Energy in Synergy: Power Pools to Drive Energy Management

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Abstract

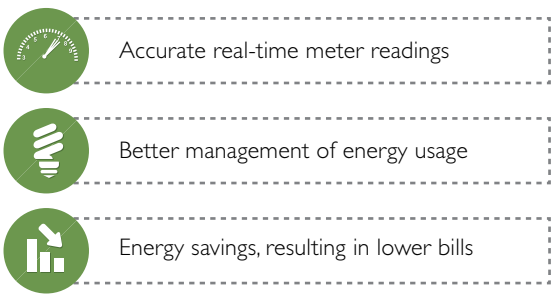
Growing digitization, security concerns and increasing competition have brought the power industry to an inflection point. Digitization of the power industry with smart meters and grids has changed the unilateral way in which they used to function earlier. Customer expectations are making them take a relook at the existing operating system and revenue models. Utilities had been working in the same way for close to a century now. It is not a surprise then that the change had been met with some resistance from within as well as the customer.

This paper attempts to understand the challenges that often surface regardless of these smart meter deployments and why embracing the smart meter wave as a community will resolve some of the most basic problems power market participants, especially Utilities, face today.

Introduction: In Full 'Measure'

Have you ever suffered an outage or flickering power supply? Have you ever paid a power bill which seemed to be a nightmare? Or have you ever tried to call the Utility with your inflated power bill and felt like being caught between the devil and the deep blue sea? Before you decide to strike a deal with the local inverter supplier, do consider this. The answer to avoid all these things could rest with smart meters and how they are managed within the power grids.

Government mandates and internal policies are driving Utilities towards digitization and at the retail end of the business, this process has begun with the installation of smart meters. Today, we live in a more personalized environment and it is important to address the customers' concerns. Some of the benefits of smart meters are:



A community pool can help customers and market participants reap these benefits sans the complaints, billing shocks and unforeseen network/transmission charges.

Jump the Snarl, Create a Pool

Interestingly, the way power reaches you is in a way similar to a city's road network and it too can suffer traffic jams. Here's the analogy. When you turn on the switch, the bulb lights up instantly. But actually it is not all that instant and magical. From the actual point of generation till the premise where it is tapped, power travels through a long and complex transmission and distribution network.

When you look at this traffic situation closely, it is evident that this power traffic is caused by different needs of power in various residential or industrial areas. You would also discover that a lack of accurate load scheduling and specific means of energy storage aggravate the situation. This lack of scheduling information and storage measures result in a high cost of power borne by the customer. And this is a situation every service provider is most affected by since it affects customers.

But do the insights provided by smart meters help resolve the issue?

Just the knowledge of usage patterns and consumption analysis, demand response programs and customer surveys do not contribute towards a smoother distribution or an easier load scheduling. While energy management tools provide insights into what the various consumption patterns can be like and what an assumed load structure can look like, the primary driver here is still the supplier or, at most, a marketer and not the end customer.

Since the customer is at the heart of every Utility service, it makes more sense if customers drive energy management. It might start with communities or pool owners deciding the frequency and intensity of their consumption patterns, and also sharing partial or full information of their consumption. This will help them get an accurate picture of load inflow and outflow. These communities may be started with the supporting backbone of distribution utilities and/or Demand Response Service Providers.

Smart pooling of grid traffic would mean sharing of the cumulative power demand. This could be achieved readily with the help of a municipal aggregation, where in a municipality can negotiate for the purchase of the combined electric supply of its residents and eligible small businesses. This would bring:

Single and focused point of participation to deal with the traffic

Subsidized rates for participants

Single energy goal for the community even after each participant had retained the flexibility of individual usage

Going beyond the concept of aggregation, the Smart Pool would also have the capacity to provide proactive load traffic analysis, driving Community Energy Management in real terms.

Breaking Silos

Community energy management together with the social platform can turn out to be a completely new face of what modern day Utilities can offer. Twitter and Facebook have proved as good media to start conversations between the customer and Utilities, and even among customers themselves to discuss and weigh choices but these need to scale up.

Although very individualistic in our choices, we do follow trends and referrals and put faith in the choices that people we trust had made. Currently, the conversations that take place in the social forums established primarily by Utilities, are taking place in silos. If the social engagements allow conversations not bound within a small locality, if they include expert opinions from other market participants, these forums could prove to be more informative and apt platforms to guide proactive energy decisions.

