Net Metering FAQ

Rate Design and Subsidies

Dr. Ahmad Faruqui – The Brattle Group,
with PUF's Steve Mitnick

A vigorous debate continues over net energy metering, NEM, in frontline states such as Arizona, California, Hawaii, Idaho, Kansas, Massachusetts, Michigan, New York, and Nevada. The debate is being watched with great interest in other states.

The NEM debate is unlike any other conversations in the regulatory arena. It transcends the regulatory boundaries in more ways than one. It embodies a full-throttled argument under oath between divergent experts who are cross-examined by the opposing attorneys.

The typical NEM battle is a set-piece encounter in the commission hearing room. It often gets played out in the public arena. The debate often spills over to the press, to the legislatures – they can pass laws providing rebates to customers who install photovoltaic panels, PVs, and sometimes involves the governor, as happened in Nevada. Ultimately, the issue also involves the U.S. Congress, and it was a topic of conversation in the last presidential election during the Democratic primaries.

To succinctly summarize the policy issues being debated in rate cases and conferences across the country from one perspective, we reached out to a frequent contributor to PUF, Dr. Ahmad Faruqui. He's an economist with The Brattle Group, based in San Francisco, who has testified on NEM rate cases in Arizona, Nevada, Kansas and Idaho, and on residential rate cases generally in several states.

Dr. Faruqui – and we at PUF – fully appreciate that readers of this magazine have a broad range of different opinions on this very controversial topic. He wanted us to note that his views, expressed in this interview, are entirely his own, and are not necessarily those of his clients or his employer.

PUF's Steve Mitnick: What is NEM?

Dr. Ahmad Faruqui: The kernel of NEM is remarkably simple. When a customer installs PVs on his or her roof, the customer is given a credit for power supplied from the PV panels to the electric utility at the same retail rate at which the customer bought power from the utility. Of course, the retail rate covers not only the price of energy but also the cost of delivering it via the grid and the cost of other public purpose programs.

PUF: When was NEM instituted?

Dr. Ahmad Faruqui: NEM was instituted in the 1980s to jump-start what was then an infant industry with high costs. State commissions wanted to promote customer-owned solar power generation as a means of achieving state goals such as renewable portfolio standards.

It is unlikely that anyone expected NEM to last for four decades. To ensure that it did not overwhelm other policy goals, in many states it was stated that once NEM-generated energy reached a "cap," expressed as megawatts of capacity or as a percent of peak demand, it would end. However, in some states, as the cap was reached, the legislatures simply extended it.

To further boost the adoption of PV technologies, the United States Congress passed an income-tax credit on solar investments of thirty percent in 2005 through the Energy Policy Act. Some states and cities also supplement the federal-tax credit with state-tax credits and rebates.

PUF: Does NEM create a subsidy in your view?

Dr. Ahmad Faruqui: Yes. NEM creates a subsidy from non-solar customers to solar customers. For example, if a customer's solar generation equals the customer's consumption over the relevant time frame – month or year, under volumetric rates the solar customer will not pay anything to the utility.

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But the customer remains connected to the grid, using it as a free battery, supplying power to the grid at times and being credited for it at the retail rate and buying it back at other times at the retail rate.

The problem arises from the structure of current residential rates and from the structure of the compensation mechanism. First, residential rates are mostly if not entirely volumetric in nature, being expressed in cents per kilowatt-hour.

That rate design is the crux of the problem. It does not reflect the cost structure of delivering electricity, which is only partly volumetric. The cost structure also includes fixed monthly costs for billing, metering, and customer care and demand costs for the use of capacity line transformers, circuits, feeders and substations.

