

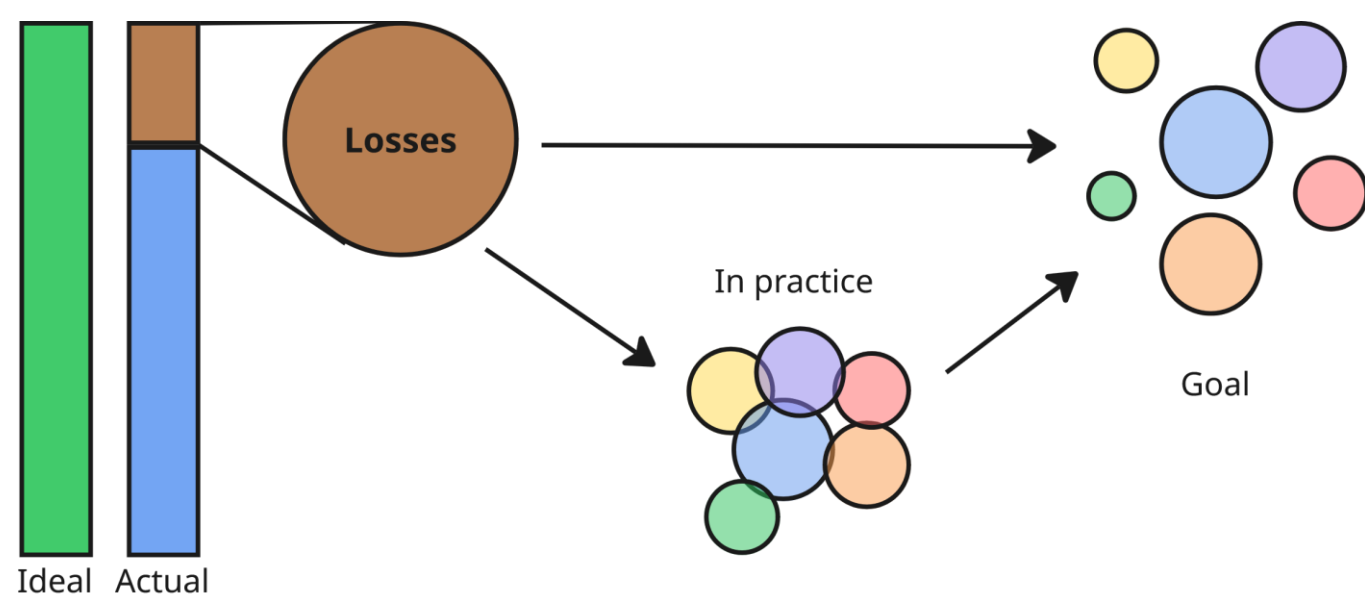
Quality Control Overview

All raw data is processed through the same quality control methods to:

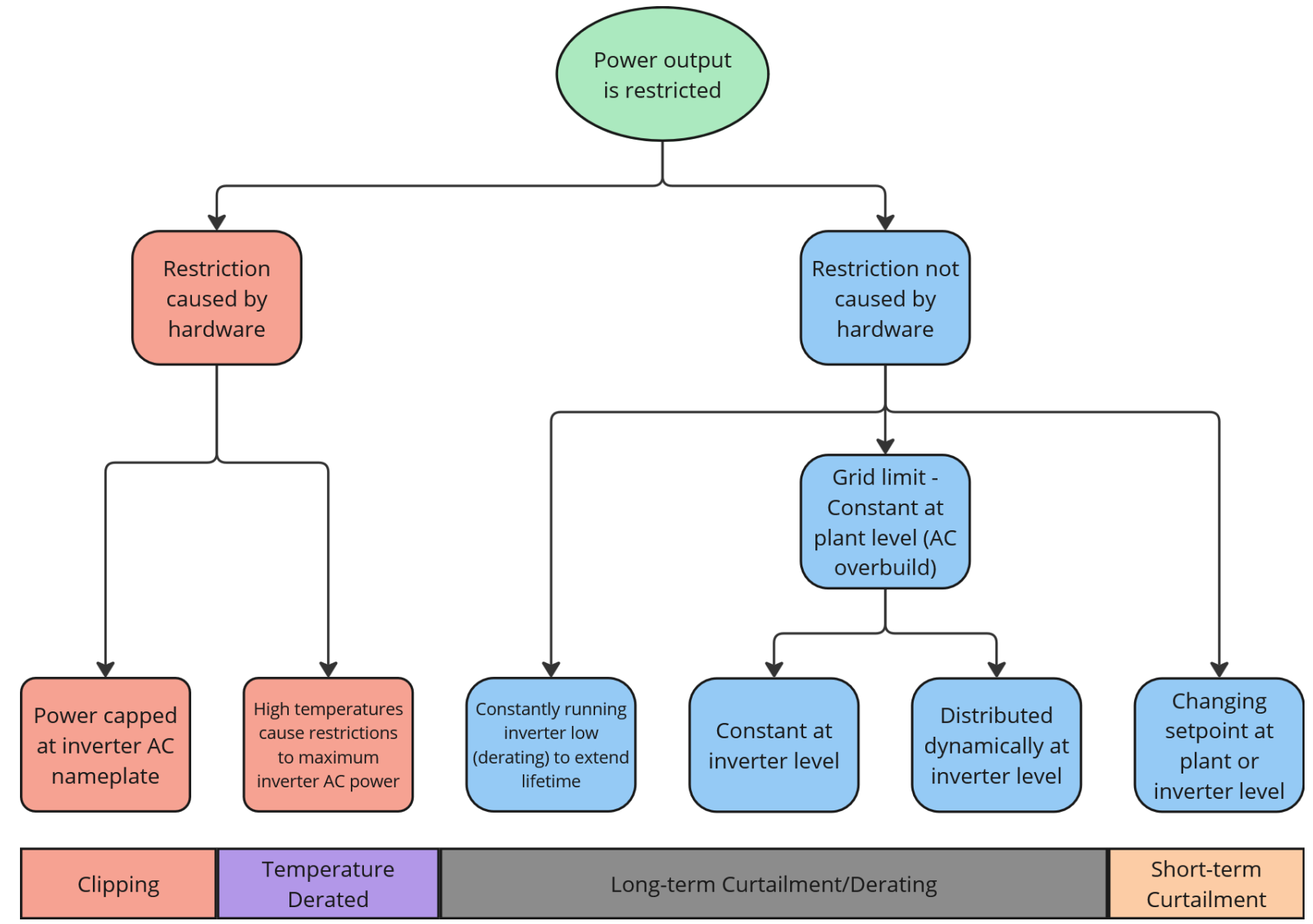
- Flag bad data
 - Stuck, interpolated, physically improbable
- Identify unit errors, time zone errors
- Label clipping/curtailment/derating
- Classify missing data as data outage or power outage using energy meter or plant-level meter
- Verify metadata

