

21ST CENTURY ELECTRICITY SYSTEM CEO FORUM SUMMARY

ASPEN, CO

The third meeting of the 21st Century Electricity System CEO Forum took place in Aspen, CO on Friday, August 16, 2013. The Forum brought together leaders from different parts of the power sector to consider actions that might be taken to accelerate innovation in electricity generation, delivery, and use.

The discussion focused on four broad themes:

1. Drivers of change in the electricity industry
2. The divergent goals of industry stakeholders and how to manage these
3. Practical business strategies and regulatory tools for overcoming barriers to innovation in the industry
4. A path forward for implementing these tools and strategies

1. Drivers of change in the electricity industry

Forum participants identified several major drivers of change in the electricity industry today, including: evolving customer needs; the growing contribution of distributed energy resources; the role of advanced metering and grid innovations as enablers of demand response and other services; the impact of energy efficiency gains and distributed generation on utility load and revenues; and the emerging role of microgrids.

In the view of many participants, the electricity business is being rapidly transformed by steep declines in solar and battery costs, inexpensive gas, and advances in microCHPs, other distributed generation technologies, and microgrid operating systems with the potential to guarantee power quality and reliability at lower cost. To an unprecedented degree in the modern era, customers now have alternatives to traditional utility service. This confronts utilities with a dilemma: facing the need for increased spending on infrastructure upgrading and hardening, they are also potentially less able to fully recover their costs from customers. In the view of some participants, the utilities are now at risk of entering a 'death spiral' of higher costs and lower sales. On the other hand, in many parts of the country, where conventional electricity supplies remain inexpensive, there is little or no debate about these new trends. Moreover, even where the debate is most vigorous, falling utility sales have so far been driven more by gains in energy efficiency and demand response than by distributed generation technologies.

Distributed generation presents challenges to system stability, but it can also bring operational benefits. However, the level of penetration at which DG may become problematic rather than beneficial is not well defined, in part because this also depends on other system capabilities. More generally, while the issues are often debated in terms of absolutes, one attendee argued that the more interesting questions are matters of degree: while certain practices and policies – such as net metering – may erode the rate base and cause other problems if taken to extremes, at lower levels of DG penetration the risks to the system may be manageable.

However, some participants worried that even now insufficient attention is being paid to the likelihood of assets being stranded in the longer run as a result of actions being taken today. The comparison that is sometimes made with telecom deregulation is imperfect. In that case, massive gains from innovation created new value for customers as well as for a wide range of industry actors. But in the case of electricity, the dynamics of innovation are different and, especially given the important role of energy efficiency gains, it is less clear whether the pie will grow or shrink. Some participants doubted that the pie will be large enough for everyone to emerge as winners.

"I think 2012 is going to be remembered as the year in which the clean energy agenda was sideswiped by the reality of distributed energy resources. Will distributed solar, storage, etc. disrupt the utility business model that we had been depending on to make the clean energy agenda work?"

"At the current levels of penetration, I'm not sure that we're in the death spiral and I'm not sure that customers would pay fully to avoid any kind of cost shift, because we're in cost shifts all the time."

"People forget that in 30-40 states in this country, rates are good, nobody needs DG, and you have no chance of having this debate."



2. Managing divergent stakeholder goals

A recurring theme of the discussion was the challenge of responding to the changes sweeping through the industry while meeting multiple, and often diverging stakeholder objectives. Regulatory commissions, rating agencies, legislatures, shareholders, and multiple classes of customers each bring different interests and objectives to bear. How to balance the rights of individual customers to choose to self-generate with the need to sustain system reliability for all? How to reconcile opportunities for customers to reduce their own costs with the goal of minimizing overall system cost? What are the implications of both customer choice and system cost minimization for other important system objectives, including the need to respond to the risks of climate change? And how can the traditional understanding of electricity as a public good, paid for by all customers, coexist with the fundamental principle that consumers should be allowed to choose how, where, and what kind of services to acquire and, potentially, to depend less or not at all on the existing distribution system? There was no agreement as to the priorities among these goals. For some participants, the most important challenge was to enable customer choice, whereas others stressed the importance of responding to climate change or reducing overall system costs.

