Interpreting Reliability Data

A New Approach to Benchmarking

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Purpose of the Study

• SAIDI, SAIFI are internationally recognized indices used to describe electric service reliability at distribution level

• Used to:
  – Provide Context
  – Understand correlations
  – Improve performance
  – Estimate future performance / establish resource needs

• Public Data available (IEEE, EIA, Regulators, CEER, Utility websites etc.)
Reliability Growth Model
Results include rows where 'ID_4'=301 or 'ID_4'=302.
Performance Quantification

\[ \Delta = 8\% \]

- Estimated SAIDI
- Actual SAIDI

Cumulative Time (years)

Cumulative IEEE SAIDI

Results include rows where 'ID_4' = 301 or 'ID_4' = 302.
Trending / Prognosis
Performance by System

OH contribution to total SAIDI is higher than the contribution of UG. However, both systems are comparable in size.
Performance by Cause

Vehicle hits have higher contribution to the SAIDI however balloon caused outages are increasing.
Reliability Index

- Compute average yearly SAIDI and SAIFI
- Assess SAIDI and SAIFI evolution over time
- Determine second order performance change (tip-up or tip-down)
Project Status - Benchmarking

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<thead>
<tr>
<th>Utility</th>
<th>Example</th>
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<tbody>
<tr>
<td></td>
<td><img src="image1" alt="Green" /> <img src="image2" alt="Amber" /> <img src="image3" alt="Red" /></td>
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</tbody>
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Green values are good, Amber needs to be monitored, Red is concern

Multivariate Machine Learning Algorithm based on utility data, self adjust with the “information content” of the data
Overall score combines all features
Outlier rejection included
Model builds with experience
Influence of individual good / bad years is minimized

<table>
<thead>
<tr>
<th>Average SAIFI</th>
<th>Average SAIDI</th>
<th>SAIFI Trend</th>
<th>SAIDI Trend</th>
<th>SAIFI Tip-up/down</th>
<th>SAIDI Tip-up/down</th>
<th>Score</th>
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Algorithm (outlier rejection, level, trend) can also be used for visualization

- 25 PUDs
- 220+ Munis
- 400+ Coops
- 150+ IOUs
- 800+ Utilities
State Cooperatives Example - Median Data

Size of bubble relates to number of CoOps reporting

Data Scrubbed Outliers Rejected
2103 to 2018
State Cooperatives Example - Trending

Data Scrubbed
Outliers Rejected
2103 to 2018
State Cooperatives Example - Local Context
State Cooperatives Example - Benchmarking

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- Multivariate Machine Learning algorithm creates a single reliability index for benchmarking purposes.
- Index can be used to compare with other state cooperatives.
- Can be used with peers selected by other criteria (not geographical proximity).
- Can be used with any level of granularity.
Thank you for your attention!

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