Data Flagging

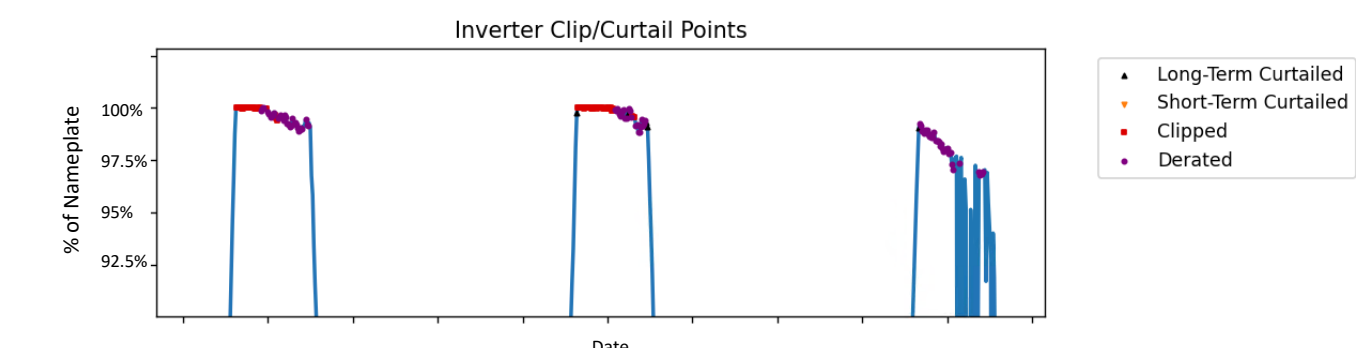
- Accurately flagging and classifying the various losses that impact a plant allow owners and operators to assess and target their most impactful issues.
- SUPER utilizes these flags and filters to isolate and calculate various loss categories with the goal of continuing to improve category separation.