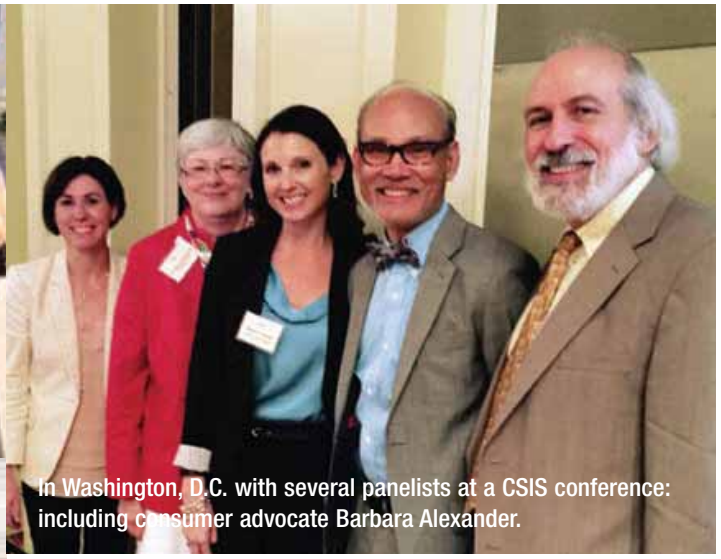
In California there are no fixed charges in the rates, and the volumetric rates also include the cost of public-purpose programs, such as energy efficiency and low-income discounts. Second, the compensation for supplying power to the grid is set at the full retail rate, whereas the actual benefit is much lower, being equal to just the avoided cost of energy.

PUF: What's an analogy to NEM from another industry?

Dr. Ahmad Faruqui: The problem was summed up for me by

With Mike Martinez and Russ Garwick at SCE at their headquarters complex in Rosemead.

At the CPUC with a visiting delegation from Malayasia; (second row left) Stephen St. Marie of the CPUC.



In Washington, D.C. with several panelists at a CSIS conference: including consumer advocate Barbara Alexander.

a commissioner on the sidelines of a NARUC meeting. He said imagine that a man comes to a restaurant but does not order food. He just sits at the table and begins eating the food that he has brought from elsewhere. He shares the silverware, the napkins, the space on the table and the water. But he does not want to receive a bill from the restaurant when he is done.

He does this every day for a week. Would that be fair to the other customers who are paying for the silverware, the napkins, the space on the table, the water, the staff and the rent for the building?

A week later he steps up the game. He brings food for himself and some additional food, which he begins selling to other customers in the restaurant. It is priced below the food being sold by the restaurant and the other customers begin buying it from him and not ordering anything from the restaurant.

PUF: The distributed solar industry doesn't accept this argument I imagine?

Dr. Ahmad Faruqui: No. They contend that the electricity from distributed rooftop solar panels is more valuable than the alternatives, so the subsidy runs in the other direction. They argue that the PV customer is consuming his or her own power and does not incur the line losses associated with central-station power being transmitted through the grid. The customer also reduces emissions and helps clean the air.

PUF: Walk us through how PV customers interact with the grid.

Dr. Ahmad Faruqui: PV customers buy energy from the grid and sell energy to the grid. They engage in a two-way transaction, since they are prosumers. While results vary across utilities and depend on many factors such as the size of the PV installation, the orientation of the roof, and climate, it is reasonable to think that on the average, PV customers will drop their consumption by about half, but their peak demand will go down by substantially less. Thus, their load factor will drop substantially, making them much more expensive to serve than other customers.

The customer remains connected to the grid, using it as a free battery, supplying power to the grid at times and being credited for it at the retail rate and buying it back at other times at the retail rate.

PUF: The distributed solar industry wants NEM and the current rate design to continue?

Dr. Ahmad Faruqui: Yes, that is my understanding. The industry provides a number of reasons why NEM and the current rate design should continue. It argues that the number of solar customers is small, and the subsidy is not large enough to warrant concern.

It also says that NEM subsidies are not unique to solar since all rate designs embody one or more subsidies. For example, the residential class is often subsided by the commercial class and sometimes the industrial class is subsidized by other customer classes.

They state that subsidies also exist within the residential class, where rural customers are often subsidized by urban customers and low-income customers are often subsidized by non-low-income customers.

PUF: In your opinion, has the time come to start winding down these NEM subsidies?

Dr. Ahmad Faruqui: Yes, NEM has achieved its objective. It has jump-started an infant industry. With every passing year, the magnitude of the subsidy rises as more customers install PV technology, driven by declining PV costs. The PV industry is no longer an infant industry and it does not need to get a subsidy, either through NEM or through the income-tax credit. The latter will begin to be phased out in 2020.


At the Kansas PUC.

In Bangkok with Neil Lessem of Brattle and others.

PUF: What is your most fundamental issue with NEM?