Participants discussed how to give customers who want higher power quality or a lower risk of interruption or lower emissions what they want in a way that doesn't also create problems for the system as a whole. For some customers new micro-scale technologies may now offer greater assurance of power quality and reliability at costs lower than utility rates. But third party technology suppliers or service providers are often ill equipped to handle outages in the aftermath of storms and other emergencies, while individual customers won't have the sophistication needed to deal with such situations. Yet the local regulated utility may in the future lack the revenue base to fix these problems. In these circumstances, who will be accountable for system failures and who will be responsible for restoring service? Some participants worried that system failures may be blamed on clean technologies themselves. They emphasized that clean technology providers therefore share an interest in integrating clean energy technologies while preserving the underlying power system, and that these firms should work with utilities to find ways to avoid system failures as distributed technologies claim an increasing fraction of the market.

Another recurring theme was the strengths and weaknesses of utilities versus third-party competitive firms in providing innovative services to customers. IOUs and municipal utilities were discussed in parallel sessions. For IOUs, the stage for innovations in customer services will be set by interrelated innovations in business models, financial models, and rate design. Some larger munis have been innovative, but the political environment they face is often complex, and many municipal utilities have limited access to the information and resources necessary to adopt innovative technologies and strategies. The lifeblood of most munis is their access to the bond markets, and bond investors and rating agencies are typically unenthusiastic about innovation. One proposal to address the challenge of access to capital centered on the creation of public-private partnerships in which a muni could contribute low-cost capital while a private, third party provider could contribute expertise and a willingness to take technology risk.

"I think we want to protect the fundamental consumer interest that protects the customer's right to choose – that's the regulatory challenge – allowing customers to preserve the right to choose."

"I believe that clean technology gets blamed if we allow the system to collapse – we need to figure out how to penetrate significantly into the industry without destroying the system that allows that to happen."

"We are trying to figure out how we create an environment that rewards the power sector for taking risks. The current model is not conducive to this. It's not that utilities don't want to create value and create innovation, but their environment doesn't allow them to."



The role of rate design, and of regulatory models more generally, in addressing these problems was noted, as was the extensive attention being given to rate design issues in various states. Pilot projects were discussed as a means of experimenting with different rate designs, though views differed as to the scalability of these projects (this is discussed further below).

3. Strategies and tools for overcoming the barriers to innovation

Much of the discussion focused on the ability of particular business strategies and regulatory tools to resolve divergent stakeholder interests and overcome other barriers to innovation. A key concern is the uncertainty over the prospect of stranded assets and who will have to pay for them. Some participants worried that the stranded cost issue is so contentious that it risks destroying the credibility of clean technologies.

In one view, the challenges to utilities posed by distributed energy resources (DER) won't be addressed effectively by regulatory approaches such as decoupling and performance-based regulation; nor will forward integration by regulated utilities be an effective strategy, with DER rolled into the rate base along with conventional assets. None of these approaches can solve utilities' basic dilemma of escalating costs and declining sales. In this view, what is needed is a 'right-sized' (i.e., smaller) core of regulated assets – primarily network assets – that can ensure universal service and enable the development of a vibrant competitive market in DER. In this model, utilities will retain opportunities for growth through their unregulated arms-length affiliates.

Differentiated Services. Participants agreed that, given the opportunity, customers are likely to be willing to pay different prices for different levels of service, and different classes of customers have different cost-reliability tradeoffs. One participant proposed a differentiated services model with a regulated universal base service, augmented by unregulated service 'add-ons' such as multiple tiers of reliability services, IT services, time- and place-of-use services, green services, with prices set by the market.

Fixed Charges. Fixed charges covering customers' use of the grid were seen as a remedy for a number of problems, including customer cross-subsidization, although the importance of designing such charges so as not to deter customer energy efficiency or DER measures was emphasized. A combination of capacity and network charges embedded within new bilateral or three-way contract structures would have the benefit of shifting performance risks away from utilities and the added virtue of making utilities indifferent across different types of innovation. It was suggested that a good starting point would be large commercial and industrial customers that would place high value on certain attributes such as reliability and quality while preferring to purchase bundles of services rather than being their own energy managers. However, it was noted that bilateral contracts are not suitable for residential customers, and more generally participants differed on how or whether contractual arrangements with large C&I customers could be implemented on a wide scale at the residential level.

“How do you align investment with revenue so you can differentiate these services and customers are paying for what they want?”

“Innovation is not going to spawn inside out at munis, probably not at IOUs either. It will happen at the periphery, but utilities will be the adopters, they will have to help technologies find a home.