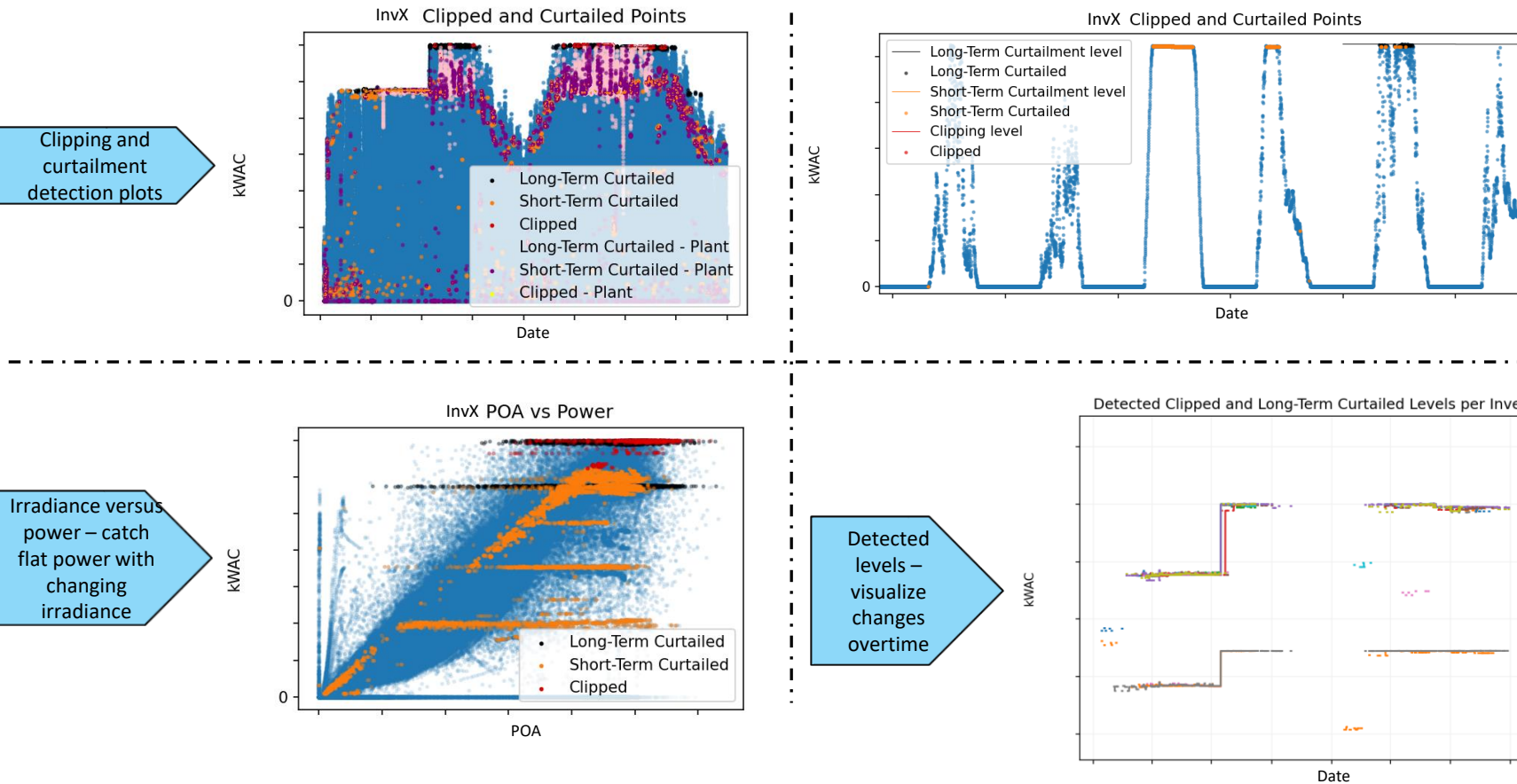
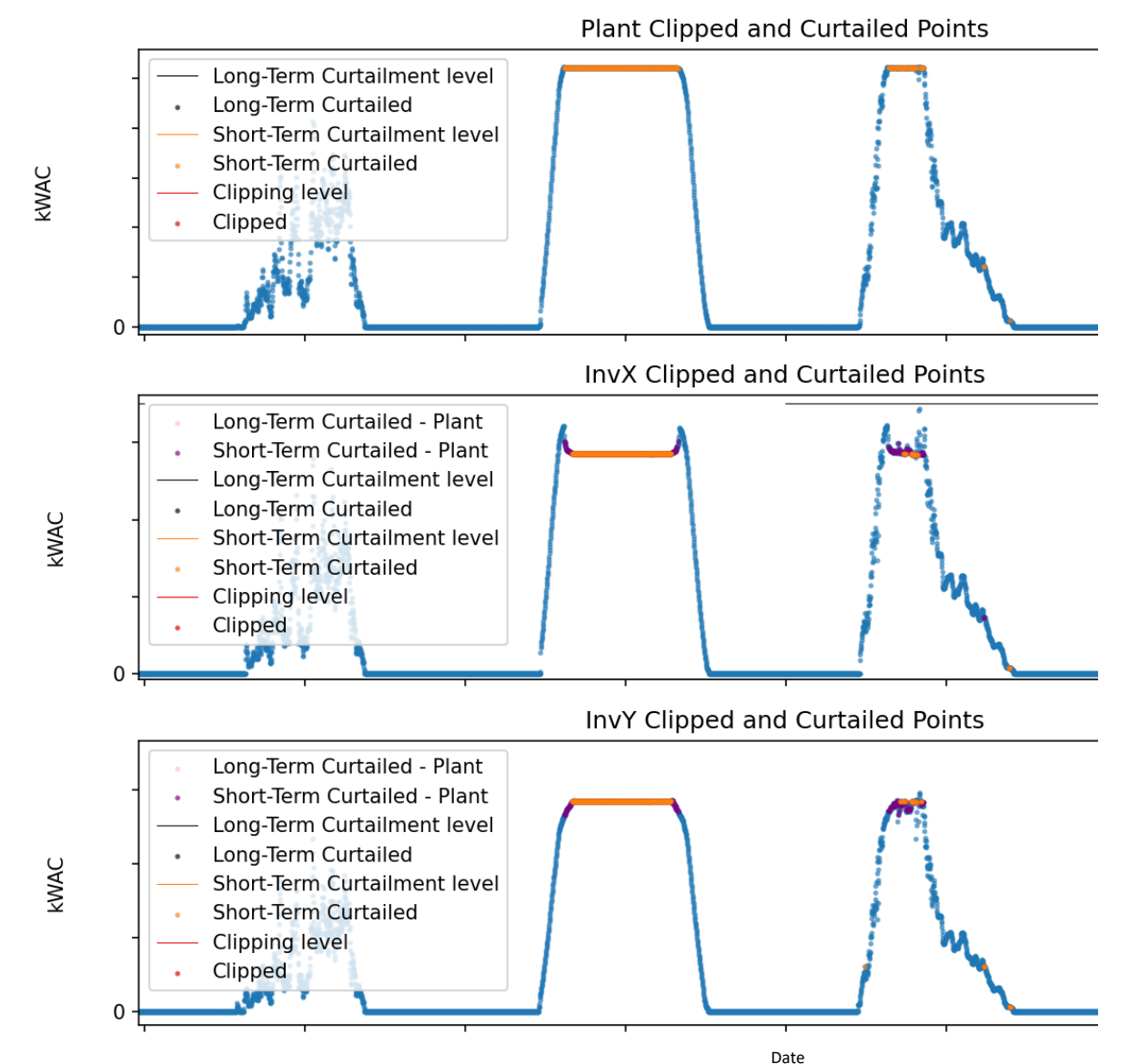
Power Restrictions: Clipping, Curtailment, or Temperature Derating