Dr. Ahmad Faruqui: Under NEM, the utility is being forced to credit energy from PV customers at full retail rates, which clearly exceed the utility's own cost of generating energy, or the wholesale price at which it could buy energy from the market.

Solar customers are being over-paid under the NEM compensation mechanism. Furthermore, if enhancing the renewable content of energy generation is a policy driver, it may be better to pursue utility-scale solar or commercial-scale generation, which is likely to cost less and be more reliable than residential customer-owned generation.

PUF: What's the best way to reduce or eliminate these subsidies (if they are to be reduced or eliminated)?

Dr. Ahmad Faruqui: The NEM subsidy can be substantially ameliorated by replacing the two-part rate with a three-part rate, consisting of a fixed-service charge, a demand charge, and an energy charge. I have called this Rate Design 3.0 in a previous article in PUF.

Under the two-part rate, when a PV customer reduces its consumption by fifty percent, the bill goes down by nearly fifty percent. Under Rate Design 3.0, the bill will only go down by the share of energy costs in total costs times fifty percent. If the energy share is fifty percent, then the bill would go down by twenty-five percent.

PUF: Do you know if the distributed-solar industry is opposed to such three-part rates?

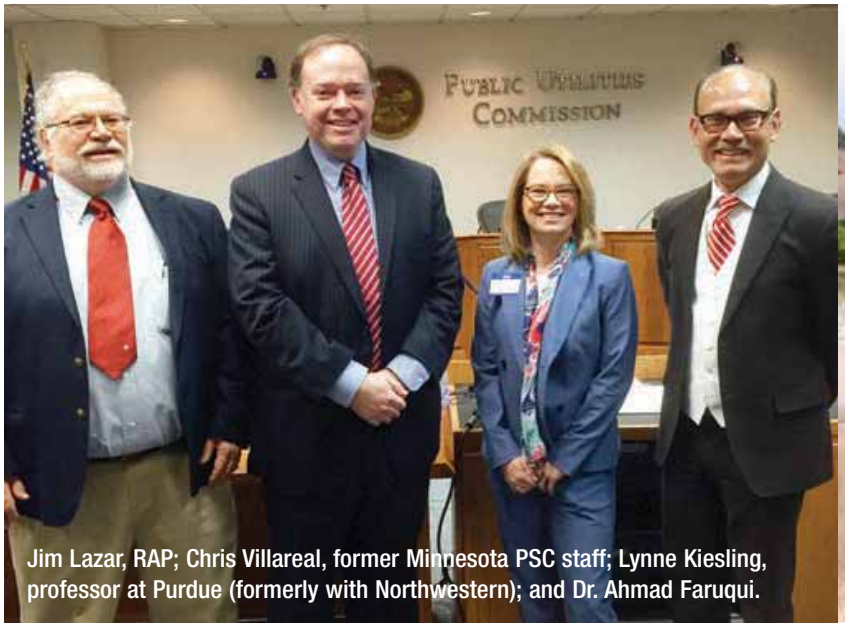
It is reasonable to think that on the average, PV customers will drop their consumption by about half, but their peak demand will go down by substantially less.

Dr. Ahmad Faruqui: In general, they don't like demand charges. They argue that they do not reflect costs, have been made obsolete with the arrival of smart meters, and that customers won't understand them.

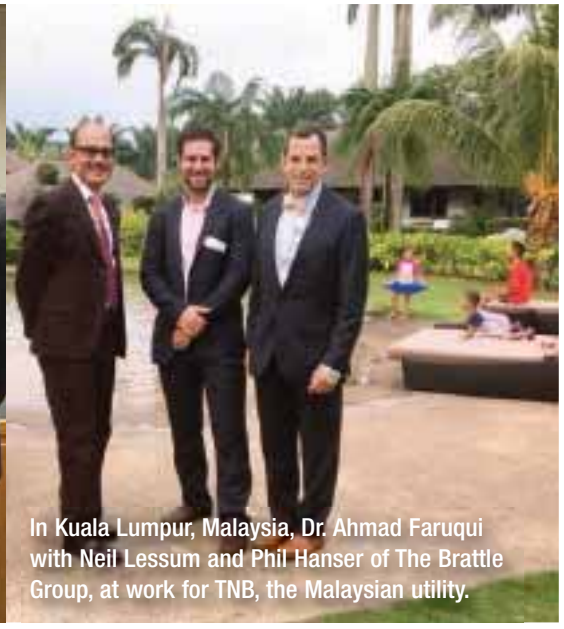
In my view, three-part rates do a better job of reflecting costs than flat volumetric rates. Demand charges are the best method of collecting capacity costs. If that was not the case, then why would we have had demand charges for commercial and industrial customers in place for decades? They have not been rendered obsolete by smart meters since large customers have had smart meters for a very long time.

