

Data Collection Devices for P2 Measurement And A Hotel P2 Assessment



Presenters

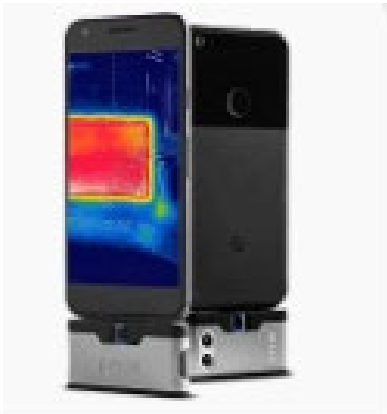
- Michelle Gaither, PPRC
- Ken Grimm, PPRC
- Any attendees that know more about instrumentation than Michelle/Ken know

Data Collection Devices for P2 Measurement

Device	Purpose
Infrared camera	Detect heat or cold losses (visual images)
Infrared thermometer And/or Thermocouples	Measure surface temperature
Current switch / data logger for conduit	Measure voltage and current over long-term or instantaneous
Kill-A-Watt meter	Measure watts consumed by plug-in devices
Ultrasonic probe	Detect air or gas leaks,
Triode pH meter	Measure pH of a solution
Conductivity	Measure conductivity of a solution, indicating Total suspended solids
Clamp-on Flow sensor	Measure fluid moving through a pipe (e.g., in gallons per minute)
PID multi-gas detector (photoionization)	Detect CO, VOCs, NO ₂ , ozone, H ₂ S, O ₂ , or other gases in air
Particulate counter	Measure particulate in air
Halogen detector	Detect refrigerant leaks
Decibel meter	Detects sound levels
Hygrometer	Detects humidity
Battery tester	Measures battery charge



Infrared Imaging and/or Thermometer



Function:

- Detect heat or cold losses/inefficiencies and hot spots
- Measure surface temperatures

Application(s): Boiler, weatherization, cold air leaks (curtains), breaker panels, motors

Potential Challenge/ Limitations:

- Training necessary for high-accuracy use/interpretation
- Readings sensitive to emissivity of object
- Instantaneous readings, not usable for long-term monitoring
- Calibration



Digital Thermometer /Thermocouples



Function:

- Measure exterior surface temperatures
- Measure internal temperatures (probe)

Application(s): Exterior of pipes, boilers, HVAC equipment, hot water tanks, even food!

Challenges/Limitations:

- Calibration

Multi-Meter (Voltage, Current, etc)

([Video](#) 0:20 -1:20 min)



Replace split or package A/C unit with one that exceeds Title 24 building standards.

Function:

- Measure voltage and current (amp)
- Multi-meters can also measure resistance, capacitance, power
- Some with data loggers

Application(s): Many!

Evaluate operational efficiency of equipment (kwh fluctuations over time), compare voltage In-use compared to specs

Challenges or Limitations:

- Basic level of understanding of current/training for use and analysis of electricity data

Various Electrical Meters



[Ammeter](#) watch video 0:20 -1:20 min

Function:

- Measure voltage and current (amp), and/or resistance,
- capacitance, power

Application(s): Many!

Current switch logger- Measure equipment run time (on/off)

Meters - compare voltage/amps during use – to manufacturer specs

Challenges or Limitations:

- Basic level of understanding of electrical
- Training for use and analysis of data



Current Switch Logger



Voltage Meter



Multi-Meter



Watt Meter



Function:

- Measure wattage consumption on plug-in operating devices
- Convert to kwh based on time
- Some calculate cost based on kwh pricing

Application(s): Any plug-in device

Challenges or Limitations:

- Requires ability to unplug the equipment from the electrical socket
- Instantaneous reading, not usable for long-term monitoring



Ultrasonic Leak Detector /Probe

Function:

- Detect air or gas leaks
- Multiple preventive maintenance capabilities



Feature: Leak software or survey app/reporting feature, converts to electricity loss and cost

Application(s): compressed air systems, steam trap and valve function, potential for bearing or lubrication failure, electrical system potential failure (arcing, corona, vibrations, more)

Challenges or Limitations:

- Basic training required, headset required to audibly hear leaks
- Requires conversion of air leak data to electricity loss, but software/app can do
- Not usable for long-term monitoring
- Calibration

(Video: <https://www.uesystems.com/applications/ultrasonic-leak-detection/>)



Triode pH meter



Function:

- Measure pH of a solution

Application(s): wastewater, cleaning solutions, rinse water, pool water...