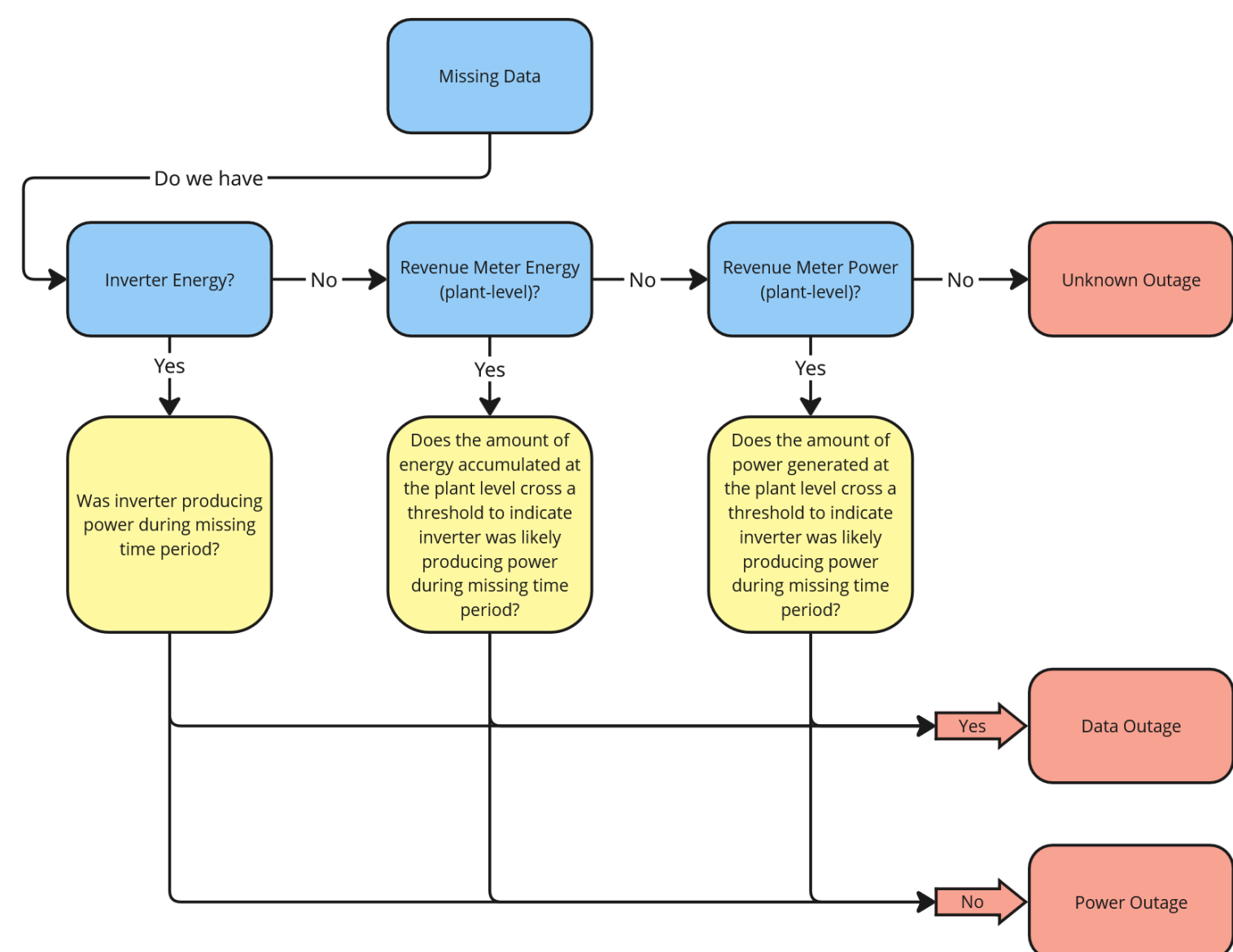
Inverter Temperature Derating



Applying Plant Level Impacts to Inverters



Missing Data: Power Outage or Data Outage



Power Method

Example: If a site has 10 inverters but 1 is missing data...

