FLUKE®

Most common energy wastes in an HVAC system

Energy Checklist

The HVAC system is often among the largest consumers of energy within a facility. Air ventilation volumes and outside air percentages should always align to national standards, however system settings stray over time. Many systems over-ventilate, either because of discrepancies within the system or because of waste inefficiencies in the distribution process. That overventilation represents excess energy use, energy being used to condition and distribute air unnecessarily. The very largest loads in a facility are often found in the HVAC system: chillers, compressors, air handlers, fans, motors, and pumps.

Four common culprits behind waste:

1. Overproduction
2. Leaks
3. Sensor misalignment
4. Inefficient usage

Three strategies for improving performance:

1. Lower artificial demand
2. Improve control strategies
3. Improve energy use

Energy waste detection and quantification steps for HVAC systems:

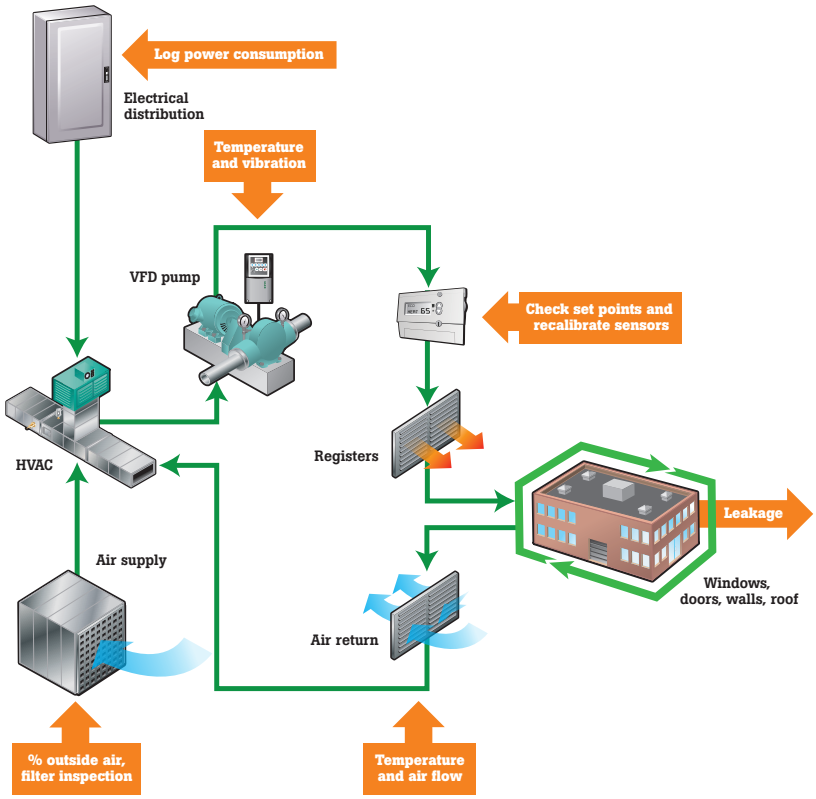
STEP 1 Log energy consumption at full load over a full production cycle—quantify total cost and identify unnecessary operational hours.

STEP 2 Thermally scan system components to identify ventilation leaks and equipment inefficiencies.

STEP 3 Measure differential and static pressure, air velocity and air flow readings.

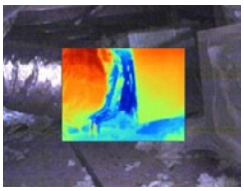
STEP 4 Use an air flow meter to assess overall airflow, outside air balance, and ventilation levels.

Measurement points



FLUKE®

STEP 1 Thermal testing



- ☐ **1.** Use a thermal imager to detect temperature differences at duct joints indicating sealing problems, insulation leaks and other air leaks.
- ☐ **2.** Use a thermal imager to spot check temperature at air vents, for sensor correction.
- ☐ **3.** Thermally inspect all electrical and electro-mechanical equipment.

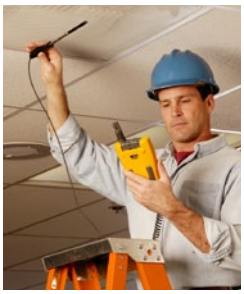
STEP 2 Electrical testing

- ☐ **1.** Log energy consumption at the power supply as well as large loads, so that you can quantify specific costs and savings.
- ☐ **2.** Assess presence of waste energy (power factor, harmonics, unbalance).
- ☐ **3.** Check for peak demand charges and identify biggest rate schedule/time-of-use issues, both weekly and seasonally.

STEP 3 Pressure testing

- ☐ **1.** To determine whether a filter is clogged, use a manometer to take a pressure measurement on either side of the filter. The greater the pressure difference, the more clogged the filter is, and the harder the system is having to work to push or pull air through.
- ☐ **2.** Pressure measurements for dampers can also be taken with a manometer, to test whether they are fully opening and closing.

STEP 4 Air flow testing



- ☐ **1.** Use a manometer and air flow meter to measure differential and static pressure, air velocity and air flow readings to assess the ductwork.
- ☐ **2.** Use an air meter to assess overall airflow, outside air percentage and conditioning levels.

Quick tip:

Notes about HVAC balancing

Air conditioning systems use a mixture of outside air, return air, and something called mixed air. Unless your facility needs to control infection (pharmaceuticals, hospitals), your optimum efficiency involves a balance of these air types. You don't want to heat, cool, filter, and dehumidify more outside air than necessary, but if you don't condition enough, you won't have a healthy balance of oxygen to carbon dioxide.

Determining how much outside air is appropriate for your building involves a couple of different measurements, all of which the Fluke 975 AirMeter can take.

The built-in keypad menu records the temperatures at the air handler unit and calculates the ventilation air percentages. As long as you know the CFM produced by the air handler, the AirMeter will determine the percentage and volume of outside air.

Take measurements at both the outside entrance to the air handler and the conditioned air exit into the building, use the AirMeter's Outside Air menu, select temperature or CO2, and follow the AirMeter's prompts to record outside air, return air, mixed air, and outside air temperature or CO2.

Then, ask your HVAC technician to calculate the total heat in BTUs absorbed by the cooling coil or created by the furnace. Once you know that, you can calculate the tonnage and electrical cost for the unit. Compare that value to standards.

Printed in U.S.A. 4/2013 4331653A_EN