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SMART CITIES
CERTIFIED INDUSTRIAL ENERGY PROFESSIONAL
CIEP TRAINING PROGRAM
FOR INDUSTRIAL ENERGY SPECIALISTS
KRISHNAJI PAWAR,LEED AP BD+C,GSAS CGP,ISO 14001:2015,GCP
ENERGY SPECIALIST CURRICULUM
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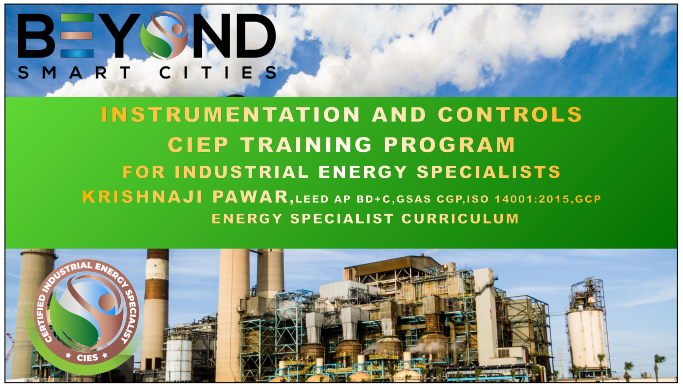
BEYOND
SMART CITIES
INSTRUMENTATION AND CONTROLS
CIEP TRAINING PROGRAM
FOR INDUSTRIAL ENERGY SPECIALISTS
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WHAT SHOULD YOU LEARN
Tools for the Audit
Energy Audit Instrumentation
Data logging and Communication Technologies
Data Collection Technologies 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 02, CO, CO2, temperature
- ☑ Sometimes SOx and NOx
- ☑ 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 Guage
- ☑ 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

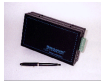
## ENERGY AUDIT INSTRUMENTATION +

**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