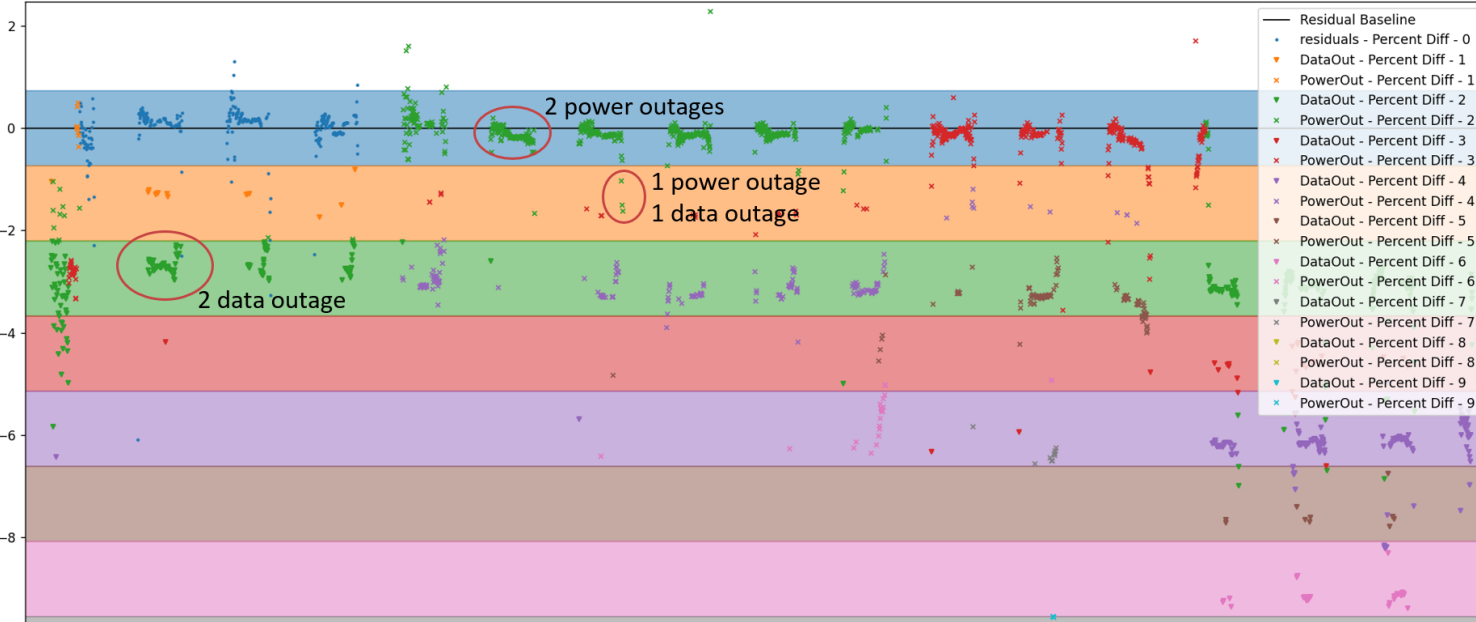
Power Outage

• If: $\sum 9 \text{ Inverters} \approx \text{Plant Power}$

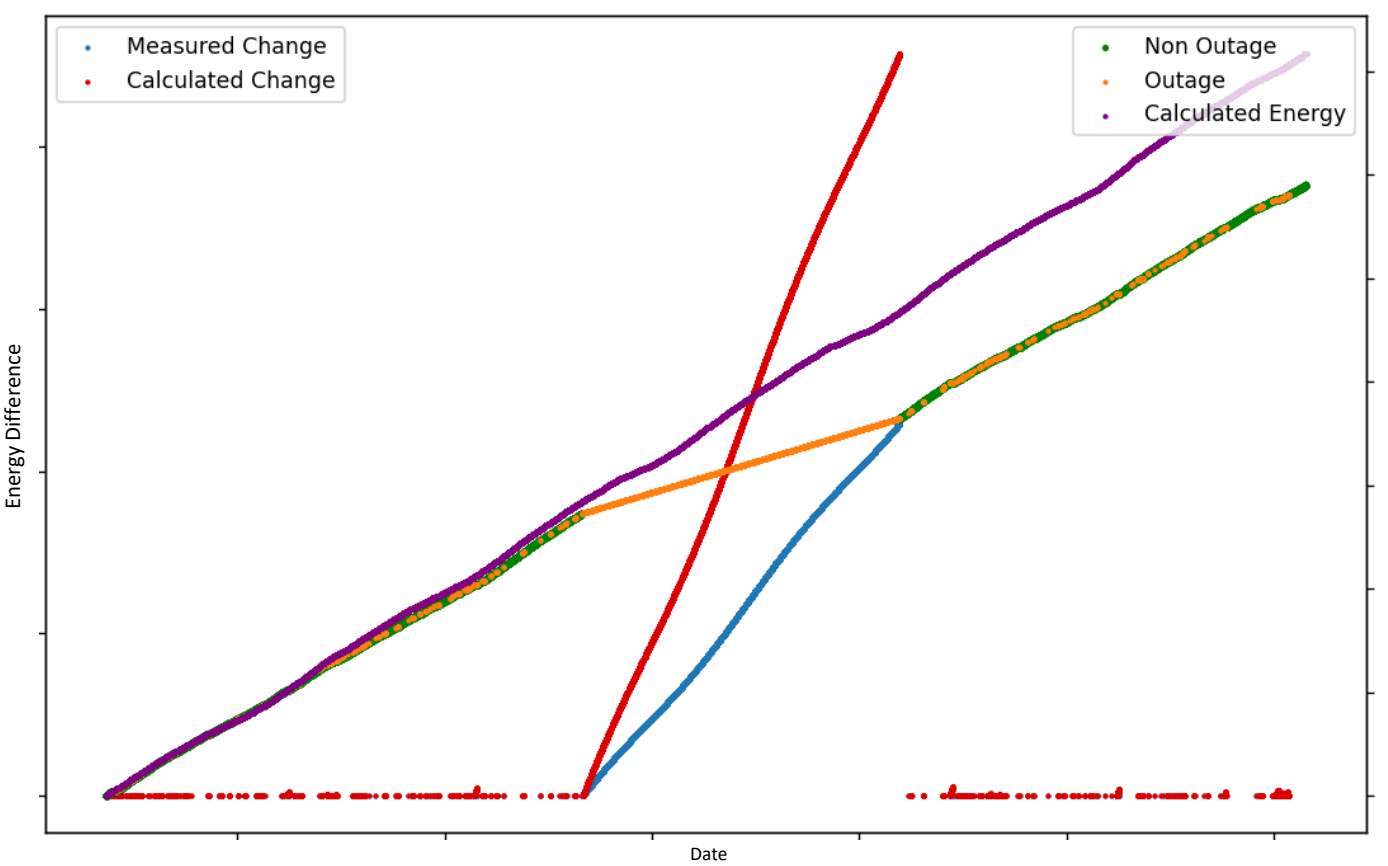
Data Outage

• If: $\sum 9 \text{ Inverters} < \text{Plant Power}$

