HOW TO CHECK IF YOUR PV SYSTEM IS MEASURING UP TO EXPECTATIONS

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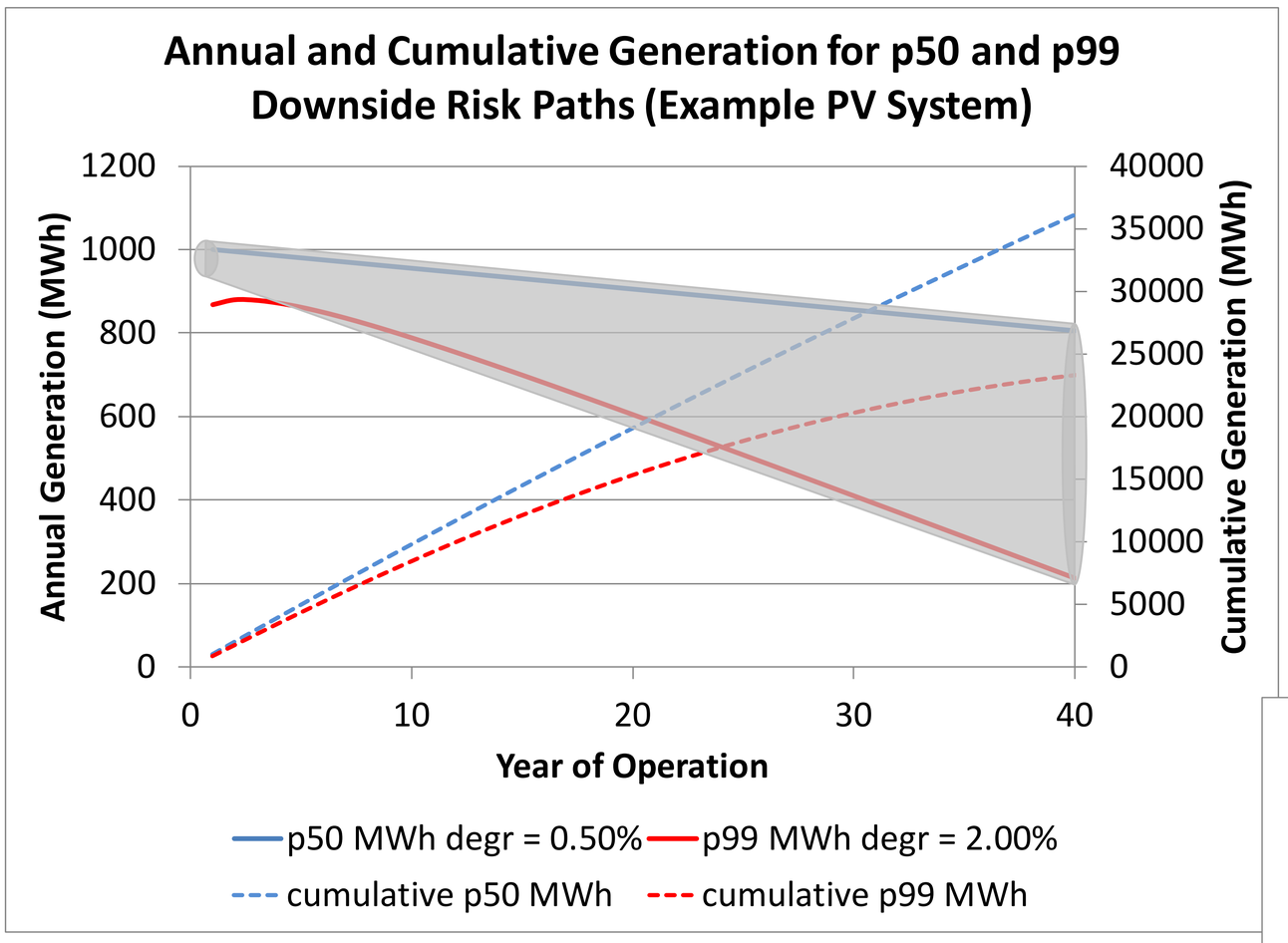
- ❑ STEP 1: SIMULATE MODELED ENERGY "CONE OF UNCERTAINTY".
- ❑ STEP 2: MEASURE ENERGY PRODUCTION VIA REVENUE-GRADE METER.
- ❑ STEP 3: IF MEASURED ENERGY FALLS OUTSIDE OF CONE, TROUBLESHOOT.



