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ORIGINAL



December 18, 2013

Docket Control
Arizona Corporation Commission
1200 W Washington
Phoenix, AZ 85007

Re: Docket No. E-00000J-13-0375
In the matter of the Commission's Inquiry into Potential Impacts to the Current Utility Model Resulting from Innovation and Technological Developments in Generation and Delivery of Energy

Dear Commissioner Burns and Commissioners:

Thank you for your questions regarding the impacts of technology advancement and innovation on our current utility model.

I cannot think of a single business model that is safe in a world dominated by humans whose only desire is to capitalize on technology advancement to enable their lives to operate more efficiently, effectively, and enjoyably. Frankly, it is astonishing that any business model has lasted as long as the centralized utility business model.

**Democratized Power**

Before reviewing the six major areas outlined in your letter, I want to explain a concept that plays a significant role in this discussion.

When the computer was invented, only the world's largest entities could afford them, and early adopters rented into the system. Now, thanks to technology and innovation, the majority of Americans own their own computers and we all pay to protect the network which connects us.

Likewise, we have enabled ourselves, through the same innovation, to own our own energy production, forcing our utilities to relinquish a portion of their decades-long control. But just as we must collectively maintain the internet to protect our interests, so too must we maintain our energy grid, at least until technology and innovation dictate otherwise.

Rather than continuing to rent power from the utility as we once did with computers, customers can now own a portion of their power production through Distributed Generation (DG). This is often referred to as Democratized Power, placing power production directly in the hands of the people that choose to adopt the superior, affordable technology.

Historically, rate payers have had no choice but to invest billions of dollars to keep the lights on, but none of that investment resulted in any form of asset ownership by the same body of people. The current business model guarantees utilities a rate of return, reducing or eliminating their risk by placing it all on those who pay the bills but have nothing tangible to show for it. The current utility model privatizes profits and socializes losses, exposing vulnerabilities that have opened the door to an overthrow by technology advancement and innovation. We've given the people a taste of Democratized Power, and there is simply no taking that freedom back.

**1. Distributed Supply and Storage Resources Enabling Customer Self-Supply**

I'll refer to all customer self-supply listed in Commissioner Burns' letter, such as solar or fuel cells, as distributed generation (DG).

**Distributed Generation without Storage**

We have already seen this in action for several years. Accessible, affordable technology has enabled residential and commercial utility customers to offset their utility energy needs by investing in solar power located on their own properties. Because of the nature of solar producing some excess power during sunlight hours, we implemented a policy that fairly compensates solar customers for the power they temporarily send back to the grid. Docket 13-0248 placed a temporary fee on new solar customers until we determine through the planned 2014 ACC net metering workshops if and how solar shifts grid infrastructure costs. To protect the grid we all rely on, we must implement intelligent regulation by first determining the true costs and benefits of distributed generation without bias from our utilities or DG industries.

**Distributed Generation with Storage**

In the case of solar DG without storage, we will always require some form of centralized power production provided by our utilities. Therefore, DG without storage is a stepping stone toward wholly Democratized Power which would require storage.

In the coming years, storage, like solar, will become more accessible to the people through technology innovation. California regulators have already mandated that a portion of DG include storage to stay ahead of technology and the changes it brings. Adding storage to a solar electric system located on a customer's rooftop will further reduce that customer's reliance on the grid. As both solar and storage technology continue to improve, this will inevitably lead to many homeowners disconnecting from the grid all together. Because no regulating body has the ability to force a customer to stay connected to the grid, this could lead to significant cost implications given the current utility model.

**Customer Shared Generation (Aggregated Net Metering & Virtual Net Metering)**

The above scenario (Distributed Generation with or without Storage) only applies to those customers with suitable rooftops or other areas on site to locate their DG and storage devices. The majority of utility customers, including many homeowners, renters, condo-owners, and commercial customers, will not have this luxury regardless of costs or technology. They will simply have no place to put it. Their investment into this system will require shared generation, whereby their customer-owned power generator will be located elsewhere. Because this shared generation source would be located off site, its existence must be enabled by

very specific policies most commonly known as Aggregated Net Metering (ANM) and Virtual Net Metering (VNM).