Missing Data Categorization



Energy Method



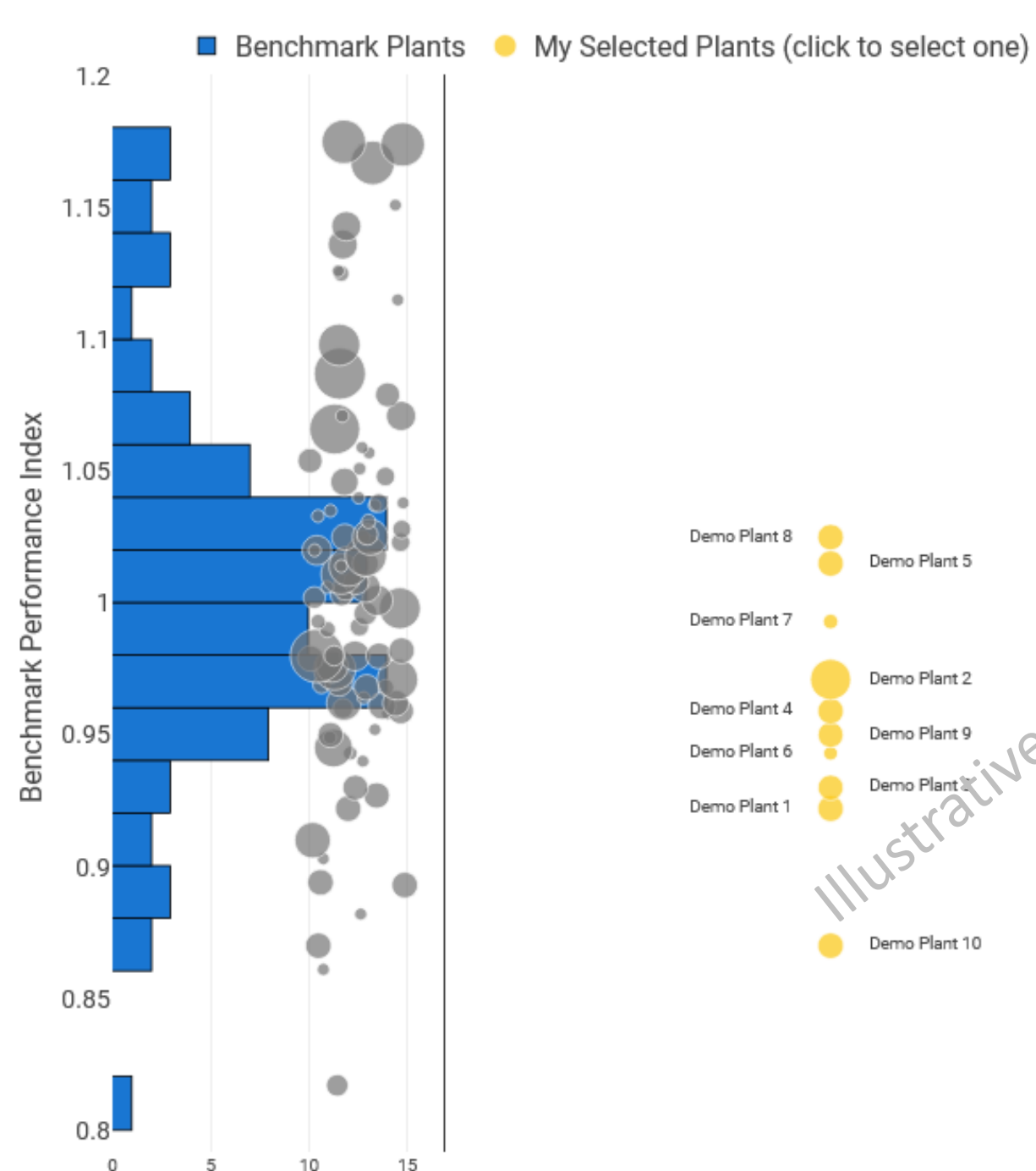
Look at the actual change in energy versus the modeled change to determine the ratio of data outage vs power outage during times of missing data.

