



**ENERGY MANAGEMENT AND AUDIT - CEM
REFRESHER TRAINING COURSE**

KRISHNAJI PAWAR, LEED AP BD+C, GSAS CGP, ISO 14001:2015, GCP
CEM REFRESHER TRAINING COURSE





**ENERGY AUDIT INSTRUMENTATION
FOR ENERGY PROFESSIONALS**

KRISHNAJI PAWAR, LEED AP BD+C, GSAS CGP, ISO 14001:2015, GCP
ENERGY SPECIALIST CURRICULUM COURSE



WHAT SHOULD YOU LEARN





- Tools for the Audit
- Energy Audit Instrumentation
- Data logging and Communication Technologies
- Data Collection Technologies and Instruments Related to Energy Systems



TOOLS FOR THE AUDIT

✓ To obtain the best information for a successful energy cost control program, the auditor must make some measurements during the type of energy-consuming equipment audit visit.

✓ The equipment needed depends upon the type of energy-consuming equipment used at the facility, and on the potential EMOs.

✓ For example, for a waste heat recovery EMO, the auditor must take substantial temperature measurement data from potential heat sources.



ENERGY AUDIT INSTRUMENTATION

1. Electrical System Performance

- ✓ Multimeter-Voltage, Amperage
- ✓ Insulated Gloves
- ✓ Power Meter – Watts, Vars, VA, PF
- ✓ Light meter- light levels



ENERGY AUDIT INSTRUMENTATION +

2. Temperature Measurements

- ✓ Thermometer
- ✓ Surface Pyrometer
- ✓ Portable Electronic Thermometer
- ✓ Thermocouple Probe



ENERGY AUDIT INSTRUMENTATION +



3. Combustion Measurements

- ✓ Handheld, microcomputer Combustion Analyzers to measure O_2 , CO, CO_2 , temperature
- ✓ Sometimes SO_x and NO_x
- ✓ No particulates



ENERGY AUDIT INSTRUMENTATION +



4. Air Velocity

- ✓ Anemometer - Deflecting Vane
- ✓ Anemometer - Rotating Vane
- ✓ Pitot Tube
- ✓ Heated Thermocouple
- ✓ Hot Wire Anemometer



ENERGY AUDIT INSTRUMENTATION +



5. Pressure Measurement

- ✓ Manometer
- ✓ Draft Gauge
- ✓ Bourdon Gauge



ENERGY AUDIT INSTRUMENTATION +

6. Humidity Measurement

- ☒ Psychrometer
- ☒ Electrical Conductivity
- ☒ Hand-held units
- ☒ Hair Hygrometer



ENERGY AUDIT INSTRUMENTATION +

7. Infrared Measuring Equipment

The real temperature of an object can be found by measuring its emitted radiation.

- ☒ Infrared Camera System
- ☒ Hand-held temperature guns



ENERGY AUDIT INSTRUMENTATION +

8. Compressed Air Leaks

- ☒ Ultrasonic Leak Detectors
- ☒ Tunable ultrasonic receivers

9. Steam Leak Detectors

- ☒ Ultrasonic Leak Detectors
- ☒ Use for steam-traps



ENERGY AUDIT INSTRUMENTATION +

- ✓ Mini Data Loggers
 - Light on-off
 - Motor on-off
 - Temperature
 - Relative Humidity
 - General channel
- ★ Any 0 to 2.5 volt input



SAFETY CONSIDERATIONS

- ✓ Safety-a critical part of any energy audit
- ✓ All auditors should have a basic knowledge of safety equipment and procedures



BEYOND
SMART CITIES

THANK YOU

www.beyondsmartcities.in



**THE WORLD'S 1ST GREEN TECHNOLOGY
MARKETPLACE**