**LFE SAM Major Use Case Groupings**

**Grouping Name:** Basic Metrology

**Functions Included:**

* Record Time Series Data
* Simple Billing

**Description**: The SAM needs to measure, collect and record (locally) high-resolution V & I (current, voltage and power) as a time series. Local computing and analysis is conducted on the data and reported both locally (to customers) and to back-end systems to support utilities or researchers.

**Grouping Name:** Data Access

**Functions Included:**

* Pull Measurement Data
* Customer Limit Awareness
* CLI Data Access
* Data Access
* Opt In Data Access

**Description**: The SAM will facilitate data accessibility and portability for utilities, customers, and third-parties. Measurement data stored by SAM can be uploaded to the utility’s backend system when requested by the utility. Customers can access their historical data on-demand and can provide access to third-parties on an opt-in basis.

**Grouping Name:** Disaggregation

**Functions Included:**

* DER Detection
* Behind the Meter Load Awareness
* Unify metering/ Multi-utility Metering

**Description**: SAM enables residential customers to locally track their energy usage across major energy consuming appliances with only one device and without sharing that private data. Information pertaining to relevant events is shared with the DSO or energy Retailer and subject to consumer consent. Initially this disaggregation will cover major DERs such as PV production and EV charging.

**Grouping Name:** DER Management

**Functions Included:**

* EVs as a Grid Asset
* Curtail Behind the Meter Solar
* EV Charge Management
* DER Optimization
* Reduce peaker Usage
* Neighborhood Energy Transactions
* DERs for Economy

**Description**: SAM will facilitate two-way communications between DERs and the utility to maximize DER utilization based on co-optimized premise-level and system-level needs

* PV management = PV inverters begin and end curtailment when requested by utility operation from control center during times of excess production,
* EV management = Coordinate EV charging and discharging (battery charge or dispatch)
* DER disaggregation = Assessing DER capacity, energy, and grid services availability at the device and premise-level.
* DER Optimization = optimized and coordinated dispatch based on utility-defined goal (economic, reliability, etc.)
* Peer-to-Peer Transactions: Customers within the distribution system can transact with one another for real and reactive power in real time based on DER availability

**Grouping Name:** Outage Management

**Functions Included:**

* Surgical Load Shedding
* DERs for Stability

**Description:** Avoid outages to the many by strategically dropping or reducing service to a few loads. SAM could carry out the shedding, as well as identify loads of lowest expected harm to shed. SAM can also strategically and safely facilitate islanding individual customers to maintain or restore service during outages.

**Grouping Name:** Predictive Forecasting

**Functions Included:**

* Short term forecasting of customer netload
* Short term forecasting of local PV
* Classify anomaly
* Predict anomaly

**Description**: Produce local nodal forecasting of net load for planning decisions factoring in PV and Wind production as well as other historical measurements. Forecasting will include recommended hosting capacity thresholds, safety risks / limits, equipment failures and potential outages. Update predictive models to recommend hosting capacity thresholds. Predict safety risks, equipment failures, and outages

**Grouping Name:** DER Validation

**Functions Included:**

* DER Accounting
* DER Validation

**Description**: Once a specific action is taken (ex. Curtail PV production by Xkw), SAM then validates DER performance and compliance with the instruction and shares relevant information with customers and DSOs. SAM is able to detect contract violations where DERs are subject to specific contractual constraints. On an ongoing basis SAM monitors and reports relevant information pertaining to DER’s ongoing performance.

**Capabilities required:**

* Disaggregation is a prerequisite

**Grouping Name:** Customer Engagement

**Functions Included:**

* Energy Usage Displayed to Customer
* Programmable Alarms and Events
* Climate Aware Usage
* Dynamic Incentives
* Support Flexible Tariffs

**Description**: SAM can send real-time notifications regarding energy consumption to customers to elicit demand response (conservation during peak demand, or increased usage during times of low prices or high/excess intermittent renewable generation, local congestion management, etc.). Customers can opt-in to automated, algorithmic responses to take action based on SAM notifications. Customers can override opt-ins and SAM will respond accordingly.

**Grouping Name:** Correct Records

**Description**: Update utility models for distribution system

**Grouping Name:** Grid awareness

**Functions Included:**

* Record local power quality
* Get Local Grid Conditions
* Identify Security Breach
* Detect unbalanced phase loads
* Problem Spotting
* Estimate meter to transformer assignments
* Track and Inform Hosting Capacity
* Estimate Hosting Capacity

**Description**: SAM uses line-side V & I data to provide utility with real-time information on local grid topology, conditions, events, and anomalies such as congestion, real-time hosting capacity for DERs, safety risks, equipment failure, fault and impedance detection, and anomalous power quality.

**Grouping Name:** Remote management

**Functions Included:**

* Remote Connection Management
* Remote Dis/Connect
* Neighbor Health Monitoring

**Description**: The SAM needs to provide the Utilities (DSOs and Energy Retailers) the ability to remotely turn service on/off. Send distress signal on behalf of neighboring SAM who stop checking in, covering device health case for communication or total device failure

**Capabilities required:**

* Remote disconnect switch controllable (including reset) via LTE.