

Discussion Note 01-2016

***Planning for Accelerating Smart Meter
and Smart Grid Roll outs in India***

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The Electricity Policy has taken a bold move to kick-start Smart Meters in India. This discussion note discusses roll-out options.

Many HT consumers are already on digital metering, that too with downloading of data (even if via a handheld instrument). Making such users' metering "smart" will be analogous to AMR (automated meter reading) – faster, but won't change the fundamental data available to the utility.

For LT consumers, the bulk of consumers, there are 3 main types of options for smart meter roll-outs:

- 1) Bottom-up (Organic) purely DisCom driven
- 2) Mandatory with criteria/thresholds
- 3) Universal deployment

		PROS	CONS
1	Bottom-up Discom Driven	<ul style="list-style-type: none"> • Utility Buy-in • (possibly) Easier to manage scale • (with effort) Optimization of solution to local needs/conditions 	<ul style="list-style-type: none"> • Utilities may remain laggards • Business As Usual is too slow/weak • Greater risk of piece-meal / non-standardized approaches <ul style="list-style-type: none"> ○ Higher procurement prices
2	Mandatory with Thresholds	<ul style="list-style-type: none"> • Utilities pushed to speed up deployment • Can choose thresholds that align with best "bang for buck" areas/functionalities first • Can stagger deployments (aligning with utility heterogeneity) 	<ul style="list-style-type: none"> • Cost per consumer is higher than with blanket deployments • Some functionalities may be hard/unattainable depending on CRITERIA for threshold <ul style="list-style-type: none"> ○ Clustering is a good (sub)criteria • Utilities STILL may not be ready
3	Universal Deployment	<ul style="list-style-type: none"> • Large volume = low prices • Can kick-start many co-benefits (enterprise re-vamp, retail competition-related, renewables, etc.) • Solves an issue of "cherry-picking" when we move to separation of carriage and content 	<ul style="list-style-type: none"> • Very, very large exercise • Utilities less likely to be ready • Standardization has its limits (both for cost-saving and applicability to local conditions)

It is more than the capital costs which should guide the roll-out plan.

The most fundamental point is the system *design* relationship:
Costs ↔ Functionalities ↔ Benefits

What is it we want to achieve, what design(s) make sense, and *then* what are the benefits?

Functionalities depend on architecture and design. Certain threshold (limited) deployments may have lower total cost but higher per consumer costs if communications costs per user rise without sufficient clustering. Some threshold (limited) deployments may also not enable certain functionalities. E.g., how can one differentiate supply between neighbors unless all are on smart meters? Similarly, leakage detection becomes both easier and timely when all consumers in an area have granular and time-stamped metering.

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It is also important to note that some benefits are an output side metric and unknowable for sure in advance. E.g., one cannot know what the consumer participation rates would be a priori (e.g., peak load shifting due to price signals).

Successful rollouts for smart metering require 3 issues to be answered:

- 1) Are utilities ready?
 - a. R-APDRP rollout giving consumer indexing, GIS, databases, etc. (“building blocks”)?
 - b. Do we have *appropriate* feeder and DT metering in place (for near real-time visibility and push messaging)?
 - c. What are the options for rural and agricultural metering (e.g., innovative pole-mounted solutions)
- 2) Do utilities have a plan?
 - a. Roadmap for scaling up, new functionalities, new services, manpower, etc.?
 - b. Cost-benefit analysis to guide which functionalities are key, as well as where any deployment should start? Even universal deployment will take several years (Italy (Enel) took ~5 years planning, 5 years roll-out; Southern California Edison took similar (slightly less for each step).
- 3) Is there Regulator buy-in?
 - a. The significant capital expense needs a plan (how much can go in the ARR?)
 - b. What is to be done with newly-installed (digital but not smart) meters?
 - c. What are the new pricing schemes and new services to be offered? What are impacts on consumers?

There are 3 options for existing meters

- 1) Re-use them in areas NOT planned for immediate Smart Grid deployment
 - 2) Upgrade them to become AMR if not fully smart – not as easy since they are not standardized
 - 3) Write-off the balance life (this cost, pro-rated, would then have to be justified by additional benefits for the Smart System)
- [options such as asking the supplier to do a buy-back or even swap-out is unlikely to work because (a) the techno-economics may not work out, and (b) one is then locked to using the same vendor]

A cost-benefit analysis is a key ask from regulators to give approvals. Else, a top-down requirement risks becoming an unfunded mandate, or one that is undertaken with a “tick-mark” mindset.

The best scenario would be where DisComs would vie for support for universal deployment by having their homework, road-map, and business-case (cost-benefit analysis). This gives lowest costs per consumer, but we start with where it makes sense. In addition, we must enable future plug-and-play rollouts. This means we must have DT metering, Back-end (software/analytics) etc. all ready. The missing link remains communications.

If we only do a subset of consumers in the immediate run, one still needs a communications platform (typically PLC or wireless mesh – GSM/3G per consumer is expensive). With this in place, it could be designed to add more consumers as the threshold tightens. However, the details of such models need further examination.

Suggestions / Educated Guesses (based on discussions with Discoms¹)

¹ Data from several Discoms show 500/200 unit thresholds leaves many pockets with relatively low *number* of consumers, making some functionalities harder.

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In an ideal world, we would have universal deployment, and utilities would be ready for it. Then again, they would have already successfully implemented R-APDRP, had all feeders real-time monitored, filed tariff proposals on time, had appropriate manpower ready, reduced losses to 15%, etc. Given the practical difficulties of today, a balanced approach is more realistic. It may even be more cost-effective, in that different areas have different priorities and needs. Universal rollout but in steps also allows us to re-use existing digital meters while roll-outs progress.

We should start with universal deployment in clustered areas (full utility or sub-sets there-of, e.g., cities, divisions, etc.), where 2 criteria are met: (1) Background homework is ready (see above); (2) the business case and functionalities are clear. All utilities would start, just at different scales, and have tight timeframes for true universal deployment.

Loss reduction might be an attractive driver, but isn't the only criteria for a business case. First, there are many states with relatively low losses which are more efficient/professional, and it is precisely there where Smart Meters (rather, Smart Grids) are more likely to work. A very high loss area needs political will for any change to work. Thus, where we have high losses but clear political support for change is where we also have a good driver (almost a U-shaped curve across the utilities for losses and where we should start). Utility ratings may give a *starting point* for assessing utility maturity levels.

The next step should be a multi-level, multi-stakeholder discussion(s) on how to create both thresholds for universal deployment (in that area) as well as tight roadmaps for making roll-outs truly universal.

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