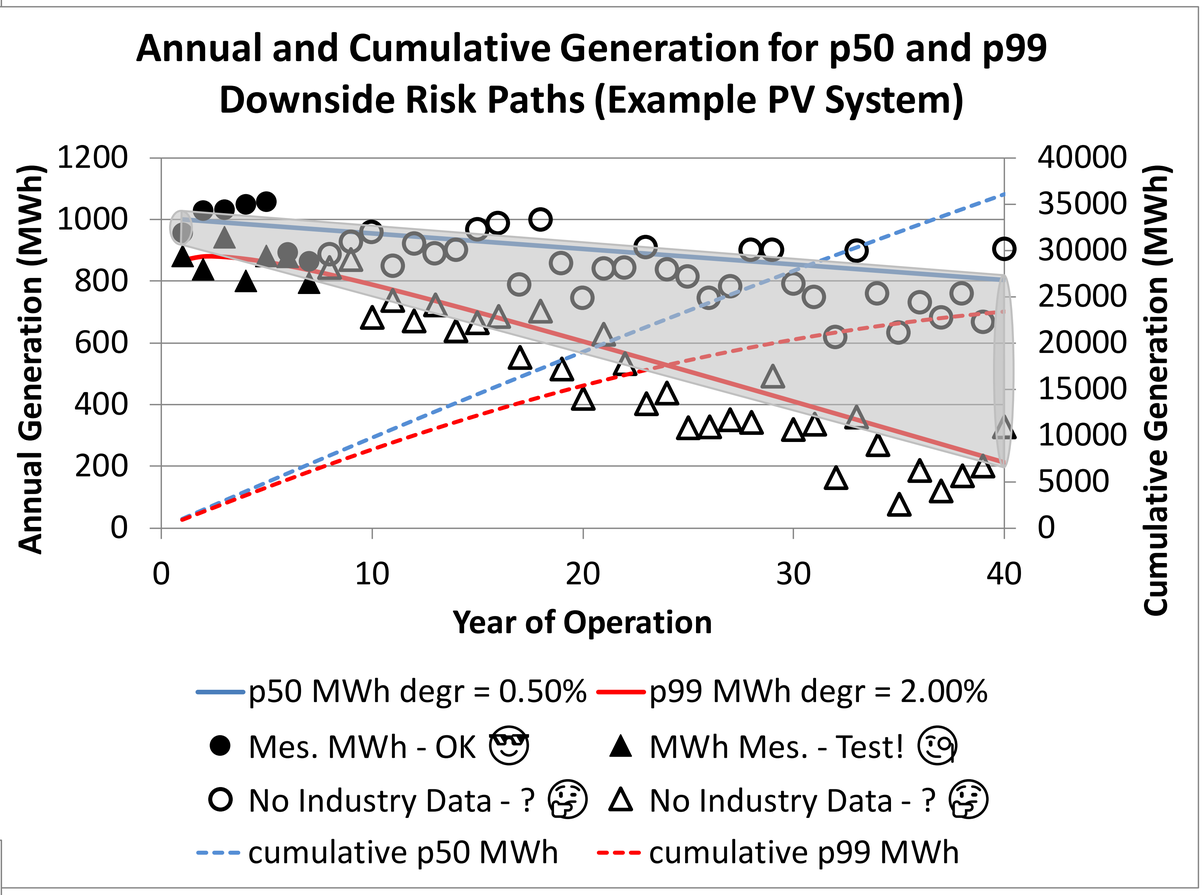
1a. Set up PV system's pro forma project model in PV energy simulation software.

