*Smart Grid Implementation Workshop*

Breakout Group Report

# *Optimizing Asset Utilization and Operating Efficiency Efficiently*

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# Major Findings/Caveats

- **Optimizing asset utilization and operating efficiently depends on proper integration of technologies with business processes and associated IT**
- **Build metrics, by definition, need to be updated regularly to reflect new technology**
- **Build metrics should not be technology prescriptive or result in narrowing technology options for Smart Grid (should be as "technology agnostic" as possible)**
- **Build metrics need to differentiate between statistics measuring number of deployed widgets/data versus having the widgets/data available for use**
- **Focused value metrics are probably more critical, relevant, and meaningful than "build" metrics; however, build metrics could be considered as "leading indicators" of SG**
- **Build metrics will be different for transmission, distribution and consumer parts of the "asset utilization and operating efficiently" smart grid characteristic**
- **Advanced materials and equipment, local communications and local intelligence are also part of the solution for Smart Grid**

# Metrics for Measuring Progress

| Transmission | Distribution | Consumer |
|---|---|---|
| • # of assets deferred and period of deferral (better use of exstg)<br>• # of MW that are controlled by VOLT-VAR<br>• % of assets with real-time condition monitoring and diagnostics<br>• # of lines with dynamic rating capability<br>• # miles of line with expanded transmission capacity through advanced materials, e,g, superconductors, FCLs, and composite conductors, etc. | • # MW of DG/storage connected to grid as dispatchable asset<br>• % of smart grid enabled switches/reclosers/ capacitor banks<br>• # of MW that are controlled by VOLT-VAR<br>• % of assets with real-time condition monitoring and diagnostics<br>• # of customers connected per automated circuit segment | • # of smart meters<br>• # of customers utilizing real time pricing<br>• # of MW of dispatchable demand response |
| • # of IEDs (smart sensors) deployed<br>• % of IEDs with communications that allows it to perform its function<br>• # of operational IT applications that are integrated | | |

# Metrics Issues (General)

- Need to determine who (organization) is responsible for "owning" the metric (collect, publish)
- How to get data (historical and future) from utility
- Need to identify critical data needed to calculate metric
- Need to define common method to "measure" the parameter
- Need to define division of responsibility for data collection policy→ state (distribution) vs Federal (transmission)
- Before selecting communication infrastructure we need to know all smart grid functionalities and technologies that will be implemented

# Crosscutting Metrics (T, D, and C)

**# of IEDs (smart sensors) deployed**

- Issues
  - Easiest to measure
  - Should be used as the baseline
  - What should be the end point
  - Break into categories:  1) asset monitors, 2) power monitors, 3) meters, 4) controllers
  - There will be a different metric for each area of the power system (Transmission, Distribution, and Consumer)

# Transmission Metrics (1)

- **# of assets deferred and period of deferral**
  - This is investment that is deferred while still maintaining the same result (e.g. reliability/performance) through better utilization of existing assets
  - Assets need to be tracked by category (large investment items)
    - Transmission lines
    - Substations
    - Substation transformers

# Transmission Metrics (2)

- **% of assets with real time condition monitoring and diagnostics**
  - Need to track according to each category of asset
    - Substation transformers
    - Circuit breakers
    - Static Var systems, FACTs devices
    - Capacitor banks, Shunt reactors, series capacitors
    - Transmission lines (e.g. dynamic line rating) - this was listed as a separate index but can be included in this set of indices
    - Surge Arresters
    - Insulators
    - Towers
  - Need to define the criteria that qualifies as real time condition monitoring and diagnostics
    - Communications
    - Diagnostics
    - Notification/alarming
    - Etc.

# Transmission Metrics (3)

- **Amount of active Voltage and Var control on transmission systems**
  - What technologies are included
    - FACTS
    - SVC
    - Series capacitors
    - HVDC
  - What is metric?
    - MVAR of compensation/active control (could include storage)
    - Increase in transmission capacity (MW)
    - % of MW or MVAR that are controlled with advanced equipment

# Transmission Metrics (4)

- **# miles of line with technologies for expanded transmission capacity**
  - Need to identify examples of technologies that are included in this metric
    - Superconducting cables
    - Composite conductors
    - Distributed transmission line var compensation
    - FCLs mentioned as technology to consider but may not be appropriate for this specific metric - this could be a separate metrics related to advanced fault management
  - Miles of line may not be the best metric for measuring the increased transmission capacity - if we used another metric like the increased capacity itself, we could include technologies like FACTS, FCLs, etc.

# Transmission Metrics (5)

- **# of IEDs (smart sensors) deployed**
  - There are multiple categories of devices
    - Voltages, currents, powers, etc
    - Physical quantities (temperature, pressure, wind, etc.)
    - Analytical quantities (gas analysis, etc.)
  - We should track these by elements of the system that are being monitored/managed
    - Transformers
    - Lines
    - Breakers
  - Criteria for including
    - Communications
    - Intelligence?

# Transmission Metrics (6)

- **Level of Implementation of Extensible Common Information Model and Integration Bus**
  - This is an infrastructure metric
  - It needs to be measured with some kind of matrix of the applications that are integrated with interfaces that are standardized
    - EMS/SCADA (%)
    - GIS (%)
    - Asset Management Systems (%)
    - Etc.  - need a full list for tracking

# Consumer Metrics (1)

- **# of smart meters**
  - Percentage of meters with
    - 2-way communications
    - Open protocol (plug and play)
    - Load management capability
    - Home area network enabled
  - Sources
    - Utilities/meter companies

# Consumer Metrics (2)

- **# of customers with dynamic pricing**
  - Percentage of meters with
    - Time of use
    - Real time\dynamic pricing (enabled and utilized for both
  - Sources
    - SECF *(??– handwriting unclear….)*
    - Utilities

# Consumer Metrics (3)

- **# of MW dispatchable**
  - Percentage of meters participating
  - Available kW/meter
  - Realized kW/meter
  - Analysis needs:
    - Participation dynamics
    - Factors driving predictability *(or prepilatability? Or predilatability? – handwriting unclear)*
  - Sources
    - Utilities

# Value Metrics (Parking Lot)

- **Deferred generation**
- **Maintenance costs versus reliability**
- **Time to convert data to action**
- **Hours of overtime**
- **Transmission grid/line power losses (%) over time**
- **Joules of energy consumed/joules of energy sold**
- **Improved circuit load factors**
- **# or cost of assets where upgrades are deferred/eliminated that can be directly attributable to a technology/approach**
- **System load utilization (peak load/average load)**
- **Unplanned outage rates**
- **Reduction in reliability violations**
- **$ savings by optimizing and utilization of existing transmission assets**
- **Capital improvement costs versus demand and energy (load factor)**
- **Increase in capacity/cost ($)**
- **Transmission and distribution losses (total energy delivered/total energy generated)**
- **# years of equipment life increase**