps the same as any other customer. Because the overall power requirement from the utility is reduced, its revenue drops, making it more difficult for the utility to maintain its ability to distribute peak power and remain profitable.

This means that while it is not Net-Metering itself that is at fault, power is being produced locally, and is therefore reducing demand through the utility from power plants and transmission lines: the PV arrays are contributing to the revenue problem.

The reason this is thorny is that the utility must maintain a system that has the capacity to deliver peak power needs – there are periods of very high demand such as hot summer afternoons. Maintaining such a system is expensive, and this expense would be the same with or without Net-Metered additions of power. The expense is not in the delivery of power, but of creating and maintaining the system that does.[1] Creating local power reduces revenue, but it does not affect the cost of operation. For a such a business, usually rates are used to cover costs. But in this case, the rates are fixed.

The utility revenue drops; Yet their peak load requirement remains the same; And Net-Metering (one cause of the drop) is paying their share. There's the thorn.

That last part, that Net-Metering is paying their share, is not a sure thing, but it is my argument. Given the trivial use of resources required by a Net-Metered account, I think a 13% gain is pretty impressive.

If it were not for the fact that PV production is actually a form of conservation and therefore desirable, I might say that the Net-Metering scheme as it is now was a reasonable way of filling the utility's revenue hole. That is, only if they were unable to raise the rate in order to make themselves a sustainable outfit on their own.   Instead, the 29% Levy is the subsidy that keeps them going.

1 Logically, invoicing for such a a system would be based not on watt-hours, but on watts. Because it is the peak that determines the required capacity of the system, it is each account's contribution to that peak at each moment that actually matters. In fact, in theory all moments that are not at near peak hours could be ignored. It is the demand that drives up the capacity requirement that counts. Off-Peak and Peak rates work toward this principle.

I said “might”. More important is that as local power generation increases, this subsidy will shortly become unsustainable, itself. The Levy will need to become so large that sellers will likely begin to revolt and perhaps go off-line. Twenty-nine percent is already pretty discouraging. Because the source of the subsidy is skewed to such a a small subset of the total customer base, the defections could easily cause the entire scheme to collapse in a hurry. No, if the utility is being subsidized by this Levy, the rate must rise.

PV production is not only a good thing, whether we like it or not, it is coming like a freight train. It is now cheaper than Northeast grid power, one just has to pay their electric bill up front to get it. This revenue problem, not only due to solar but other conservation efforts as well, is going to get a lot worse and I think it would be a good idea if the distribution system was part of the solution, not part of the problem.

Appendix D: Rates Used in Examples

The following rates are from my Liberty Utilities invoice dated May 28, 2021.

```
[rees@hawk18 C]$ MeterRead --stop 21-5-1 --viewrates
Stopped reading data file at 05/05/21: 20482, 22659

Example calcs are based on rates:
               Dist      Energy  Transmission
Delivered:   0.05713    0.06426    0.02732  =  0.14871
Received :  -0.01428   -0.06426   -0.02732  = -0.10586
Sys Ben  :   0.00678
Stranded :  -0.00072
  (SysBen + Stranded =  0.00606)

Delv Distribution portion of rate:
   0.05713 /  0.14871 =  0.3842  (38.4%)
```