Challenges or Limitations:

- Basic training
- Obtaining representative samples
- Equipment probe cleaning /maintenance
- Calibration



Conductivity Meter

Function:

- Measure conductivity or total suspended solids in a solution, which indicates the level of impurities in a solution
- Measure resistivity or salinity

Application(s): Wastewater, plating bath quality, rinse water quality, chemical streams, demineralizer output, reverse osmosis water, stream boilers, condensate return, waste streams, boiler blowdown, cooling towers,

Challenges or Limitations:

- Basic training
- Representative sampling
- Calibration and maintenance required



Clamp-On Flow Sensors (Non-Destructive)



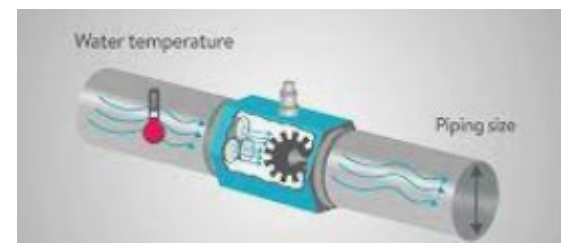
Function:

- Measure the flow (gpm, etc.) of fluid moving through a conduit/hose/pipe
- Continuous monitoring and data logging available

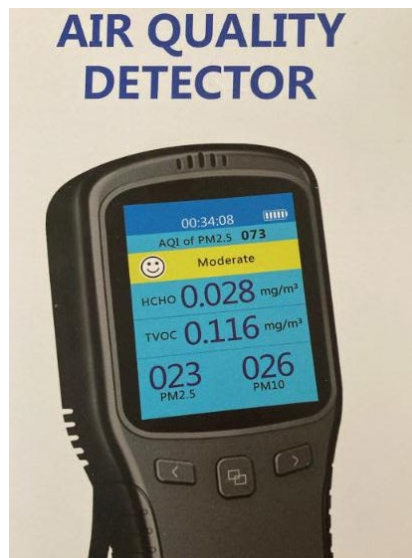
Application(s): Water consumption or flow for specific water-consuming equipment

Challenges or Limitations:

- Basic training
- Calibration
- Pipe modification for some mechanical models



Air Quality Detectors



Multi-Gas
Photoionization (PID)

Function:

- Measure concentration of various gases and/or PM/dust in air

Application(s): Some may be used as alarms, and/or to collect data in real-time

- CO, VOCs, NO₂, O₃, H₂S, O₂, lower explosive level (LEL) gases, formaldehyde
- Some may also detect particulate

Limitations:

- Basic training and understanding of how much data needed and how to interpret
- Some units may only detect one species, others multiple
- Calibration



Home
Office



Outdoor
(Smoky in Seattle)

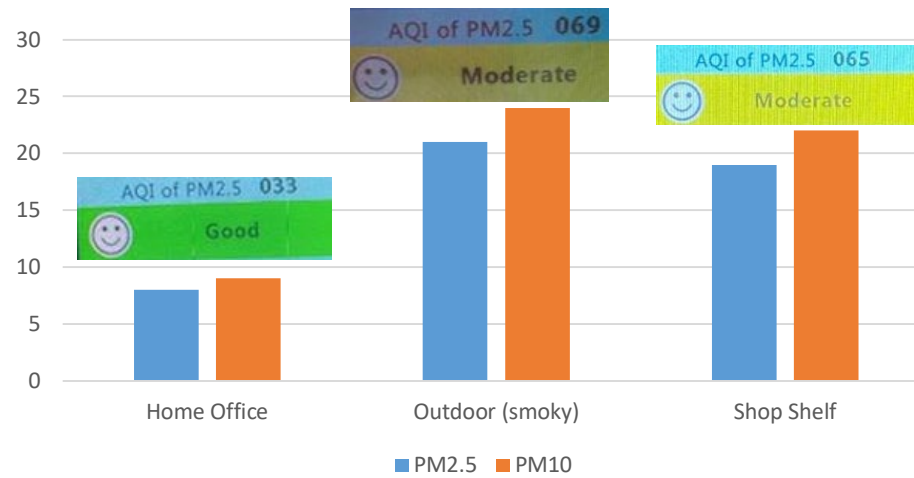


The “Shop” Shelf of Nasty Chemicals



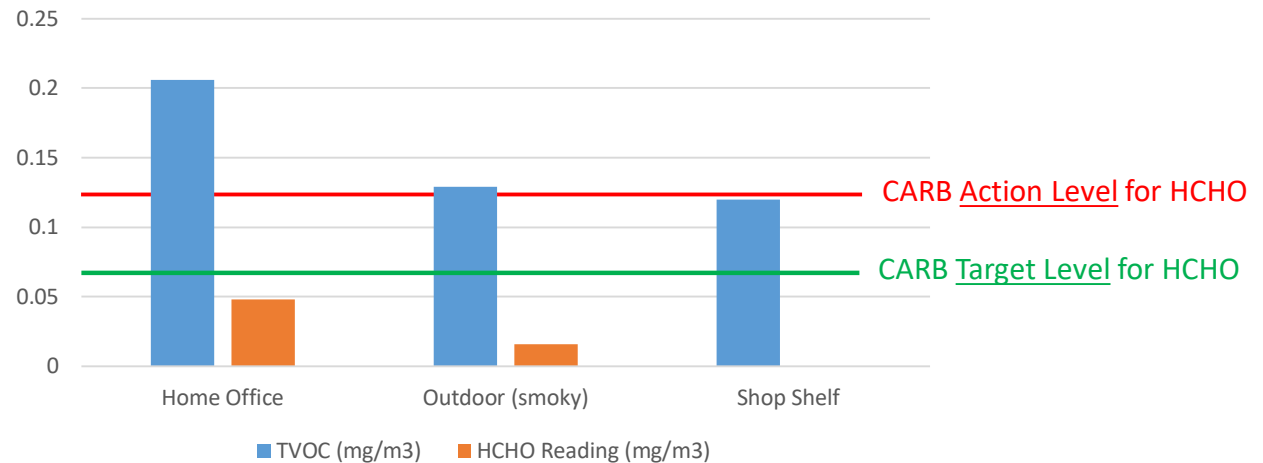


Particulate



AQI = Air Quality Index

TVOC and HCHO Concentrations



Particulate Counter (Aka Aerosol Dust Monitor)

