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UNPACKING AND REBUTTING THE UTILITY EMBEDDED COSTS FALLACY

Following the National Grid proposal to charge an access fee on distributed generation in Rhode Island (recently withdrawn), I was asked to explain the situation. Specifically, I was asked:

Isn't National Grid's argument that as customers change over from using power to generating power, they will pay less of the charges that support system costs? … If there are a thousand customers, and we charge X/1000 for some cost X, then when one of the customers goes away, everyone will pay X/999, won't they? That is, they charge rates that recover the entire cost of the system, but those rates only recover the entire cost if no one is allowed to opt out. Right?

Here is my brief answer:

Yes! Monopoly distribution utilities have proposed charges and other mechanisms to collect those system costs as they planned, and want to reduce any credits earned by customer generators in order to make it less economic for customers to become customer generators.

I also thought the situation deserves a more detailed and comprehensive response:

Essentially, the utility wants guaranteed revenues regardless of variation in use. In particular, they want to charge customers who use less than average and to give discounts to customers who use more than average. They want this because they hope it will remove the financial reward that customers realize by reducing their use and remove the cost penalty they would otherwise face by using more energy. In this way, they hope, customers will stop using less energy, they will increase demand on the system, the utility will have to increase system investments, and the utility will make more profits on a large rate base of invested capital.

Note that the utility argument for charges on customers who reduce their use through distributed generation is the same argument as the utility argument for increased fixed charges—only focused as a punitive measure on customer generators. A grid "Access Charge" is nothing more than a post-hoc fixed charge imposed on customers who invest in the capability to systematically reduce their volumetric charges.

In the past, when they were increasing sales by 4–6% per year, utilities were more willing to tolerate and even support small amounts of efficiency and distributed generation. But sales have

flattened across the industry in recent years; the utilities promised high revenues to their shareholders, and lately they have been reporting that revenues are not meeting forecasts. ("Dear Shareholders: We thought we would have 1000 units of sales to cover 1000 units of costs – but customers have been taking things into their own hands. Don't worry, we have a plan! Our plan is to make saving energy or generating it yourself less rewarding for customers – the sector is small now, this is the ideal time to stop it before it gets too big.")

If customers keep finding ways to use less utility-delivered energy to get the same quality of life or the same business output, the utility will have to deploy less infrastructure, what is deployed will last longer, and the utility infrastructure capital investment engine will slow and stall. For the US economy as a whole, we we are now experiencing economic (GDP) growth independent of growth in electricity sales—we call this an improvement in energy intensity. What's good for the economy is not necessarily good for the old-fashioned electric utility operating under antiquated business model. The utility of the future will profit and prosper from enabling and supporting growth of markets for distributed energy services and technologies, rather than fight a losing battle to maintain a monopolistic through-put business based on overbuilt utility infrastructure.

The utility argument is a classic false "slippery slope" argument. First, note that for the utility the significance of "economic defection"—a customer using less than the class average of electricity—is reduced sales. And the slippery slope is: "Maybe reducing sales to 999 (or 999 customers' worth of sales) is no big deal today, but if sales go down a lot more, there will be few and fewer customer and sales over which to spread the $1000 in costs."

The utilities have really poisoned the discussion by acting as if all fixed costs are sunk – that is, that they are "embedded" fixed costs. They act as if, and often baldly assert that "once the transformer is installed," there is nothing you can do to reduce that cost. True if you limit your perspective to sunk costs, but transformer costs in rates also reflect the useful life of the transformer—life which is specifically and objectively extended with reduced use. That is, costs classified as fixed are often variable over the long term and over variable levels of use. Indeed, the utility cost (ignoring loss of sales they hoped they would make) of reducing sales through efficiency and distributed generation is much less than the marginal cost of infrastructure replacement—making demand side resources the best bargain available. They are just not as profitable for the utilities under the ratemaking formula (see below). Acting as if efficiency and distributed generation will not reduce system costs over time (which utilities do, repeatedly) is economically and technically false. As free-market capitalists, we have to reject a false simplifying assumption that changes in consumption have no impact on the costs of production, don't we?

In a terribly cynical twist, utilities often also argue that since poor people don't have access to energy efficiency or distributed generation, they will, by definition be the ones left to pay for all that $1000 in costs. There is so much wrong with this that it boggles the mind. Using the poor as a

human shield in an effort to preserve revenues in a failed business model that couples profitability with volumetric sales is, well, cynical.