Automated data quality control is essential for consistent, accurate results

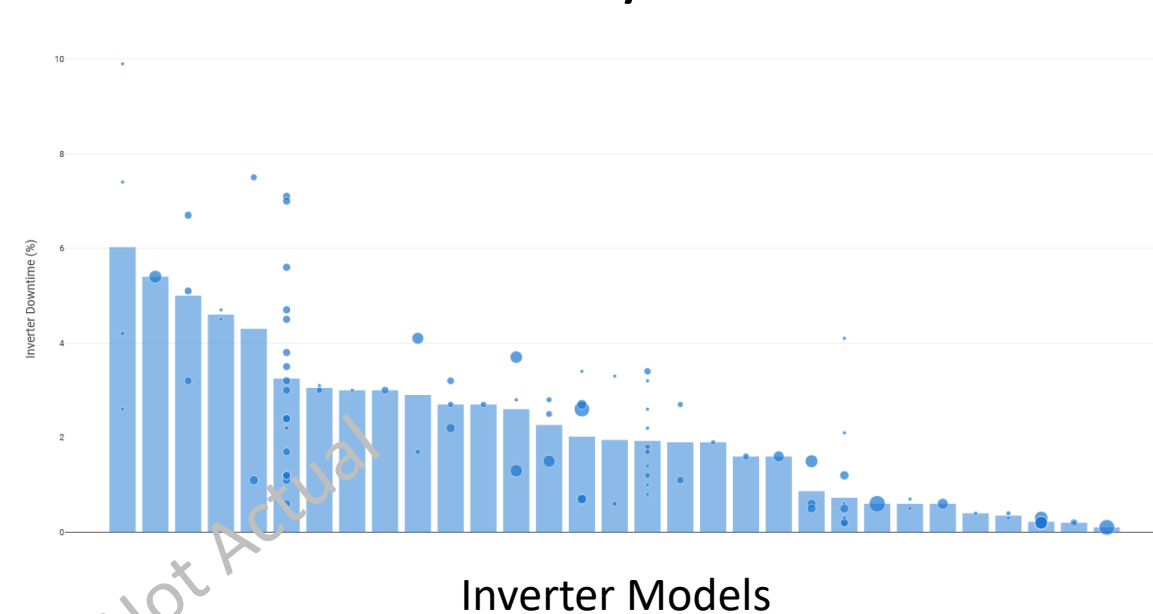


SOLAR UTILIZATION PERFORMANCE RELIABILITY BENCHMARKING APPLICATION

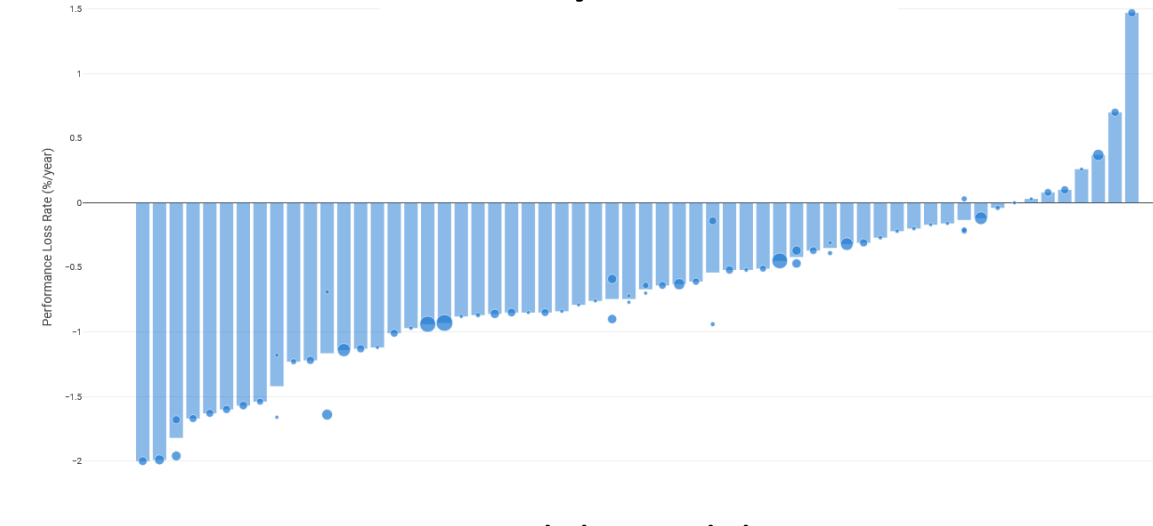