Let's use solar as an example, though fuel cells or other technologies would be very similar with respect to policy. Both ANM and VNM policies would apply to solar systems located away from the system owner's point of power consumption. Though it is most likely that these would be larger scale solar systems over empty parking lots or undeveloped plots of land near or within city limits, the size is not important. It is only important to specify the location as a site other than the location of power consumption. The overall idea for both ANM and VNM is that a solar system located on one side of town would produce power that would then apply virtually to its owner on the other side of town.

Aggregated Net Metering generally applies to larger commercial scale utility customers. For example, the City of Phoenix has thousands of utility meters scattered throughout town. In order to integrate their own renewable energy, current policies require the City to connect solar individually to any and all meters that they wish to offset with solar power. There are several problems with this model. First, many of these buildings are not suitable for the addition of solar panels. This could be due to structural issues or simply a lack of sufficient space to site panels. In many cases, interconnecting solar to existing buildings requires costly electrical upgrades that would otherwise never be necessary. Finally, installing many small solar systems on numerous buildings is much more expensive than building one large system thanks to economies of scale. What if there was a way to build one large system whose power production would then virtually apply to the thousands of city meters located throughout the valley? That is ANM.

Currently, the City of Phoenix could choose to invest in the installation of one large scale solar system on a plot of their unused land. However, current policy would not allow the City to apply the power generated to their city meters. In order to make this economical, the City needs a new version of our current net metering policy. Today, net metering is just an administrative billing process that separately adds up the solar power produced and the grid power consumed and nets it out to charge the customer only for the total power consumed from utility sources. Aggregated Net Metering would add up the solar power produced as normal but would instead apply it to an aggregation of the energy consumed by all of the City's meters that they choose to "tie" to the solar system. In this specific case, because City operating costs are paid by taxpayers, this would have an even more relevant and positive financial effect.

The ANM process is the very same as net metering with one change, the location of the solar system with respect to the customer. One of the most significant factors limiting our adoption of solar is that most sites in need do not also possess the space required for solar. A responsible ANM policy would open the door for thousands of utility customers to invest in their own energy supply. ANM would empower restaurant chains, real estate investors and landlords, any entity whose portfolio includes multiple utility meters within one service territory.

Where ANM involves one solar system owner applying power to their multiple meters, Virtual Net Metering involves multiple owners of a large solar system applying the power to multiple meters. The same form of net metering applies where the only difference is "multiple owners" instead of "one single owner". Imagine a community whose homeowners choose to invest in a solar shade structure located above their neighborhood park. The homeowners could each own X% of the production from that system which would then be applied to the

utility meters at their houses down the street. The solar system would perform just as if it were attached to all of the participating homeowners' rooftops.

Another scenario could involve a large scale solar system somewhere within or close to the city owned by several homeowners and business owners who otherwise would not have been able to install solar on their own properties. Several homeowners could own a small share and a few businesses could own a few larger shares, and once again the solar system would perform just as if it were located at the site of each owner. The power produced would apply to their own meters through VNM.

**Effects on the Utility Model**

In the immediate future, innovations like DG without storage, DG with storage, and Customer Shared Generation (ANM/VNM) will have the most significant impact on the utility business model.

With Distributed Generation (with and without storage), the customer's reliance on the grid will be significantly reduced. With ANM/VNM, customers will have the very same reliance on the grid as before their solar investment since their solar systems are located off site. As I stated before, I wholeheartedly believe that the grid must be protected by all those customers who require it. In order to determine what this looks like, we need to properly establish the realistic costs and benefits of the non-utility-owned generation sources described above. Our past efforts and studies up to this point have provided us with biased information from both sides that has gotten us no where in determining this cost breakdown. Until this task is adequately completed, we cannot responsibly regulate anything related to this topic.