What is most false is the assumption that as sales goes down, costs will not go down. The utilities that seek to thwart distributed energy resources market growth want you to believe that the $1000 in costs can never go down and may even be growing. It is an argument that "we bought you a pole – you can't stop paying until you finish paying for it—and, by the way, I was planning to buy you a new heavy duty stormproof pole, and you have to pay for that, too." It is an argument for them to spend anything they want on poles, to ignore societal improvements in energy intensity, trends toward efficiency; to maintain sole control over the direction of energy flows, and the quantity of charges. It is a monopolist argument for unimpeded extraction of rents.

At the root of these issues is the ratemaking formula. The ratemaking formula is:

(Operating Expenses + (Capital Investment, net of depreciation * (1 + rate of return)) / forecast sales = Rate

This formula is essentially repeated for each rate class. There is a lot of cost allocation and functionalization that determines just how much capital and expenses are assigned to each rate class. There is a lot of subjectivity in those tasks, but the notion under cost of service regulation is that we assign to each class the costs to serve that class. This would be an easy process if every asset and every expense could be simply allocated to a specific homogeneous class of customers – a socialist utopia in which every residential customer was like every other customer. But its not. One pole can serve several customers with varying usage patterns and even serve several different kinds of customers.

It is therefore important to realize that it is not simply that they "bought you a pole, some cable, etc." The fact that they use average rates to recover those investments does not and never has meant that the utility can charge you until the system is paid for. (In fact, the stock of poles and transformers and conduit and other stuff is constantly wearing out, being replaced, etc.)

The number of customers does not appear in the formula at all. "There is no average customer or any utility right to average revenues from each and every customer. Average consumption" is an artificial construct of the utilities in order to anchor rates that might, or might not, approximate the usage of any particular individual in the class—it is just dividing the number of units of consumption/sales by the number of customers. In fact, rate classes are typically designed not according to volume of use (energy), but according to level of demand (capacity). That is, rates classes are typically divided not by how much you use as much as by the maximum amount of use you will have at any one time. Think: First by size of the pipe, and second by amount of flow.

Demand vs. energy. For customer classes with large demand for capacity (think large commercial and industrial), we have "demand charges" that help ensure that the utility efficiently recovers large fixed costs. These "demand" charges add a complication to electric service that residential customers would find difficult to understand. Moreover, large customers have the tools and knowledge to manage their demand charges—spreading out consumption evenly or shifting it to low-cost periods. Residential

customers don't today enjoy the same flexibility and tools today. The determinants of their demand, and hence the drivers of the fixed costs to serve them, are largely driven by the nature of their home and large appliances—durable investments that cannot be changed easily.

Fortunately, there is a high correlation of demand for capacity and volume of use in the residential sector. McMansions require bigger circuits because they have more water heaters and air conditioner tons and gadgets than small apartments. That means that energy efficiency and distributed generation saves not just on variable costs, but also on capacity costs. In utility speak, volumetric (per kilowatt hour) rates send the best price signal for both demand and energy costs to residential customers. Fixed charges and capacity–denominated access charges on distributed generation frustrate those price signals, encourage excess consumption, and create economic waste.

It is important to note that utilities fighting to frustrate growth of distributed generation and distributed energy resource markets refuse to acknowledge the significant contributions that distributed resources make in reducing system investment costs. Arguments that distributed generation must be fully backed up with a system designed as if the customer generators don't exist serves two purposes—it justifies continued growth of unnecessary capital investments to support profits, and simultaneously undercuts the economic and operational value of resources that private customer investments bring to the grid. The "full back up" argument is factually and technically wrong on purpose.

Indeed, there is general consensus that the preferred path to addressing peak costs is peak pricing—rates that vary according to the demand costs at various times of the day (or that increases the credit for reduced consumption during peak periods). And especially note that imposing charges on customers who reduce their use will frustrate this important price signal effect. Of course, that is the point—to reduce the incentive for efficient use, to increase sales, and to make more capital investments!

With the inherent diversity of any 1000 customers, note that not all of them contribute an equal 1000th share to most kinds of costs and certainly not to all costs. Therefore, none deserves or should be expected to pay a 1000th share in a rate or the revenue requirement (the top part of the formula before dividing by forecast sales). We have always known and appreciated this. Since cost generally increases with use—especially with the capacity demanded, we can accept average rates that are heavily volumetric (meaning costs are averaged across all units of use, even if each unit of use has a distinct and unique cost) as being a pretty good way of ensuring that costs are roughly allocated to cost causers—a core principle of ratemaking.