Smart Pool Benefits

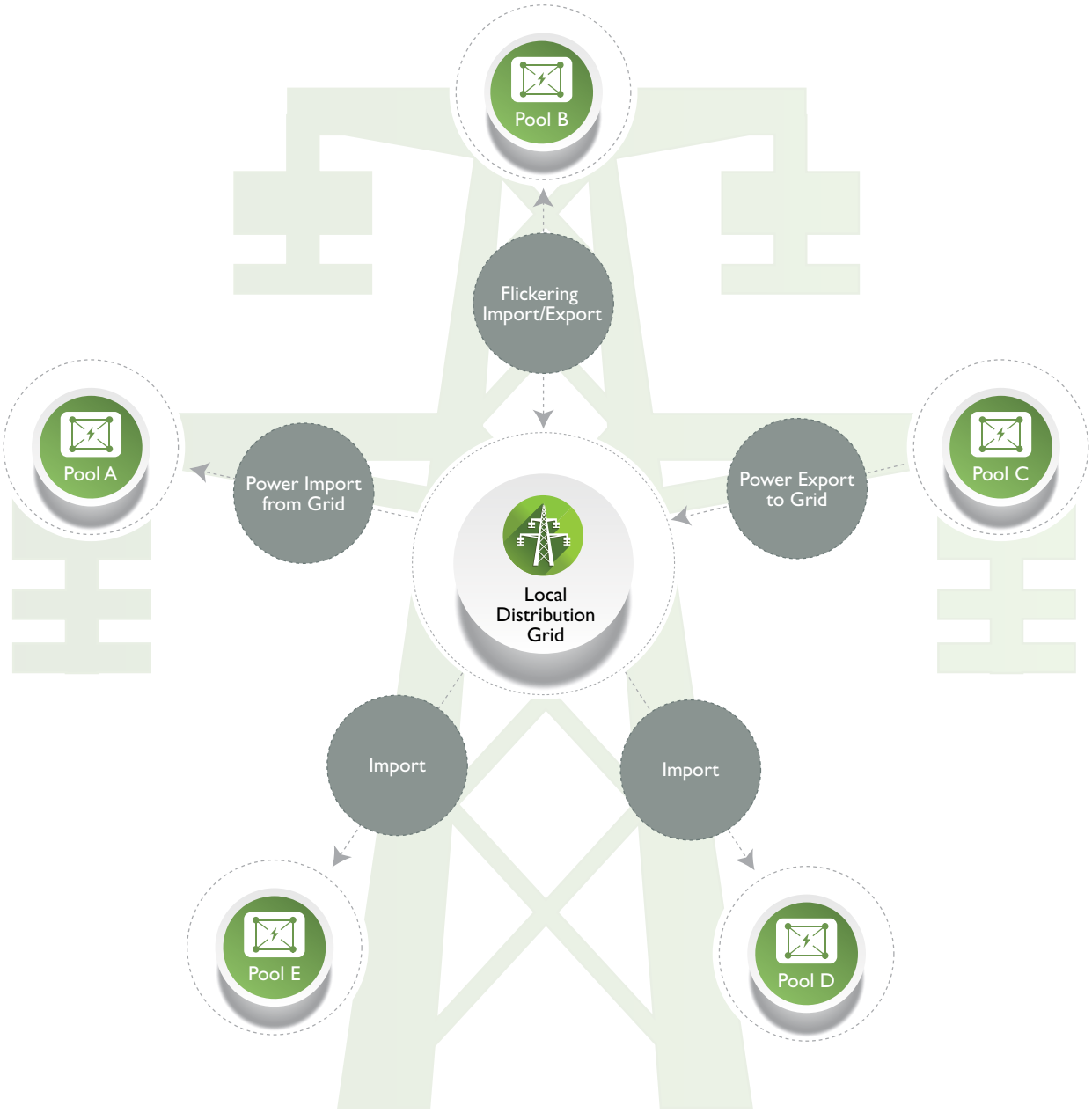
Technically then, it would help us if we view a load control situation through a Smart Pool forecast system. It could help us take pre-emptive actions on load scheduling, real-time network issues and timing generation cycles where the Utilities are vertically integrated.

The stakeholders benefitting from this approach would be:

- Suppliers
- Distribution/transmission/vertically integrated utilities
- Generators
- Marketers
- Demand Response Service Providers

While these pools can be formed based on some basic criteria such as usage patterns throughout the day and number of people living in the premise, certain other things like credit history and seasonal pools can be considered to better define a community energy goal. These pools could be self-forming when customers move in or move out of pools based on commonly agreed terms and conditions

Figure 1 shows how the idea of a common "power pool" is at work:



Customer pool with Virtual Powerplant setup which monitors the import/export of electricity, establishes energy management for the pool

The Smart Pooling Dynamics

In this "reverse demand/supply management" kind of a setup, where the demand is predetermined by a community, the customers have two options:

i) **Opt-out:** The pool automatically combines the electric load of residential and eligible small businesses for purchasing purposes except for those customers who actively choose not to participate in the pool.

ii) **Opt-in:** Only those who opt-in are able to have their electric load included in the aggregation program and take advantage of the price negotiated on their behalf.

Whatever the preference of customers, opt-out or opt-in, the infrastructure of Smart Pool will ensure customer participation to get an accurate picture of load in a region.

Smart Way Forward

What's next then? Hypothetically, due to inter-pool dynamics, energy trading might reach a high we can't even gauge at this juncture. Could community energy certificates be the next big thing after renewable energy certificates trading?

Demand Response Service Providers could make the best of this approach to hit a breakthrough in customer involvement and enablement in a world of smart grids. Until the meter becomes nearly as familiar as a refrigerator, perhaps 'Smart' won't enter our everyday lives. Would Smart Pool engagement of the customers then strike a chord with the decisive stakeholders? Only time will tell.

About the Author

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Shiuly Kisku has been responsible for generating Proof of Concepts in areas of Smart Grid. A specialist at Wipro's Smart Grid Center of Excellence, Shiuly has been involved in hedging and Portfolio Management, Utilities, Retail & Business Transformation, Domain Consultancy, implementation of Deployment Planning Tool, Meter Data Management Systems, etc. She is an electrical engineer and holds a Strategy & Finance Executive MBA from IMT, Ghaziabad.

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