9.3 GWac Analyzed | 120 Plants Analyzed | 5 Years Average Age | 12,194 Failure Records | 95.8% Availability (Energy) | 8.4% Data Outage



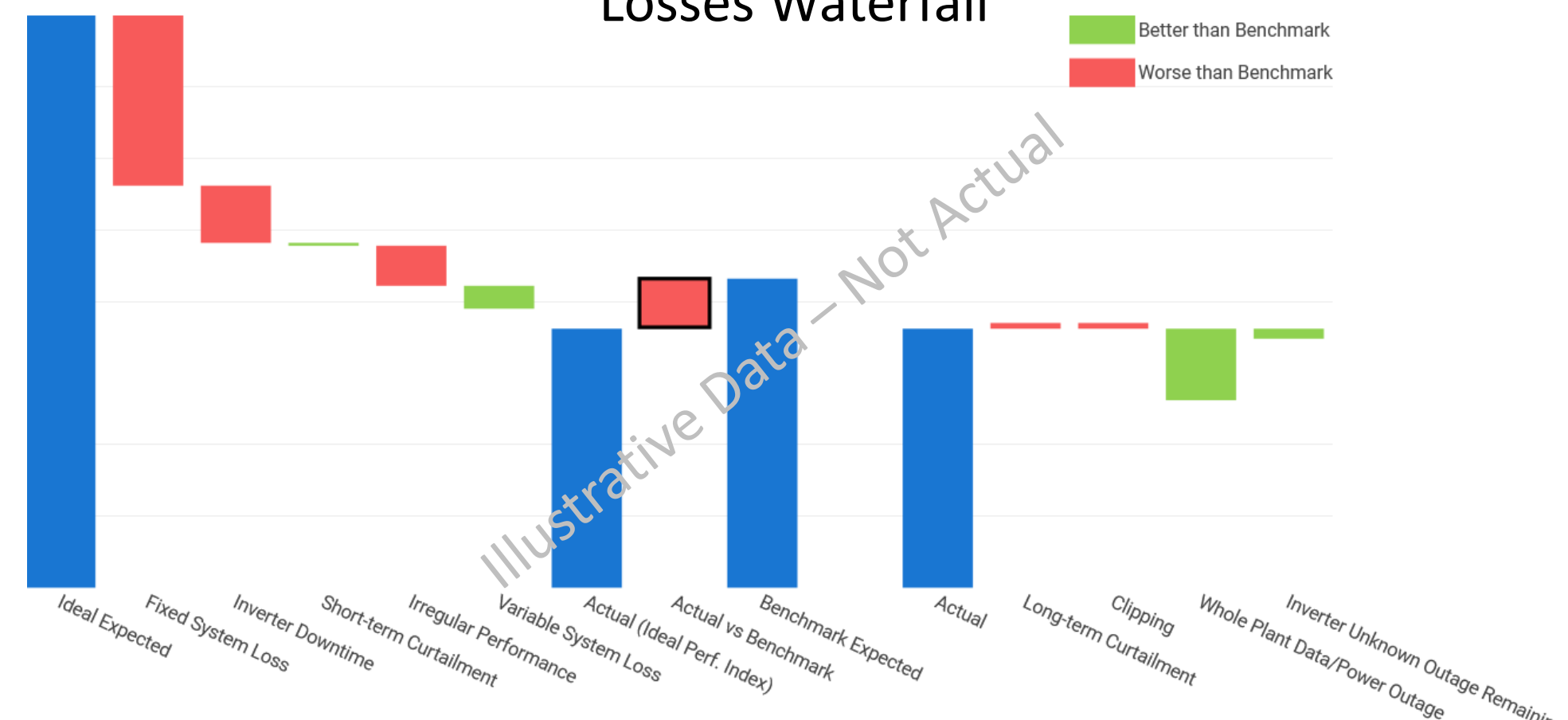
Downtime by Inverter



PLR by Module



Losses Waterfall



Losses by Plant

