Analytics Use Cases and Foundational Components

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- we can share results from a study which performed phase identification using supervised and un-supervised learning or I could provide analytics use cases for difference areas in a utility and then go through in more detail.

Analytics Use Cases and Foundational Components

Transmission and Distribution

Meter voltage profiling
Transformer load profiling
Customer load profiling
Meter events/status

- Improve Situational Awareness
- Optimize Event Prediction & Response
- Improve Operational Reliability
- Anticipate Energy Events

Asset Management

Predictive maintenance forecasting
Predictive failure forecasting

- Optimize Asset Health
- Optimize Asset Deployment
- Mitigate Critical Infrastructure Risk

Customer Engagement Group

Meter to cash optimization
Improve energy program adoption
Improve e-billing adoption

- Know the Customer
- Optimize Customer Segmentation

Human Resources

Targeted retention
Turnover modeling
Risk management

- Optimize Performance Mgmt
- Optimize Planning & Design

Finance

Model based forecasting
Budget performance (impact drivers)
Employee expense fraud detection
Capital portfolio optimization

- Optimize Performance Mgmt
- Optimize Planning & Design

Power Supply

Analyzing power demand and usage profiles to better understand potential success of demand response and load shed

- Understand Cust Energy Usage
- Understand Cost To Serve
- Anticipate Emerging Technology Impacts
- Transform Rate Analysis

DER Integration

1 VOLTAGE ANALYTICS CAPABILITIES

Distribution Engineers, Distribution System Operators, and Planners will evaluate voltage data at customer meter end points and at several strategic bellwether locations along a circuit. The analysis will help to facilitate several proactive decisions Planners, Distribution Engineers, and Distribution System Operators need to undertake such as customer voltage complaints and circuit voltage criteria violations.

2 ENERGY AND POWER ANALYTICS CAPABILITIES

Distribution Engineers will evaluate the energy consumption data starting with the end-point customers and aggregating it to the transformer, sub-circuit, circuit, and substation bank level. The data will then be analyzed to (1) understand the asset loading conditions of the electrical network, (2) provide comparisons to nameplate ratings of the assets, (3) provide comparisons to the SCADA data recorded at substations and primary network, and (4) present loading status in the form of heat map visualization. The detailed power flow of the entire network will be utilized by various enterprise planning tools including System Modelling Tools, Long Term Planning Tools, and Grid Management Systems.

USE CASE 3 – BASE ENERGY AND POWER ANALYTICS

Description

Users will have the ability to view aggregate load and generate load profiles of service transformers by aggregating load from the customers connected to the service transformer. Based on the load profiles at the meter and transformer, generate an area wide heat map visualization to identify potential customers and transformers at risk. Users are able to view the data in tabular or on any graphical user formats.

USE CASE 4 – ADVANCED ENERGY AND POWER ANALYTICS

Description

Users will have the ability to view aggregate load and generate load profiles of strategic nodes upstream of multiple transformers by aggregating load from the customer to the transformer to the strategic node (for example, Branch Line Fuse) along the same circuit. The same analysis can also be used to further aggregate the load to the getaway breaker level as well as the substation bank level. User is able to cleanse and normalize data while creating the profiles. Based on the load profiles at the meter, transformer, and circuit level, generate an area wide heat map visualization to identify potential customers at risk. User is able to integrate other data such as weather and conduct sensitivity analysis.

USE CASE 5 – DER PROFILES

The proliferation of distributed energy resources (DERs) in Southern California requires planners and engineers to have a more comprehensive view of the performance of the grid. This means planners and engineers should have the ability to query each of these assets for basic asset information, such as nameplate and identification numbers, but also have the ability to query the historical performance of metered DERs, as well as other distributed generation (DG). With the Grid Analytics Application (GAA) SCE plans to provide system planning personnel with the tools required to view this new data dimension not readily available in the past.

Description

As part of the regular distribution planning process, an SCE planner is required to perform analysis of the historical performance of the distribution energy resources (DERs) and distributed generation (DG) connected to a distribution circuit. Using the Grid Analytics Application (GAA) the planner first queries the distribution circuit for all the interconnected generation within it. This query can be performed at the substation level as well as at the circuit or sub-circuit level.

3 ASSET HEALTH ANALYTICS

USE CASE 6 – BASE ASSET HEALTH ANALYTICS
Description
Distribution Engineers and Planners are able to perform system wide service transformer capacity analysis and load growth. This includes the ability to perform service asset load factor, asset
load/generation addition impacts, and asset failure degradation calculations (e.g. transformer and conductor life expectancy).

USE CASE 7 – ADVANCED ASSET HEALTH ANALYTICS

Description

Distribution Engineers and Planners aggregate the peak kVA load at the transformer level and compare to the nameplate rating, IEEE Standards, SCE design standards, and other loading criteria. Users then will evaluate overloaded assets (e.g. transformers, conductors, fuses, etc.) to identify those at risk and calculate asset loss of life.

USE CASE 8 – BASE ASSET CONNECTIVITY ANALYTICS

Description

Using the Grid Connectivity Model user is able to identify various assets connected at different levels of circuit hierarchy (i.e. substation, circuit, circuit segment, load block, transformer to meter). Typical information presented to the user will include total assets and customer counts connected to the circuit section being queried.

USE CASE 9 – PHASE DISCOVERY ANALYTICS

Description

Using the smart meter voltage signature, consumption data, and SCADA data, system should be able to ascertain the “phase” of all single phase transformers in the system (for both phase to neutral and phase to phase connected transformers)

USE CASE 10 – SECONDARY SIZING ANALYTICS

Description

Currently the conductor sizes for all the secondary and service network are not fully available in any of the mapping systems at SCE. For conducting voltage drop and flicker analysis by planners, it is essential to have an approximately accurate sizing chart for this network. Through this analysis, utilizing smart meter voltage, power consumption data, and distribution design standards, users are able to estimate the type of secondary/service conductor connecting end points to the service transformers. SCE's distribution design standards and some additional assumptions regarding the sizing parameters will be provided by SCE subject matter experts for this analysis.