

21ST CENTURY ELECTRICITY SYSTEM CEO FORUM SUMMARY

HOSTED BY MIT, CAMBRIDGE, MA

On March 6th, **Advanced Energy Economy** (AEE) & **MIT's Industrial Performance Center** (IPC) convened a group of senior utility sector executives and advanced energy company CEOs at MIT to discuss the challenges and opportunities for accelerating innovation in the U.S. power sector. The half-day, invitation-only event was the inaugural session in a series of regional convenings of advanced energy CEOs and other leaders in the energy industry. The goal of these discussions is to develop an action plan that will identify key pathways to help accelerate business innovation and advanced energy technology market adoption within the power sector. The next event in the series will take place in Texas.

Participants at this first meeting identified three opportunities to help meet the innovation goal:

1. Help advanced energy companies better understand the taxonomy of utility needs
2. Align business models and incentives so that innovation can create value for the full range of stakeholders and thus can be embraced by utilities
3. Assist regulators in encouraging innovation in the electric power sector.

Below are summary notes from the forum.

1. Help Advanced Energy Companies Understand the Taxonomy of Utility Needs

DEFINING UTILITY NEEDS. Some meeting participants suggested that utilities need to enumerate and prioritize their needs better, rather than simply specifying solutions. The market could meet high-priority needs more effectively if they were identified as such, rather than as calls for specific, pre-determined technology solutions. Suppliers of advanced energy products and services could then be more targeted and creative in addressing utility needs, while also becoming better educated about utility business models and practices. And utilities would be able to choose among a wider variety of options, some of which might meet their needs in previously unimagined ways.

AFFORDABILITY AND RELIABILITY. There was general consensus among participants that a crucial issue for technology adoption is affordability and reliability. There is significant consumer demand for innovations in energy generation and delivery. Participants expressed the view that customers want more of it, even though they may not understand the costs. For many consumers, reliable and inexpensive energy was practically a “constitutional right.” Utilities therefore require reliable technology options that will not impact rates adversely.

- At the outset, the innovation hurdle for emerging technologies and services is high because they may be more costly and less reliable than mature technologies.
- Cheap natural gas prices enabled by the North American shale gas boom exacerbate this issue, as new technologies and services must often compete directly with affordable natural gas, and this situation is expected to persist for some time.
- For several utilities, energy efficiency represents their primary advanced energy initiative. However, regulators vary in terms of their enthusiasm for these efforts (e.g., some cited customer reservations about smart meters).

“As an industry we should have a taxonomy of need that is very transparent, so that as we [utilities] go to procure things, we can express that in generic, abstract terms of need, and not prescribe technologies that meet the solution. That’s important because a lot of money is being spent buying things that utilities aren’t very happy with, simply because that is what is available. If you could take the same money that is being spent on inferior things and expose it to a needs taxonomy instead of a technology taxonomy, then I think we can get somewhere.”



ACTION ITEMS

- Increase Advanced Energy Understanding of Utility Value Proposition: Encourage utility companies to communicate more effectively their business and operational interests so that advanced energy companies can better target their product/service solutions and can potentially engage in more successful partnership arrangements with utility companies. Also, better educated advanced energy companies about utility business models and practices.
- Municipal utilities may be more innovative because of their size and their stakeholder base, and may be a good target for pilots. They are less driven by shareholder return.
- Improve Utility Procurement: Utilities should better articulate their generic needs/ specifications when procuring solutions, rather than issuing technology-specific RFPs that presuppose an answer.
- Help utility companies understand the importance of defining “energy innovation needs”, not solutions.
- Get away from “technology cram” – technology is dumped on the utility sector now, and utility companies need help thinking more about the longer-term view.

2. Align Business Models and Incentives so Utility Companies can Support Innovation that Creates Value for Diverse

“Our mandate is reliability and efficiency. That’s the key mandate for the utility industry. As a society we want that to be the mandate for monopoly utilities. But what that does is to cut out “new and different” because new and different usually means “inefficient and unreliable.” So how do you get around that?”