Last century's utilities want to recover most of their costs from you with fixed charges, to reduce your incentive to conserve and become efficient. They want to do exactly the opposite of allocation according to cost causation. A residential bill that varies primarily by use is actually the best way to reflect cost of service ratemaking.

For all these reasons and more, we have never used downward deviation from the

average as a justification for imposition of a charge on a particular customer – this is a new "solution" proposed by utilities only since the advent of customer owned distributed generation.

(Note that so-called revenue decoupling designed to recover lost profits due to mandated energy efficiency imposes class-wide charges for reductions in sales. A whole other discussion. Perhaps not surprisingly, some utilities have argued for fixed charges and access charges as an extension of the decoupling mechanism. In Massachusetts, National Grid asserts that profits it loses due to distributed generation operate as a cost of net metering!)

Here are some utility arguments for the charges they want to impose, and some responses:

Utility Argument 1: Customers who reduce use below average are "avoiding paying their fair share" for the grid.

This is the argument that a "fair share" is equal to the average revenues collected from the hypothetical average customer. This total socialist garbage—there is nothing and certainly no principle of capitalist or free market economics, regulation, or ratemaking that equates "fair share" with "average."

If there are $1000 in total costs, and a forecast of 1000 units of sales, and 100 customers, we know that the average customer will have a $10 bill based on using an average of 10 units because that is what you get when you divide 1000 by 100. But you could get that same average $10 monthly bill with an infinite number of different distributions of use. (50 customers at 8 units, 50 at 12; etc.) In fact, customers are probably more diverse than "average," especially at a granular level.

The concept of the average customer is surely not and never has been a basis for rate collection except under the very narrow category of customer charges. Customer charges are properly reserved for those costs that vary ONLY with the number of customers served. In general, and to advance economic efficiency and send meaningful price signals to residential customers and to the utility, if the utility expects the average customer to use 10 units, and that customer uses 11, they get charged for 11. If they use 9, they pay for 9. Again, this is because cost of service studies show that high users generally create higher costs (and lower users create lower costs). Only for costs that ONLY vary by number of customers (a fraction of the meter cost, the last few feet of wire, a fraction of billing and collection, etc.) does good ratemaking impose a per-customer charge.

Utility Argument 2: Fixed costs are an increasing fraction of utility costs in a world of flat or declining sales. Therefore, more of revenues should be recovered through fixed charges. And since more fixed costs should be recovered through fixed charges, customers who reduce costs by reducing volumetric use are avoiding fixed costs and should be assessed fixed charges.

This is a wrong for several reasons.

First, there is also a legal policy argument about why customers should only be charged for use—and especially not for "not using." It has to do with the fact that since society grants market power in the form of a monopoly to the utility, service must be according to tariffs. Tariffs are a special form of contract that is binding on the supplier solely by virtue of "acceptance" by a qualified buyer through use of the service. Customers who take service under a tariff ONLY pay for what they use—to do otherwise would allow the monopoly to exploit their market power—extract "rents." Tariffed, pay-only-for-what-you-use rates, are the regulatory mechanism to prevent abuse of market power by the monopoly. If the electric utility wants to collect a "cover charge," then they should surrender their monopoly.

Second, there is absolutely no principle of economics that says the form of the cost (as either fixed or variable) should be symmetrically reflected in the design of the charge that is used to recover that cost. There is an appealing and totally false symmetry to the notion that fixed costs should be recovered through fixed charges (or through access charges imposed to collect lost revenues due to customers reducing their volumetric consumption). I am really ashamed when I hear regulators and policy makers repeating this. There are plenty of high fixed cost businesses that recover those costs through volumetric charges. Competition tends to reject fixed charge pricing, and only regulators who seek to immunize utilities from competitive forces will allow them to extract rents through fixed charges. And this violates the fundamental duty of regulators (and regulatory policy)—to act as a substitute for the competition that the utility would face if they weren't granted a monopoly.

Indeed, if a customer who uses 9 units gets charged for 10 units no matter what they use, and a customer who uses 11 units only pays for 10—all because that is what the average customer would have used, then the customers get an economically inefficient price signal. And because most costs vary with use (over the long run, all costs are variable), charges based on deviation from the average use are spherically perverse – they make no sense no matter which way you look at them.

Utility Argument 3: We should recover our costs regardless of variations in actual sales.

Actually, no. It would be bad policy and a poor substitute for the forces of competition to insulate a utility from the consequences of poor forecasting except under the most extreme of situations.