PUF: Are there any utilities that have demand charges for residential customers?

Dr. Ahmad Faruqui: Yes, some forty-four utilities are offering



Jim Lazar, RAP; Chris Villareal, former Minnesota PSC staff; Lynne Kiesling, professor at Purdue (formerly with Northwestern); and Dr. Ahmad Faruqui.


In Kuala Lumpur, Malaysia, Dr. Ahmad Faruqui with Neil Lessum and Phil Hanser of The Brattle Group, at work for TNB, the Malaysian utility.

fifty-two demand charges in twenty-two states to their residential customers. The list includes investor-owned utilities such as Arizona Public Service and Black Hills, municipal utilities such as Glasgow, Kentucky, and the Salt River Project in Arizona, and co-operatives such as Butler in Kansas and Mid-Carolinas in North and South Carolina.

That widespread deployment across the country indicates that there is no understandability issue with demand charges by residential customers, especially since most of the deployments to non-PV customers are voluntary.

PUF: Do you expect that residential customers would really respond to demand charges?

Dr. Ahmad Faruqui: They will respond to demand charges if the concept of demand is explained to them. The easiest way to do that is to hold up a light bulb and show the customer that the size is expressed in watts.

In fact, when utilities try to explain the price of electricity to customers as a way of helping them understand their monthly bills, they often begin by saying that if you turn on a hundred-watt light bulb for ten hours, it will consume a thousand watt-hours, or one kilowatt-hour. If the price of electricity is twelve cents per kilowatt-hour, then it will cost you twelve cents to leave on that light bulb for ten hours.

The Big Five appliances tend to be the central air-conditioner, the clothes dryer, the oven, the washer and the dishwasher. Households with an electric spa may find it is the biggest load. In my house, a two-story structure with four bedrooms, I have found that the central air conditioning accounts for two to five kilowatts of demand – it has a variable-speed compressor and SEER of eighteen, the clothes dryer for four to five kilowatts, the oven for three and one-half kilowatts, and the dishwasher for two kilowatts.

The base load is some one-half kilowatt, comprised of refrigerators, freezers, lighting and miscellaneous plug loads. I used to have an electric spa, and it would pull some five to eight kilowatts of demand. I found these estimates simply by alternating the use of the major appliances and checking the display on my smart meter.

The compensation for supplying power to the grid is set at the full retail rate whereas the actual benefit is much lower, being equal to just the avoided cost of energy.

Utilities can easily explain to customers the load that their major appliances put on the grid using something similar to the home calculator provided to its customers by the Salt River Project, a municipal utility in Arizona.

Customers would then be advised to avoid running all their major appliances at the same time. It's as simple as that.

PUF: In the long run, capacity costs aren't fixed. Charging customers a demand charge to recover capacity costs is an obsolete method that doesn't promote economic efficiency. How would you answer this contention of the distributed solar industry?

Dr. Ahmad Faruqui: First, capacity costs should be separated into two categories: those associated with the generation of electricity and those associated with delivery of electric power, such as the grid.

The capacity costs associated with the grid have a longer life than a solar panel and can be considered as being fixed costs for the life of the solar resource. Second, capacity costs also exist in the long run and demand charges can change over time in response to those long-run capacity-cost changes. Demand charges are an appropriate and efficient means of recovering those costs.

PUF: If you take a flight, or hire a taxi, there aren't demand charges. Why should there be any for electricity?

Dr. Ahmad Faruqui: No two industries are alike. Unlike the other industries with which they interact, a utility's customers have a twenty-four/seven call option on the electric grid. They can use as much power when they want, simply by flipping the switch. Electricity cannot be stored, and has to be supplied instantly, or disaster strikes.

All customers have to pay for that call option. And that is what a demand charge is designed to recover. If the taxi had to wait in the customer's driveway twenty-four/seven, it would recover what is essentially a demand charge.