“People get fired if lights go out for even a couple of minutes.”

“Some innovations are inherently disruptive. They cannot be introduced without winners and losers. And we can’t get to the kind of low carbon energy system we want without some disruptive technology. We can’t solve the entire problem by being cooperative.”



Stakeholders

NEW BUSINESS MODELS. In order to pursue new areas of innovation as well as business opportunities, the existing utility business model will need to evolve. For incentives for innovation to be properly aligned, and for utilities to play a role in catalyzing innovative activities, the incentive structure for the utilities themselves will have to change.

- For many key innovative technologies and services, including energy efficiency, demand response, and distributed generation, it is difficult for utilities to share in the economic rewards. Utilities may therefore see no choice but to resist innovative new entrants to the sector in order to protect their economic interests.
- Are there opportunities to free up utilities in part of their business to take on more risks and earn larger returns as a result, e.g. better aligning incentives for innovation? What areas can be opened up without conflicting with the core reliability mandate?
- Despite discussion of the importance of evaluating new business models, participants also stressed how hard it is to change the regulatory mandate and mindset. Pilot reform efforts in specific locales may be the best option for addressing this.
- While reforms may free the utility to be an adopter and investor in innovation in some instances, in other cases that may not be possible. Competition between utilities and new entrants will persist in those areas. Such competition should ideally be encouraged by regulatory reforms, although participants recognized that these reforms are unlikely to be welcomed by utilities with conflicting economic interests.

FINANCING AND MONETIZATION. The financing of energy innovation is one of the critical challenges facing new technology adoption. Energy innovation

“We’ve got an “impedance mismatch”[in the utility sector]: we have innovators and entrepreneurs who are taking a high risk and therefore need a high rate of return to make it work. But on the other hand we have a regulated utility sector that’s not allowed by practice, law and statute to earn more than 8% ROI. We need a “transformer” between the two to make it work and it needs to scale.”

“I’m struck by commonality of such strong sentiments in the room around the significant constraint of the regulatory structure on the business model of the utility and how that puts a cap on the returns to investment in innovation. ... We need to think about how that changes to create a vibrant, economically efficient, innovation ecosystem.”

“If [an innovative new entrant] can show how you can help our customer and help us [the utility], then we would be interested. ... If we are talking about mutual benefits, how do we improve the system as opposed to disruptive stuff, then I think we’d love to have those conversations.”



“Utilities will often fight, fight, fight because new things are seen as interfering with their business model. Some utilities are riding with that wave and trying to find out how to benefit from distributed generation and not fight it. But we have to figure out alignment so that everyone can benefit from these changes and support changes. We need a long-term view to do that.”

“Many of the changes we’re talking about are highly disruptive to the business. Not just incremental. If this stuff takes off, it creates whole new business models and businesses. Utility models are hugely destabilized by distributed generation and storage for example. So if people resist that, it’s understandable. There are new opportunities out there, but they are also very disruptive to stable monopolies that are supported by long-established laws.”

is seen as a high risk, high reward activity and financial market actors assess technology firms accordingly. By contrast, powerful institutional investors view utilities as a source of steady returns. The short-term outlook of those concerned with stock prices – utilities, institutional investors, investment banking analysts, rating agencies - is in direct contrast to the long-term outlook needed to invest in energy innovation.

Major mismatches currently exist between the low-risk, steady-return investment environment of the traditional utility and the higher-risk, higher-return requirements of innovative ventures. Returns are often too low to attract traditional VCs and risks are too high to attract traditional institutional investors in utilities.

- Utilities also lack R&D budgets of any substantial size. Most R&D going on in the industry is financed either by government or by risk capital (VC or private equity) investors funding early-stage firms operating outside traditional utility businesses.