In my opinion, utility generation of power must be completely disconnected from transmission and distribution. The problem with that idea is the current "cost plus profit" business model afforded to the utilities. We cannot accurately determine fair costs associated with grid infrastructure when our utilities are rewarded for wasteful practices. I am an electrical engineer and electrical contractor, and I have experienced this waste by our utilities with my own eyes more times than I can recall over the years. Frankly, I am not sure how we are going to determine honest costs when our grid is managed by utilities answering to investors and shareholders expecting the same profits they've received for so many years.

**2. Customer Load Management Technology, Energy Efficiency, Major New Loads, and Related Services**

Most of the items mentioned in this area do not seem to be very related to a conversation about the evolution of the utility business model.

**Load Management, Energy Information Systems (Energy Management Systems), Demand Controllers**

These platforms have been in place for decades and have been heavily adopted by commercial utility customers. Building controls and automation is no new idea and has been wildly successful since it became mainstream decades ago. Certainly new automation technologies continue to make buildings efficient, but the overall idea remains unchanged. A building engineer's prime responsibility is to ensure their building is operating as efficiently as possible by implementing all of these above systems. For the most part, utility rate structures already consider and compensate for these systems.

On a residential level, there has been some technology innovation with respect to information systems and monitoring though it still proves to be a difficult area to get homeowners involved. Most homeowners are interested in energy efficiency but are not generally interested in the direct involvement associated with monitoring and controlling their energy consumption beyond the usual automation of pool pumps and evening laundry. Demand controllers were popular for a while, but most homeowners favor the hands-off approach afforded to them by energy efficiency and distributed generation.

**Energy Efficiency (EE)**

Whether or not the utility stands behind EE through the use or rebates or other incentives, the costs associated with these technologies will continue to drop and more and more residential and commercial rate payers will invest.

In some territories, EE has led to utility decoupling, but for the most part I do not believe that EE will lead to significant utility business model innovation. Because of the predictable and gradual nature of EE adoption, utilities can generally plan for these reductions in energy demand.

**Plug-In Electric Vehicles**

The topic of electric vehicles (EVs) and their integration with the grid could be categorized a number of ways. A residential customer could integrate their EV with their solar system to create a "DG with storage" scenario but these are vehicles, so it's hard to consider them any kind of fixed, stationary storage device.

There has been a lot of research and development into the possibility of using EVs (without solar) as demand response but I think this is very early yet. It would depend on a number of factors such as the vehicle's location and the vehicle owner's desire to drain their car battery.

**Effects on the Utility Model**

All in all, I do not feel that Load Management and Energy Management Systems will lead to a need for business utility model evolution. Their existing model has already been modified to account for such technologies, and these technologies are not going away.

Energy Efficiency is an ongoing problem for utilities due to the inherent flaw that requires them to sell as much power as possible to increase revenue and profits. Regardless, I do not feel EE alone will be enough to break the utility business model. Considering EE on its own, the utility is still the sole entity selling power at the end of the day, so though it might ruffle their feather to sell less, it won't put them out of business.

As for EVs, it's still very early. It will take many years to get enough EVs on the road with enough battery capacity to have a significant enough impact on our current utility model. And like EE, the utility would still be the sole power producer with or without EVs, therefore reducing the impact on its business model.

**3. Utility Scale Storage Technology**

This idea should be broken into two sections, Utility Scale Storage owned by the utility and Utility Scale Storage related to customer-owned generation sources as with ANM/VNM above.

**Utility-Owned Utility Scale Storage**

If the utility installs (or purchases power for resale from) a large scale renewable facility with storage, this will only benefit them and would not have an effect on the utility business model. As long as they are the sole provider of power on their grid, they are safe with whatever generation source they choose. This safety will only be threatened once fuel costs and ancillary costs associated with fossil fuel burning create volatility. Even then, if the utility were still the sole provider of power, this would not break their business model.

**Customer-Owned Utility Scale Storage**

Utility Scale Storage of any kind will still require the grid for the transmission and distribution of power. The question is whether or not it threatens the overall utility business model. To determine that, we have to look at several different scenarios.

