U.S.-India Subnational Energy Workshop

U.S.-India State and Urban Initiative

Inaugural Workshop | November 1-3, 2017

New Delhi, India

Memo

Introduction

CSIS in partnership with the Shakti Sustainable Energy Foundation hosted the first-ever U.S. – India Subnational Energy Workshop in New Delhi. The event brought together over 100 participants over three days including 10 representatives of Indian states, 12 representatives of U.S. states, India's Ministry of New & Renewable Energy (MNRE), Energy Efficiency Services Limited (EESL), and several U.S. federal government agencies to discuss common challenges in deploying technologies, creating policies and management of the grid of the future. The event was kick-started with an evening reception at the U.S. Embassy supported by AmCham and Azure Power. On November 2nd, U.S. and Indian states shared which smart power technologies they were deploying, challenges of managing those technologies, issues of capacity and training for staff, as well as the need for important regional interconnections to uptake new sources of distributed power. On November 3rd, participants were invited to partake in a tour of Tata Power Delhi Distribution Limited's state-of-the-art Smart Grid Lab in Delhi. The tour allowed participants to see first-hand how Indian utilities are dealing with the challenges of transforming India's electricity sector and readying themselves to deploy technologies for managing the grid of the future.

Key Learning

Given that this was the first gathering of U.S. and Indian state energy officials, the surprise among stakeholders was that the challenges states face in both countries are common. The solutions come from examples of policies and regulations enacted by states and partnerships and programs formulated by private sector, research and civil society groups. Specifically, U.S. and Indian states both need to:

- Manage the integration of new sources of renewable energy, including improved wind and solar forecasting
- Deploy new energy management technologies that allow utilities to monitor power use, improve billing efficiency and engagement with customers
- Integrate state-of-the-art technology adaptable to the needs of states including interoperability measures that allow for optimal operational efficiency while incorporating applications for the rise of the internet of things (IoT)
    - This would connect consumer services, substation workers, technical officers and engineers and improve coordination for more effective management of the grid
- Deal with existing thermal power assets as the energy transition is undertaken

- Continue to incorporate energy efficiency measures either as retrofits in the U.S. or from the start as the opportunities are greater in India
- When choosing technologies, move away from relying on only least cost as a metric for procurement and instead, also consider the long-term aspects of solutions
- Use data in better and more effective ways to improve programs and build the case for how and which technologies are deployed
- Establish connections with research institutions and universities, for new technology deployment evaluation and piloting community projects
- Empower and work with municipalities and urban local bodies to the extent possible, particularly in India
- Establish a forum, like the National Association of State Energy Officials that can allow Indian states and state-owned utilities to share best practices amongst themselves and to engage collectively with the central government and foreign stakeholders

Next Steps

1. Future Workshops
    a. In April 2018 a workshop will be organized in India focused on electric mobility
        i. U.S. states will travel to India
    b. In September 2018 a workshop will be organized in the U.S. focused on energy storage
        i. Indian states will travel to the U.S.
    c. The Secretariat will alert member states to opportunities to engage in important energy-specific gatherings in both countries to facilitate continued conversation
2. Analytical Output
    a. The Secretariat of the State & Urban Initiative will engage participants by soliciting short analytical material to unpack the energy issues being faced by states in both countries
    b. The Secretariat will also form an expert group that can provide inputs to draft policies that are open for public comment being issued by state governments in both countries
    c. The Secretariat will create podcasts specific to the challenges faced by states
3. Strengthening the U.S. – India Subnational Energy Cooperation Alliance
    a. The Secretariat will track conversations between potential partners who were able to connect as a result of the State & Urban Initiative
        i. When a specific partnership is ready to be announced, the Secretariat will provide a platform to amplify the announcement and share the outcomes with the broader community
    b. The Secretariat will create a brand for the grouping of "Energized States" who choose to participate in this subnational energy dialogue
        i. This will require participating states to agree to send officials to meetings, provide written content and be open to collaboration with potentail partners
    c. The Secretariat will facilitate connections with potential partners should participating states choose to organize delegations in each other's countries

d. Findings from the workshops of U.S. and Indian states will be shared by the secretariat with both the U.S. Government and the Government of India in support of their on-going federal and bilateral programs

In Detail: Discussion Questions

Over the course of the day, U.S. and Indian states had a discussion around what kinds of technologies they are deploying and what kinds of policies and institutions they are working with to manage their grid. The Secretariat's objective was to guide the discussion based on a few key leading questions. Answers to some of those questions are highlighted below.

Seminar I- Powering the Grid of the Future: Key Technologies

What initiatives are in place to pilot or test new energy technologies in specific regions of your state and what are the lessons learned from that experience?

Representatives of Indian states are exploring new procurement and tendering processes reexamining how they might improve their power purchase agreements to deploy new technologies. In addition, they are piloting new systems operation software and forecasting tools for real-time monitoring. LEDs and smart meters are also being rolled out in pilot phases across India's states while a few energy storage project pilots are also being planned in the states of Gujarat, Tamil Nadu, and Telangana. In the United States, energy storage programs, EV deployment strategies, and implementation of distributed generation are some of the leading areas of focus for the state energy offices. In addition, partnerships with research institutions are allowing U.S. states to study how independent micro-grids, including those run by cooperatives are increasingly integrating renewable energy and can interplay with centralized systems. Interestingly, rural irrigation needs are an important driver of power consumption for states in both countries. While in Nebraska a Load Control Program is allowing the irrigators to work with their local utilities to reduce energy usage, in Indian states like Gujarat and Maharashtra, Feeder Segregation allows for separate feeder lines to agricultural consumers helping monitor and improve overall power supply. Telangana is also working on improving the procurement & tendering process and rethinking PPAs in order to improve the system.