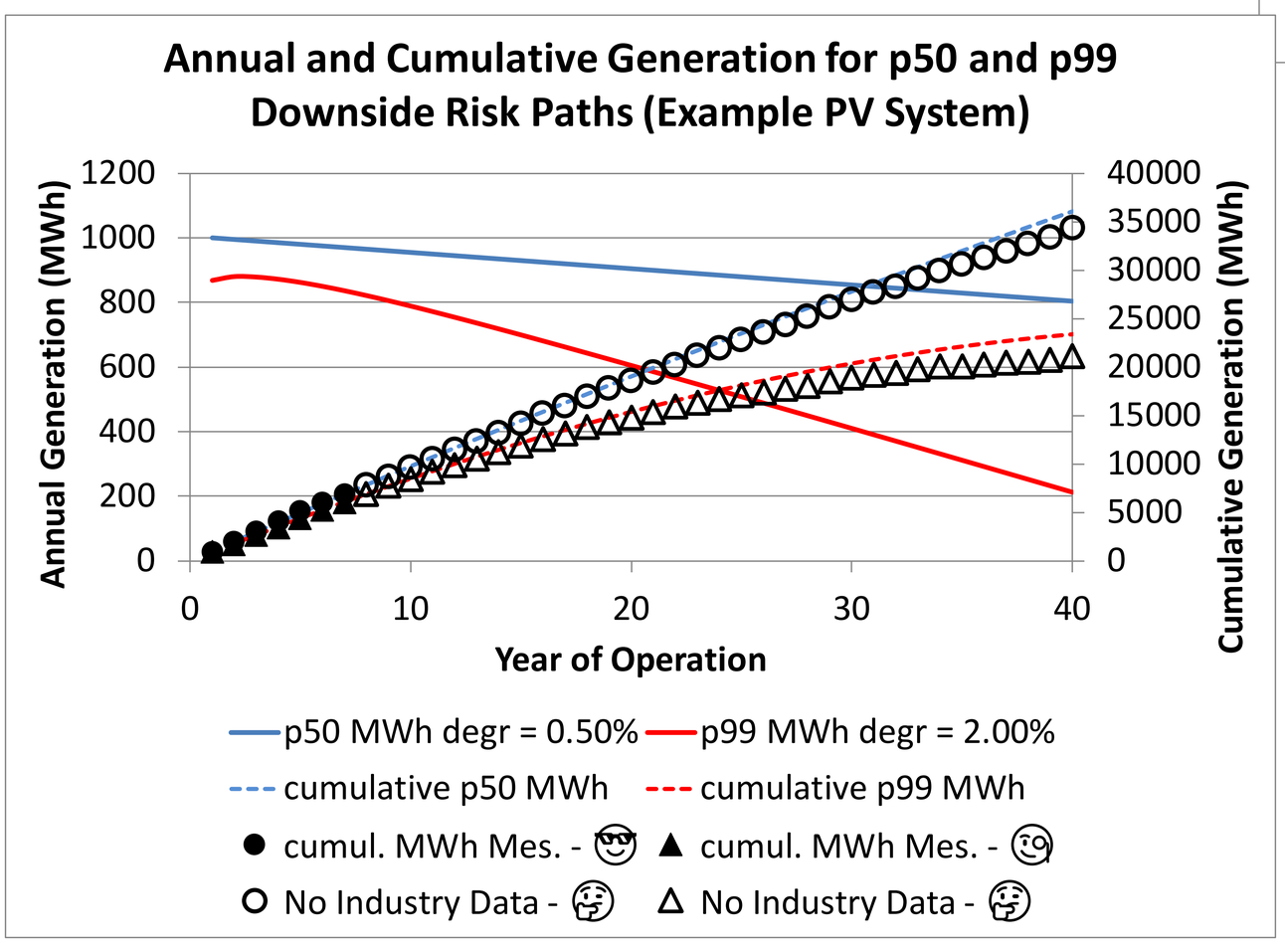
1b. Simulate median P50 and conservative P99 (or P90) ac energy over lifetime of project (e.g., 25 years) based on assumed long-term annual degradation rate and propagated uncertainties from uncertainty model (RSS of uncertainty and inter-annual variability).

1c. Plot as pro forma "**Cone of Uncertainty**".

2. Install PV system, measure ac energy, and plot on top of pro forma Cone of Uncertainty.

- The graph at right shows two possible scenarios for the same system in which actual production may (●) or may not (▲) meet expectations.
- Myriad issues may result in *unavailability* (downtime), *underperformance* (low power), *underproduction* (low energy), or a combo.





3a. Troubleshoot cases where ac energy falls below the red line or consistently falls below the blue line, using such methods as:

- Field IR (to detect thermal issues)
- Field EL (to prove quilting or microcracking)
- Lab-based LETID reversal to prove LETID
- Lab-based PID reversal to prove PID
- Lab-based and field I-V & field ASTM E2848 capacity testing to prove underperformance

3b. Share results with industry to improve our confidence in long-term energy predictions!