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# Most common wastes in an electrical system

## Energy Checklist

**Mapping your electrical system can show you precisely how much energy is being used, and what the biggest consumers are. Anytime an electrical system overheats, that is wasted energy. There are a couple broad categories into which most occurrences of wasted energy fall:**

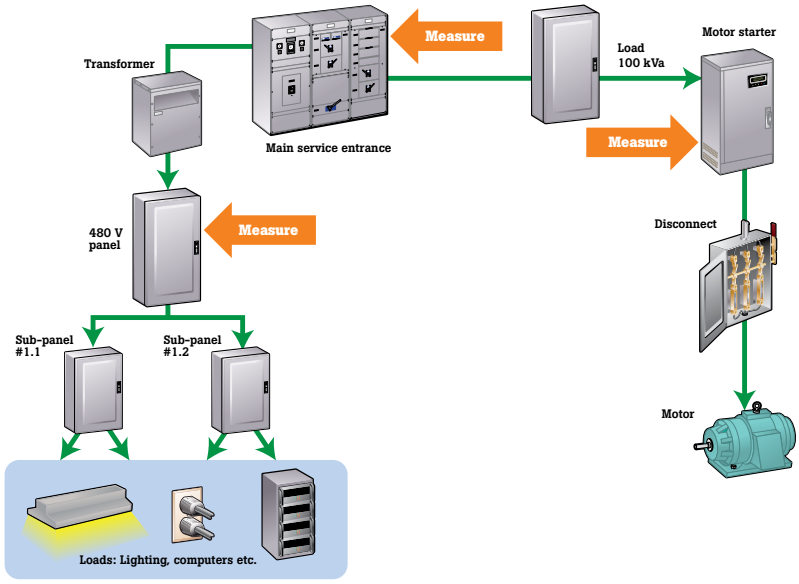
1. Inefficient operation: Operating at higher volumes or more often than is necessary, or at excessively expensive times of day in the utility rate schedule.
2. Power quality issues that make parts of the power supply unusuable, but still must be paid for.
3. Overheating. When electrical components are not operating correctly, they often overheat, and this indicates wasted energy: More energy is required to do the work because of the inefficiency, and that excess energy becomes heat.

## Energy waste detection and quantification steps in an electrical system:

**STEP 1** Power logging and power quality check

**STEP 2** Thermal inspection of electrical panels and components

## Measurement points to detect waste




***Quick tip:***

**Electrical vs. operational savings**

Malfunctioning or improperly installed electrical components can lead not only to wasted energy, but also to potential production disruption if equipment malfunctions or stalls. Added up throughout the entire plant, yes, those do contribute to excessive energy consumption. But more importantly, they are a maintenance and insurance issue. Good maintenance practices can maximize equipment efficiency, reducing energy waste and energy costs.

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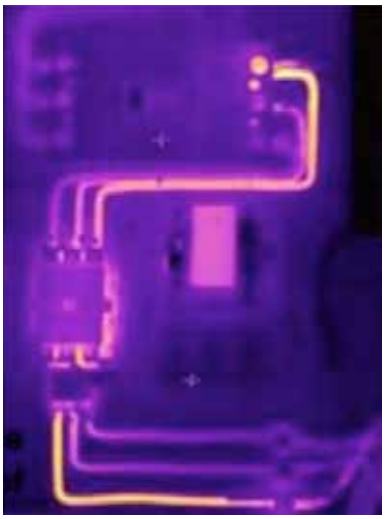
## Three different approaches for assessing different types of energy waste

1. To gauge the efficiency of operations—how much energy is being used, where—log power consumption over time.
2. To identify and quantify waste due to power quality, conduct harmonics, unbalance, and power factor checks and monetize the waste with a power quality analyzer.
3. To detect waste from electrical component defects, use a thermal imager to identify overheating.

## STEP 1 Three places for power logging and quality checks

- ☐ **1. Main switchgear:** Log for overall power efficiency, comparison to utility bills for rate schedule and operational changes, and identification of downstream issues. Log over time kW, peak
- ☐ **2. Secondary electrical panels:** Log over time: Harmonics, unbalance, kW, PF. Quantify waste from unbalance/harmonics and assess ROI. Identify changes to peak demand. Identify sources of PF.
- ☐ **3. Individual large loads:** Log over time: Harmonics, unbalance, kW, PF.

## STEP 2 Thermally inspect electrical panels and components



Electrical objects emit heat as a byproduct, so high temperature readings are to be expected as a part of normal operation. Look instead for temperature anomalies.

- ☐ **1.** Scan the largest and most critical energy consumers in the system.
- ☐ **2.** Look for:
  - Comparative hot spots (one component is hotter than another, similar unit) indicating a high-resistance connection, harmonics, overloading, or underspecified components.
  - Differences between phases, indicating possible phase imbalance or single-phasing, if one phase is cold.
- ☐ **3.** Where anomalies are detected, use other tools to follow up and determine root causes of any overheating.

***Quick tip:***

**The 12 most commonly inspected components:**

1. (3 Phase) Power distribution
2. Fuse boxes
3. Cables and connection
4. Relays/switches
5. Insulators
6. Capacitors
7. Substations
8. Circuit breakers
9. Controllers
10. Transformers
11. Motors
12. Battery banks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