If the storage is connected to a customer-owned system through ANM/VNM as described above, this would have no effect on the consumption habits of the owners/customers that the system is offsetting. It would however, affect the way the power is transmitted to the grid, reducing our need for fossil fuel power plants. In a theoretical world where every customer owns a share in a utility scale solar plant with storage, there would be no need for utility-owned power plants. On the other hand, there would still be a clear need for the grid.

Without energy deregulation, this is virtually the only way that the storage could be customer-owned. If we had energy deregulation, then any entity could build utility scale generators with storage to compete with the existing utility business model on an open market.

**Effects on the Utility Model**

If a utility invests in utility scale storage, it will have no effect on their business model. They will be enabled to shut down dirty power plants in order to replace them with clean ones.

If a group of customers invests in utility scale generation with storage through policies like VNM/ANM, this will break the utility business model related to power generation. The grid will still be required just the same, but the amount of power sold by utilities will steadily diminish over time.

**4. Metering Technology & Services**

Smart meters and other metering technologies related to this category enable the utility to perform more efficiently. This technology would likely enable our utilities to better predict load fluctuations and future energy requirements. These are natural technologies that should be invested in by our utilities to protect rate payers by operating as efficiently and reliably as possible. This technology will not affect the existing utility business model.

**5. Transmission Distribution and Automation**

Just as with number 4, these are natural grid technologies that enable efficiency and reliability but would not affect the existing model.

**6. Microgrids**

Microgrids are very similar to the utility scale storage topic of number 3. If owned by the utility, their business model stays in tact and their grid becomes more reliable.

On the other hand, if owned by customers, the current business model will require significant modification. The idea of microgrids ties very well into the idea of ANM/VNM with storage. In fact, I will just start where I left off in number 3.

Microgrids with storage refer specifically to locating multiple solar systems, or any other technology clean enough to be located near humans, in and around the point of consumption. This significantly increases the resiliency of an energy system by providing multiple points of failure to avoid catastrophic outages.

For example, that same neighborhood I mentioned earlier could have a system with storage large enough to completely disconnect their neighborhood from the grid. Their community would still rely on the portion of the grid networking them all together but would not rely on any other network outside of their community. This is an example of an isolated microgrid and could potentially be implemented by a shopping center, university campus, etc.

If you keep that microgrid connected to the overall power grid, then you have a grid-tied microgrid that will only rely on the central grid when producing extra power or requiring extra power (such as in response to adverse weather or a hardware outage).

**Effects on the Utility Model**

If ANM/VNM allows customers to self-generate as described above, then there will be a dramatic impact on the current utility business model. Though the grid will need to be maintained to some extent for the foreseeable future, the generation of power within that grid will be forever transformed. It is for that reason that we must disconnect the costs associated with generation and transmission/distribution so that we may better prepare for these inevitable changes.

**Conclusion**

We, as people acting in our own best interests, have successfully realized a method by which we can democratize our power production. Just as with the computer, technology has allowed us to take ownership of one of our life's most essential resources. No regulation will successfully take that freedom away from the people.

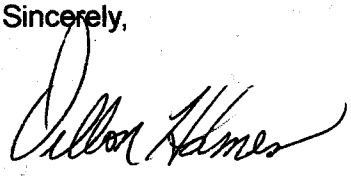
No distributed generation customer wishes harm on the rest of the customers connected to the grid, nor do they wish harm on the utility itself. They want the very same freedom for everyone because it clearly empowers the people to do what serves them best. Unfortunately for our utilities, they will be forced to give up some of their control over this transforming system.

There is a way to regulate these changes so that all parties are protected. The first step is to determine a realistic, honest cost to maintain our existing grid infrastructure. The generation of power must be separated from costs associated with transmission and distribution. If we wait too long to do this, technology will take over and cost burdens will fall on vulnerable customer classes.

Commissioner Burns, I commend you for taking a proactive approach by issuing your letter requesting information in these six areas. To all Commissioners, I welcome the opportunity to speak with you and your policy advisors in one-on-one meetings or whatever setting is most effective for you.

Finally, I would very much appreciate the opportunity to present to the open meeting and/or technical workshops associated with this docket. You may reach me anytime at the contact provided at the top of this letter.

Sincerely,



Dillon Holmes