

CASE STUDY

**Towson University
Glen Tower Complex
Towers - A, B, C and D**

Facility Description

The combined floor space, in the four towers of the Glen Tower Complex, is 399,024 net sq. ft. The four high rise residences, which also include cafeterias, can accommodate approximately 1,550 students. These towers were constructed between 1981 and 1983

Existing Electrical Distribution System Conditions:

- 32 low voltage, dry-type distribution transformers
- 31-year-old transformers had pre-NEMA TP 1 efficiencies
- Average Load Factor was only 4.8% of the distribution transformers' full load rating
- Load-generated harmonic profiles were in a range between K-4 & K-9

Challenge

Significant 'penalty losses'^[1] were present in the low voltage distribution system due to oversized distribution transformers. Transformer oversizing is the usual outcome when meeting the requirements of the National Electrical Code. In addition to the higher capital cost of oversizing, the higher operating costs of lightly loaded transformers are significant. 'Penalty losses' were also present in the circuitry because of load-generated harmonic currents. The system's harmonic impedances created significant voltage distortion at the loads.

Over a thirty-year period, electronic loads were added to a distribution system that was never designed to supply nonlinear electronic loads.



[1] 'Penalty losses' are defined as consumed power that does not contribute directly to the intended work. Circuit and transformer losses at 60Hz are excluded.



Solution

The PQI Solution™ included the replacement of all dry-type distribution transformers with ultra-efficient e-rated transformers. Transformer downsizing was made in accordance with CSA C802.4 and **nationalgrid®** guidelines. To maximize payback and return-on-investment we were limited in downsizing to one standard kVA rating.

Impact

- 185,092 kWh** annual power savings
- \$20,912** total annual utility savings
- \$47,000** utility rebate (Baltimore Gas & Electric)
- 31.5%** of project cost paid by BGE
- 4.8 years** project payback
- \$526,982** lifetime saving (30 years)