PUF: Would it just be easier to replace flat volumetric rates with volumetric time-of-use rates to resolve the subsidy issue?

Dr. Ahmad Faruqui: While energy-only time-of-use rates are a definite improvement over flat volumetric rates, they do not do a good job of recovering capacity costs, in particular, the capacity costs associated with the distribution system.

Energy-only time-of-use rates can do a reasonable job of recovering generating capacity costs provided that the pricing periods reflect the system load shape, and they do not do a good job of recovering the costs of the distribution system, which peaks at a different time from the generation and transmission system.

PUF: Wouldn't it be easier for customers, to understand and respond to energy-only time-of-use rates rather than three-part rates?

Dr. Ahmad Faruqui: There is no evidence that customers find it easier to understand and respond to energy-only time-of-use rate than demand charges. And there is evidence that customers understand and respond to demand charges, most recently from Arizona Public Service and the Salt River Project in Arizona and earlier from three pilots in the United States and Norway. PUF

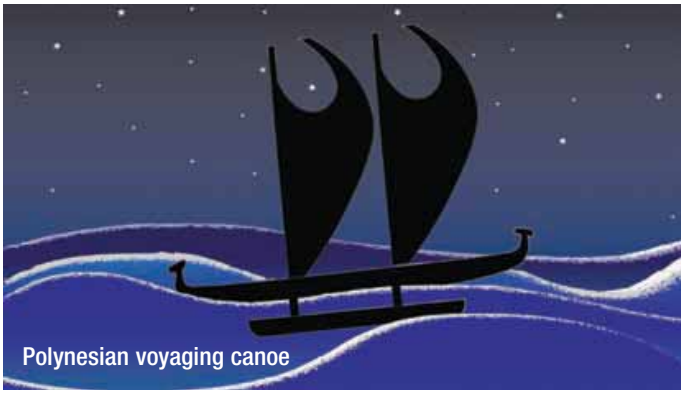
Regulatory Wayfinding

(Cont. from p. 30)

its own utility compensation study in 2015, drafted utility compensation legislation in 2016, and passed it in early 2018.

Senate Bill 2939 directs the PUC to "establish performance incentive and penalty mechanisms that directly tie electric utility revenues to a utility's achievement on performance metrics and break the direct link between allowed revenues and investment levels."

The PUC immediately opened a docket to carry out the directive, identifying two distinct phases. In the first phase, the proceeding will focus on performance: areas to be addressed, methods of measurement, and approaches to validation. The proceeding's second phase will focus on how to incorporate performance as defined in phase 1 into the design and implementation of a performance-based compensation program, perhaps to include revenue-cap ratemaking. The PUC is under an extremely tight timeframe, with the legislation specifying that utility compensation changes be implemented by January 1, 2020.



Polynesian voyaging canoe

The Hawaii PUC's leadership for electric distribution utility compensation changes is likely to continue. Regulators across the United States are encouraged to keep an eye on Hawaii PUC docket 2018-0088 for ideas regarding performance measurement and compensation reform in their own states.

For its part, the Hawaii PUC is ready, willing, and able to continue the regulatory wayfinding as established by Hawaii's Polynesian ancestors. PUF

PUF Numbers: Electric Bills Fall Below 2011 Level

This just in. Courtesy of the latest semi-annual Consumer Expenditure Survey of the U.S. Bureau of Labor Statistics. The survey's results were published on September 11.

PUF's analysis showed that the electric bills paid by American households, in total, in 2017, averaged $1,420. This comes to $118.33 per month. It's the lowest average since 2012. And it's below the level in 2011, six years ago. The annual total in 2017 was $24 less than 2016, $40 less than 2015, and $64 less than 2014.

Yet, while the annual total in 2017 was three bucks less than 2011, average household expenditures overall, for all goods and services, shot up by $10,355. In other words, electric bills shrunk in proportion to expenditures overall.

Let's go way back, to the first year of the Consumer Expenditure Survey, 1984. That year, the electric bills paid by American households, in total, averaged just $629. However, household expenditures overall, for all goods and services, averaged just $21,975. So, from 1984 to 2017, electric bills increased 125.8 percent. But household expenditures overall increased 173.3 percent, a much faster rate. Even in the long term, electric bills have shrunk in proportion to expenditures overall.