“Can we imagine a world where there is a regulated base of services, then on top of that, reliability services, then additional services like IT services, then time and place of use services?”

“You can't have competition when the utility is vertically integrated. When a utility owns generation, transmission, and distribution how can you compete? I think we started to open up, but now we've been reintegrating. As far as the competitive world, we're going backward, not forward.”

“If the customer pays the right amount of fixed charges, then all these issues go away.”



PPAs. One participant noted that PPA structures will tend to lower the cost of capital and attract more competitive interest, and that PPAs for solar and other clean technologies are already providing important price and revenue assurance and have played a key role in obtaining financing for these technologies. But while this is standard practice in California and other key DER markets, it is rarer or non-existent in other parts of the country. One participant proposed a different kind of PPA, where the assets or resources would be on the customer side of the meter rather than the utility side. In this case, resources such as community solar, demand response, energy efficiency, and storage would be embedded within a bilateral contract between the aggregator and the utility. A variant of this model might involve a three-way contract between a utility, an unregulated service provider, and a large customer.

“PPAs are . . . incredibly useful in terms of getting financing and assuring that the debt can be repaid.”

Microgrids. The case of microgrids stimulated lively discussion regarding their current and future competitiveness as well as their suitability as a focus for possible pilot-scale projects (discussed in more detail in the next section). Military bases and university campuses are lead microgrid adopters today, though in neither case have economic considerations been the primary motivation thus far. The viability of microgrids is heavily dependent on rates and rate structures as well as other state-level policies concerning grid interconnection, disconnection, and reconnection. Federal regulations affecting the provision of capacity, demand response services and ancillary services to the grid may also play an important role.

4. A path forward

One objective of the Forum was to discuss the feasibility of pilot projects designed to test new mechanisms for overcoming the barriers to innovation. Some of this discussion focused on the suitability of data centers and microgrids as vehicles for such pilots. The broad goal of these projects would be to demonstrate the effectiveness of policies, regulations, and contractual and financing structures that could enable such innovations and that would have the potential to scale. New rate designs, new kinds of bilateral or multiparty services contracts, and DG and microgrid connection policies would be the types of mechanisms that such projects would explore. As one participant noted, there are many opportunities for creativity in the design of market models and pricing structures and these, rather than the technologies themselves, might be the principal subjects of pilot projects.

“What is the pilot that we are talking about? . . . It doesn’t necessarily have to be about technologies. I think it’s also about financials, rate design, etc. and there’s a lot more room for creativity in market models and pricing structures.”

Discussion of suitable locations for these projects focused on areas with high rates where there is a strong demand for these innovations and interested large C&I customers. A key consideration would be the willingness of the local regulatory commission to permit full cost recovery by the utility within the designated pilot area. However, one participant predicted that commissions would be reluctant to approve ratepayer-funded pilots for the purpose of testing new technologies and devising policies to encourage technologies whose future benefits are still hypothetical. In this view, the tolerance of commissions for

“You can’t go into a state commission and say: ‘we want to propose this rate design based on a hypothetical state of what might be some years from now.’ You’re going to have to deal with the current state.”



ratepayer-funded pilots would likely be limited to projects that promise to reduce the cost to consumers of existing policies by combining known technologies and practices in new ways. For this reason, munis or cooperatives would be more promising venues for the kind of pilots discussed at the Forum.

Other participants questioned the scalability of such projects – both in the sense of scaling from a specific contractual structure to broader segments of the market and in terms of exportability from one location to others. The great variability in rate designs, rate levels, customer choice structures, wholesale and retail market designs, and political attitudes across the country and often even within regions argues for a ‘bottom-up’ innovation strategy, centering on small pilot projects. But this same variability is also a challenge to the scalability of pilots. As one participant put it, “what works in Peoria will be ignored in Des Moines.”

Other participants noted that there are already a number of successful pilot projects around the country, and that a useful exercise would be to gather more information about the policies and rules that have enabled them and how they could be implemented more broadly.

Although a number of questions were raised, many of the participants agreed that one or more projects to demonstrate innovative financing structures or service contracts would be a valuable next step in the effort to accelerate innovation in the electric power industry. The industry moves slowly but, as one of the participants concluded, the sense of urgency in the room was palpable.

“What’s exciting about this is the idea of actually unlocking a value proposition for customers and . . . demonstrate that you could do that and hold the network cost recovery constant, and make this so it’s not a zero sum game between the utility network and customer adoption of innovation and technologies.”



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