So what if the forecast was wrong—they thought they would sell 1000 units, but they only sold 999. First, volatility in electricity sales is a given in life—the major drivers of consumption are weather and general economic conditions. It is weak to suggest that electric utilities are special in this regard because they have a high fraction of fixed costs. So does Starbucks, the airline industry, hotels, etc. The first important question is whether the reduction in sales persists between rate cases, over several years, and is not offset by unexpected increases in sales. If the deficit persists, then we ask the second question. Was the prediction of sales – the forecast – reasonable? When setting rates, utilities tend to over-forecast sales because it increases the denominator and reduces the rate. Lower per-unit rates increase consumption, at least over the long term. This is another reason why shifting revenue recovery to fixed charges is a bad idea.

Over-forecasting sales will become common if regulators and policy makers rush to the utility's

rescue when sales fail to meet forecast. There are additional issues associated with creating incentives to increase sales between rate cases – but I won't get into that now.

So, should the regulators/legislators rescue the utility when sales are below a reasonable forecast? Start by remembering that forecasts are set in the rate case—before the sales actually occur. The utility has full due process rights to present the best evidence of a forecast in a rate case. Respect for the regulatory process tells us that both customers and utilities should get the benefit of the adjudication process. Second, if the reduced sales are truly beyond reasonable forecast and would be sufficiently significant to impair the financial integrity of the utility, there might be a case for an adjustment. There are several less-drastic remedies for such problems, however, that class-wide fixed charges or discriminatory charges on distributed generators who provide value to all customers that exceeds retail rates (as demonstrated in value of solar studies).

The right to "recover" investments derives from the property clause of the U.S. Constitution—utility shareholders who commit their assets to public service are entitled to a reasonable opportunity to earn a reasonable rate of return on their investments, and the utility is entitled to recover their prudent and reasonable expenses incurred in providing service. Are they therefore guaranteed the right to recover the lost dollar of revenue?

There is no guarantee. And the extent to which a guarantee is provided sends a bad signal to the utility. We can expect that if we do provide a guarantee (especially since only capital investments earn a return), utilities will seek to increase their investments in order to increase profits. If there is no risk that they will not recover those investments, they will have a strong incentive to over-build.

Note also that the rate of return is set at a premium above the cost of capital in rate cases in order to attract capital and fairly compensate investors for risk. If we eliminate the risk, they should receive no premium above the costs of capital, or at least a reduction in their rate of return (rate of profit). I doubt that utility shareholders would be pleased with that outcome.

And guaranteeing revenues and profits is no way to regulate a monopoly. Back to our example – if the utility knows or reasonably should know that sales will only be 999 units (or that the deviation from forecast is ordinary and not extraordinary), then we have 3 choices if we want them to recover $1 per unit of consumption: (1) let them try to increase sales, (2) let them charge someone for not buying the 1000th unit, or (3) let them figure out how to reduce costs to $999. Option 1 creates an upward spiral of costs that will result in gold-plating and overbuilding. Option 2 does the same and sends the signal to customers that no matter what they do to increase efficiency, they are going to get charged – so why bother? Option 3 allows customers to benefit by reducing use, encourages the utility to control costs, and leaves more disposable income in the community. Note that while gross profits might go down, company profitability is exactly the same under all 3. Peter Kind has written a great paper for CERES that addresses this.

When should the utility get to charge someone for that lost sale?

I could support the argument that the utility "has to get the $1 somewhere, and it should be from

the customer who reduces their use" only under the following conditions:

(1) The utility demonstrates that the customer who uses only 9 units actually and specifically caused 10 units of cost—this is why value analysis is so important.

(2) The discrepancy between sales and forecast is not going to work out in the wash over several years.

(3) There no other less socially valuable "subsidies" anywhere else—like "economic development" discount rates for increasing electricity load, and interruptible rate discounts for customers whose service is seldom interrupted.

(4) The utility is optimally efficient in incurring costs—and there is no cost-effective opportunity for reducing total costs from $1000 to $999.

(5) The loss of the $1 in revenue has absolutely no hope of signaling to the utility that they ought to pursue long term cost reductions.

(6) The loss of the $1 is actually material and creates a risk of a threat to financial integrity. And again, a charge to the customer who reduced use is the last, best way to find the $1.

(7) All customers are exactly the same.

(8) We want to completely socialize all costs incurred by the monopoly as a matter of policy and regardless of whether those costs are prudent and efficient.

If all these things are true, then we should talk about fixed charge increases and access charges on distributed generators. Otherwise, the utilities seeking to charge distributed generation customers are just seeking what economists call monopoly rents.