ACTION ITEMS



- Provide Examples of the Utility of the Future: Engage in more in-depth analyses of future utility business models (considering rate design changes, flexibility, transparency e.g. what is the business model concept for the distribution utility), along with new metrics of progress (e.g. how do we measure the value of ancillary services? Maybe we do not just focus on load growth).
- Identify new business models that can result in a win-win for advanced energy companies as well as utility companies e.g. explore the removal of caps on utility profits from advanced energy investment; promote more opportunities between incumbents and innovators for profitable partnerships.
- Define an incentive structure that is transparent and provides a level playing field.
- Provide Capital for R&D Support: Leverage work being done by AEE with its Capital Innovation efforts to support the flow of capital into the Advanced Energy sector.

“People [in the investor-owned utility business] think about share prices. The first thing we do every day when we get up is try to reward our shareholders.”

“There is a lack of alignment between people who are trying to bring in new things and people with vested interest in very long term investments”.

“How do we create the incentive structure to enable a level playing field, cross-boundary innovation, etc”?

“We don’t have R&D budgets in utilities. EPRI etc. is small beans. [All the investment] is coming from the outside, not from the utility R&D. Utilities just don’t do R&D.”

“Utilities don’t get rewarded for finding the next Google.”



3. Assist Regulators in Encouraging Innovation in the Electric Power Sector

REGIONAL FOCUS AND APPROACH. Due to regulatory and market fragmentation across the United States, efforts at promoting energy innovation have to follow a regional approach that recognizes that “we’re 50 different countries here.” State-by-state regulation is not very well aligned and there is no comprehensive federal view on the power industry. There are examples where states have come together around the table and worked collaboratively to be part of the solution (e.g., PJM transmission planning process) as well as regions such as Texas where real progress is being made. Together is an important step forward.

- Utility markets in the United States are fragmented by different ownership models (investor-owned, municipal, public utility district), regulatory models (competitive, vertically-integrated cost of service), market segments (generation, transmission, distribution, retail), and the prevalence of different generating technologies and fuels in different regions.
- It will be much more feasible to align particular regions around common goals (getting the boundaries of the region right will be key) than to achieve national uniformity (although identifying discrete federal reforms that can support or enable regional innovation may be important.)

ACTION ITEMS

- Better Educate Regulators: PUCs should be encouraged to think about how to better balance interests and be better educated and exposed to different business models.
- Target specific states for action and have vendors and utilities approach PUCs together with a strong voice for change.
- Work on a regional basis to bring key stakeholders together (while simultaneously working at the federal level to develop policies supportive of energy innovation).
- Target pilot reform initially at the commission level in a few key states like Texas. Leverage work already being done by AEE’s Public Utility Commission effort and state level initiatives.
- Educate Public Utility Commissions about the opportunities presented by advanced energy incentives. Work with AEE’s Public Utility Commission effort to educate select commissions about new business model structures that can result in a win-win.

“When it comes to energy, the USA is the SA without the U: there’s no “united” states here, just 50 different states. There are only two issues the federal government works on in the US electric sector: nuclear power safety and mandatory reliability. Otherwise, it’s a state’s issue.”

“We tried standard market design. It didn’t work. We need to think about the world in a regional lens. I’d like to think we can have a national plan, but when you get down to it, the issues in the Southeast are very different than the Northeast or the West. But I think we can get aligned on regional goals. You can have regional goals broadly set, but allow for differentiation. Otherwise we’re going to get rolled up into a lot of politics.”



The Path Forward

The debate about restructuring in the past few decades has focused on efficiency. In the future, it needs to be about innovation—a different driver for restructuring. The participants agreed there are major opportunities to work collaboratively to reduce barriers, unlock innovation and monetize the benefits of innovation. This initiative by AEE and MIT to bring utilities and emerging innovation companies together is an important step forward.

“If we can’t get to the heart of some of the issues and articulate solutions, we can’t expect regulators and or legislators to do it.”

“If we had this conversation three years ago, people would just be saying no, no, no to everything. Now people are very open and talking about how to get there.”



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