What technologies require additional policy or financial support to be commercially viable or more broadly scalable?

Energy storage, roof-top solar, electric mobility (both manufacturing and adoption) were cited as common to both U.S. and Indian states as technologies that require additional policy and or financial support in order to achieve scale. Policies defining the role of the private sector to be able to participate in the deployment of micro-grids was another area highlighted by Indian states with large

unelectrified areas. For example, Uttar Pradesh has begun to employ new business models that allow developers to set up solar micro-grids and sell power to rural consumers, thereby alleviating the burden on state-run utilities. In the U.S., electric cooperatives which serve a large portion of the farming community (need) policies and incentives to integrate automated meter reading, SCADA, and energy storage technologies will help them move into the future like the grids managed by the independently owned utilities around them. Combined heat and power is a technology that requires more support in the U.S. and may be suitable for Indian states with large heating needs where cities are in early stages of development. Hybrid technologies such as wind-solar or solar-hydro or integrating energy technologies into existing infrastructure such as canal-top solar, distributed hydro in canals or sewerage systems in addition to floating solar plants are other areas that could use both policy and financial support to achieve scale. States in both countries are grappling with issues of cyber security and the internet of things (IoT) with U.S. states in the lead though privately-owned utilities in India like Tata Power Delhi Distribution Limited have started to understand the challenge as part of a grouping of international utilities that share best practices. Furthermore, in India, SCADA technology deployment needs to be supported with policies for supervisory control and training to make the most of these heavy investments for state-owned utilities.

How much do issues about quality and concern over technological obsolescence impact issues of technology adoption?

India's state-owned utilities are cash-strapped and are in the midst of piloting various smart power technologies in order to improve management of revenue collection. To them, like private players both in India and the U.S. concerns regarding technological obsolescence matter a lot. Here, specifications set by government entities and approved vendors that are held to the highest quality standard can have an impact in alleviating concerns about quality. Furthermore, based on conversations with state officials, the best form of technology adoption is that which is supported by the policy experience of state-counterparts both within a country and examples from abroad. Some Indian state officials surveyed in the course of the project indicated that this was a need particularly when adopting foreign technologies. Evaluating technologies post-deployment and using that data to make decisions is paramount in making decisions regarding future technology adoption. Finally, central and state government programs in both countries, though moving at varied paces, are emphasizing workforce training and development to manage and keep up with emerging technologies.

Seminar II- Managing the Grid of the Future

Are existing institutional framework and governance structures adequate for enabling the transition to a less centralized, more flexible grid?

Cities, more empowered in the U.S. than their Indian counterparts are the driving forces for experimentation and deployment of new technologies and being the managers of localized institutional arrangements. In turn these cities are able to create jobs while deploying and managing emergent technologies. New coalitions like the Under 2 and Resilient Cities are meant to help states and cities from across the world share how they might build more reliable and resilient energy systems in the face of climate change. However, these are platforms for sharing best practices and setting benchmarks – ultimately to be enforced by those subnational entities that are committed to upholding them.

Regional grid cooperation as mentioned by several Indian states perhaps modeled along the lines of regional power pools might help states share information, achieve optimal dispatch schedules, balance out variations at least cost, and integrate increasing amounts of renewable energy. Increased learning between states is facilitated by organizations created by states, for states, such as the National Association of State Energy Officials in the U.S. While the Association of Renewable Energy Agencies of States (AREAS) does exist in India, it is at present inactive and the coordination amongst state-owned utilities and state power departments is very limited.

There is also a need to have a conversation about how best to prepare integrated generation, transmission and distribution plans for the power sector, and manage the energy transition which will include dealing with stranded assets as we commence the deployment of the grid of the future. As always, continued improvement in technology procurement standards will help the best and not least cost solutions be deployed. Finally, interaction with and clear guidelines for electricity distribution cooperatives operated through micro-grids and for the urban solar rooftop residential market will be important for successful management of the grid of the future.

What types of partnerships with non-government organizations (research institutions, incubators, civil society, etc.) have shaped your strategy?

In the U.S. states are partnering with a range of institutions including technology start-ups and incubators, research institutions, civil society organizations and companies to experiment with new models for distributed technology integration. No state in the U.S. has demonstrated this quite like the state of California, which has through policy measures more aggressive than federal mandates, driven clean tech innovation. It has furthered this by working with its existing network of universities, and by fostering the growth of new institutions such as the Los Angeles Clean Tech Incubator and the California Clean Energy Fund. U.S. states are also learning from the examples of military bases and universities that are early adopters of technology – in order to formulate state-

wide policies.

In India, states are pioneering new models for customer engagement in the distributed solar sector by setting up trainings for technicians and call-centers for strengthening the maintenance and servicing ecosystem for these technologies. Indian states are successfully partnering with Energy Efficiency Services Limited (EESL) to deploy energy efficient technologies such as LED bulbs and streetlighting and energy efficient water and sewerage pumps for both agricultural as well as municipal needs.

How do tariffs and compensation structures need to change to send the market signals to enable deployment of new technologies and systems?

First, tariff simplification and rationalization including time of day (ToD) tariffs for bulk procurement by utilities are necessary for improving the financial and operational performance of utilities. Availability of peaking and ancillary power services would also help bridge the gap between demand and supply of power. In addition, procurement policies need to move away from lowest cost options as they threaten the long-term health of the electricity sector and may not match the specific needs of states. To address cost burdens associated with high demand subsidized agriculture sector, particularly in Indian states, new business models such as those being implemented to incentivize farmers to become managers of mini-grids and sell power back into the system while also meeting their needs might be a mechanism to alleviate the burdens of the current tariff regime.