Meter Farms

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Meralco
January 9, 2019

Panel Session Overview

- Define a Meter Farm

- Discuss how to size and format a meter farm
  - Discuss what features should be included in your meter farm

- Discuss Uses of a Meter Farm

  - Before deployment

  - During deployment

  - After deployment

  - As a new way to do old tasks in a Post AMI/AMR world

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What is a Meter Farm?

- A Meter Farm is a representation of your meter population in the field

- The Meter Farm is designed to be a tool to measure base line performance of your meters

- Meter farms are typically located outside so meters are exposed to the same temperatures, sun and elements as your meter population.

- Meter Farms should include a simulation of the entire communication network back to the head end

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How big? How many? What forms?

A Meter Farm needs to have a statistically significant representation of your meter population in the field. This means a minimum of 30 meters regardless of population. Typical farms have 50 to 100 meters for populations up to 50,000 meters and several thousand meters for populations over two million.

The breakdown of forms should be roughly representative of the breakdown of meters within your population. 2S meters will typically have 85 to 90% of the spots in a meter farm. Every polyphase meter is represented with a minimum of two to three sockets if possible.

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What features to build-in?

Meter Farms will be used as a population management tool as well as a diagnostic tool and a certification/validation tool. To accomplish all of these things various features should be built in;

- Representation of all forms used in the field in any volume in the meter farm;

- Ability to add load to certain meters

- Communication protocols so that firmware and software updates to meters, collectors and the head end system can all be tested and verified

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Using a Meter Farm prior to deployment

Prior to deployment you are still in Meter Certification mode. Much of this work is done on meter qualification boards, programming stations and meter test boards.

Typically once the work in the meter lab is completed utilities will jump directly to a pilot program for a limited number of installations in the field. The weakness with this is that the pilot program is not dynamic.

The assumption had been made that the meters used in full deployment would be static. What was tested during the initial portion of the Meter Certification phase would be representative of what was eventually deployed.

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Meter Farm's prior to deployment (cont)

Inaccurate assumption. Meters and firmware change. Programs to be used in the field change. Communication protocols and information passed change. A meter farm allows you to perform a mini-pilot and to control and modify this pilot multiple times during meter certification.

The meters in this meter farm also allow for longer term observation of the new meters performance in the field. Any anomalies reported from the field during your pilot can be more readily identified and diagnosed.

This is a precursor to some of the ways in which you will use the meter farm after deployment.

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Meter Farm's during deployment

During deployment the meter services department is trying to manage competing demands.

You are managing the largest metering related project in the company's history and you are also trying to maintain the integrity of the daily reading and billing of every customer's account.

Everything has to remain perfect while being completely changed.

Meter Farm's during deployment

The meter farm gives you a microcosm of your population and as a result can be used as a baseline to ensure the longer term stability of the meters being delivered and to ensure that they are not changing over the course of the deployment.

Functional testing and accuracy testing allow you to do this as well. The meter farm allows longer term performance comparison between delivered meters over the course of the deployment.

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Meter Farm's after deployment

This is where meter farms are the most valuable. The meter farm becomes your most valuable tool in managing your AMI population.

Prior to a full scale AMI or AMR roll out you had a variety of meter types in the field with meter vintages that often ranged over a fifty year time period and sometimes longer.

To assess the performance of these meters and to look for potential systemic issues within a particular family of meters statistic methods were used.

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ANSI C12.1-2013 Section 5

ANSI C12.1 Section 5 is dedicated to methods for statistically sampling your meter population to determine as far in advance issues within a meter population.

This methodology is typically used with the larger meter populations (e.g. self contained) as they have the most statistically relevant populations and the ones best managed in this way.

But with a single meter type this becomes problematic. A systemic issue within a population would be found far too late. Too many false positives would be found if trying to use this on the front end and too many other issues missed.

And metering issues are now just as likely to be a communication issue and not a meter issue.

Meter Farms as base line performance indicators

How well is a meter type performing in the field? Walk through the meter farm. That is a pretty good initial indicator.

- Display issues? – You should see them.

- Power recovery issues? You can check for them.

- Component failures? You should see them.

In a perfect world you should see issues before the field reports them or in the same time frame.

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Meter Farms as diagnostic tools

Metering issues in the field are a constant part of our lives. Most are readily dealt with. Some are not.

Issues traditionally could be identified as either a meter issue or an installation issue.

Now the issue can be a meter issue, an installation issue, a communication issue (which can be in the meter, can be site specific or be further up the communication chain), and even a customer equipment issue.

And yet most utilities still send a meter tech out to change a meter as the first line of defense.

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Meter Farms as diagnostic tools (cont)

When a meter is brought back to the shop a series of diagnostics can and are run in the meter lab.

Programs are checked, alarm settings, functional tests are performed, possibly accuracy tests are performed. If that meter passed these initial checks they might be released back to the field. And that meter might come back a second or even a third time.

