

Preventing Genset Failure: Power Quality Analysis for a Rural Site

The Challenge: Additional Capacity on a Generator

An Australian engineering consultancy contacted GreenVolt Power Quality Solutions to conduct a load survey on one of their rural sites to assess the feasibility of new water treatment loads. GreenVolt Power Quality Solutions assessed:

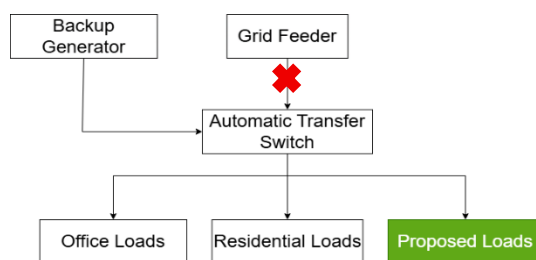
- **Capacity on LV Genset:** A key aim was to determine available spare capacity of the LV genset. The site supplied a mix of single-phase and three-phase electronic and passive loads such as lights, pumps and water treatment equipment. The customer utilised their own PQA for logging and provided the data to GreenVolt for analysis.

The Investigation: Applications of Electrical Principles

Existing hardware at the site included a 193kVA LV backup diesel genset. The site had residential, office loads and water treatment equipment that included pumps and filters.

Power Quality Logging:

A Power Quality logger (**marked in red**) was installed at the incomer to capture a full load profile over a fortnight.



Power Quality standards such as AS/NZS 61000, IEEE 519 and the local utility requirement require logging at the Point of Common Coupling (PCC) to assess compliance.

Note that the LV genset was not energised during the logging period, all data captured was from the grid supply.

Additional Considerations:

Traditional electrical commissioning usually misses PQ requirements such as harmonic voltage compliance, sequencing and Flicker at the Point of Common Coupling (PCC).

Common practice also includes sizing a generator purely by kVA. Even at the same kVA rating as the grid, the generator will experience larger voltage distortion, Flicker, and instability when supplying non-linear and rapidly varying loads.

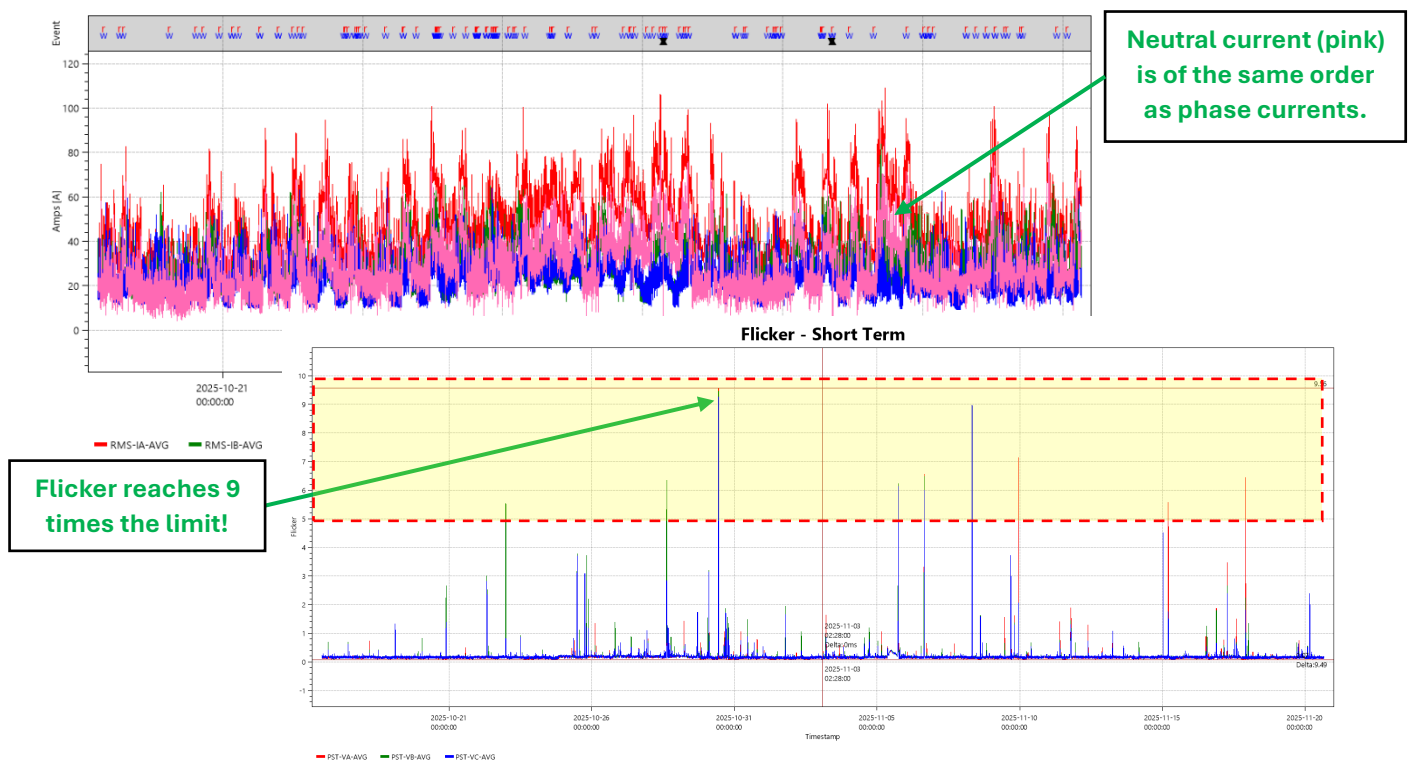
Importance of Harmonic Derating:

Harmonic currents increase copper, core, and stray losses. These higher frequency currents cause additional heating; the generator must be derated to keep its windings and insulation within safe temperature limits.

The Discovery: Preventing Failure

After analysing the data we found:

- **High Flicker:** The audit led to the discovery of high voltage flicker ($P_{st} = 9.56$, $P_{lt} = 4.18$) on phase A. It is anticipated Flicker will be higher when the loads are supplied by the generator. High Flicker can lead to stress on electronics, shortening device life and increasing periodic maintenance.
- **High Neutral Current:** There was significant unbalance in the phase currents. This caused a high neutral current (up to 79.3%) compared to phase currents. A high neutral current can cause overheating of cables.
- **Capacity Left on LV Genset:** The remaining capacity of the generator summed to 24A which is less than 10% of the original rated current of the generator.



Recommendations:

- Redistributing loads across phases to reduce the neutral current and unbalance.
- Spot logging downstream loads on grid supply to determine the equipment causing high Flicker.
- Only 10% spare capacity on the LV diesel genset identified.

Results: De-risking of the Site

These recommendations enabled the client to assess the risks associated with adding new loads to the generator.

De-risk your site with a Power Quality Audit
or
Need help assessing new loads on generator supply?
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