Now this meter can be put out onto the meter farm and run against other meters of a similar age or older and checked for any anomaly over time. Acceptance protocols can be run and performance checked one meter against the others.

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Meter Farms as acceptance testing environments

One against many. Newer against older. There is one thing for certain in metering today. The meters we are purchasing today are not the same as the meters we purchased last year. The meters we will purchase next year will not be the same as the meters we purchase today.

- The components within the meter may change

- The firmware within the meter or within the collectors will change.

- We may elect to change settings.

- The software in the head end, the collectors or the meters may change

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Meter Farms as acceptance testing environments (cont)

Develop protocols. Check for outage management issues, surges and sags, load and no load scenarios. Use what you learned during your certification and acceptance testing (and continue to learn) and incorporate this into your protocols.

Put the meters through the ringer for the first several days and longer.

What are we looking for? Nothing. Nothing different. Different is bad. A difference in display – bad. A difference in readings – much worse.

We want the new meters to perform, respond and look exactly like the base line meters.

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Meter Farms as acceptance testing environments (cont)

Use these same protocols when testing over the air upgrades or new communication protocols of any sort.

Anything new – check before deploying to the field. This is your test environment.

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Meter Farms as Development tools

Meter farms can also be adapted and used to test new technology. This can range from new collectors for a mesh system to new metering applications that are brand new to your utility.

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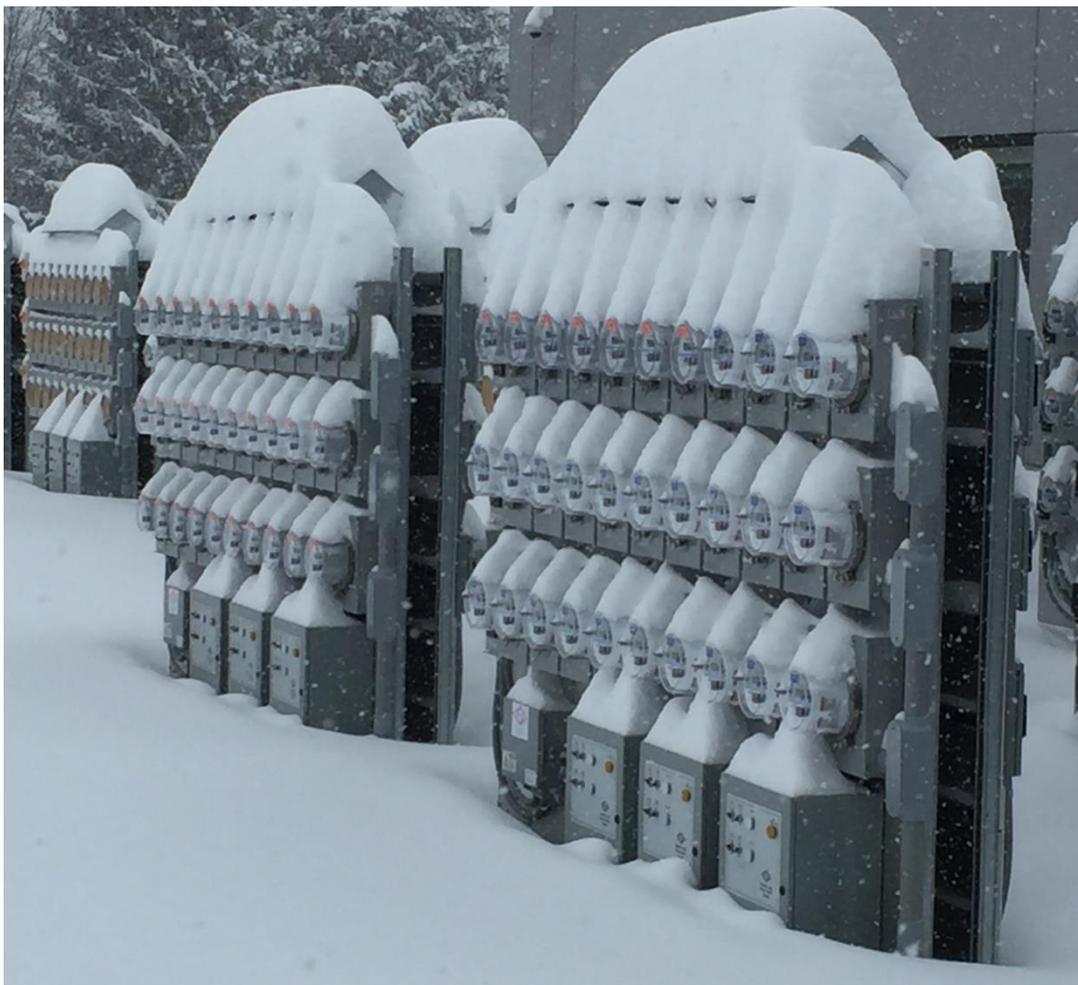THE EASTERN SPECIALTY COMPANY

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Questions and Discussion

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