Function:

- Measure levels of particulate of various sizes, or total suspended particulate (TSP) in air

Application(s):

- Continuous monitoring- can be used as alarm
- Collect data over time or in real-time
- PM1.0, PM2.5, PM4.0, PM10, TSP

Limitations:

- Calibration
- Training or understanding of particulate and how to interpret/use data to meet air quality standards



Halogen Leak Detector



Function:

- Detects HFC refrigerant leaks (e.g., R-22, 134a, R-404A, 407C, 410A)

Application(s):

- Refrigerant leak detection along refrigerant lines (including HVAC, refrigerators/freezers, and auto A/C lines)

Limitations:

- Sometimes difficult to pinpoint/find the exact point of the leak
- Calibration



Decibel Meter



Function:

- Measure loudness, sound, and noise levels from environmental and mechanical sources

Application(s): Confirm workspaces meet OSHA requirements for noise

Limitations:

- Calibration



Hygrometer



Function:

- Measure humidity /relative humidity of indoor air

Application(s):

- Probably most used in food cooking/production, basements or dank areas, greenhouses, pet reptile spaces, but may be useful for conditions that can affect product output quality (e.g., drying time of paint)

Limitations:

- Possibly need to consider outdoor ambient humidity in the measurement if space measured is open to outdoor air
- Calibration



Battery Tester



Function:

- Check charge of batteries


Application(s): Many!

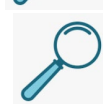
Avoid tossing good batteries when multiple batteries used in a device



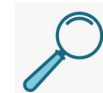
Hotels: P2 Checklist Elements

? Corporate policies and sustainability

 ? Energy & fuel efficiency

 ? Emissions

- Refrigerant type & leaks
- Idling vehicles
- Chlorine (pools)

 ? Safer Products Used in:

Custodial & Cleaning, Maintenance, Landscaping, Fleet management, Electronics, Building Materials)

 Solid waste

 Hazardous waste

 ? Water consumption

 ? Wastewater

 Stormwater



Cool P2 Things Hotels are Doing!

Chumash Casino Resort

- Bulk amenities in room (dispensers)
- Food waste to local pig farmers, and/or composted (plus paper compost)
- Buy GreenSeal, Safer Choice, or EcoLogo certified cleaning products
- Recycle spent textiles, carpet, and batteries



Loew's Santa Monica Beach Hotel ([Link to case study](#))

- [WELL](#) Health-Safety Rating
- ORCA Food Waste Digester
- No complementary bottled water
- Donate spent textiles and supplies
- On-Premise laundry (more control)
- Energy Star mini-fridges in rooms
- Peroxide-based cleaner
- Zero-VOC paint



Cool P2 Things Hotels are Doing!



ABOUT

BED BUG DOGS

AGRICULTURE DOGS

BOOK AN APPOINTMENT

BED BUG INSPECTION P

ARTICLES

CONTACT

WORK ORDER

WE FIND THEM, YOU KILL THEM!



@



Wind Creek Casino

Improved Cleaning Methods



Problem: Excessive cleaning of **matte** tile flooring, trying to achieve a **shiny** clean look.

Solution: Reset expectations for “the look of clean”. A matte finish is ok!

Solution: Switched to steam cleaning.

Problem: Sprayed air freshener to get a “clean” smell; adding to the floor residue.

Solution: Reset “clean smell” expectations; stopped using air freshener.

New mantra: Absence of Smell is the Sign of a Truly Clean Restroom.



Kitchen Sanitizer – Dilution Procedure

- Problem: Kitchen cleaning staff at a hotel mixed their sanitizing solution (without a procedure/recipe), often at a much higher concentration than necessary.

Solution: Purchase automatic dilution system; train to standard operating procedure (SOP)

Results: Saved over 500 gallons of sanitizing chemical use per year.



Single-Use Battery Use Reduction Battery Recycling

- Problems:

Lots of single-use alkaline battery waste; no local recycler.
Rechargeables require significant labor and time.

Partial Solution: Eliminated one large source of battery use: soap dispensers. Simply replaced battery units with wired units (very low current). Eliminated significant waste and labor of changing out batteries.

- Problem: Server batteries from IT Department going to landfill.

Solution: During a green meeting, IT found other Departments already used a battery recycling service for non-alkaline batteries. Now all are sent to the recycling service and/or disposed of during annual e-waste event at the facility.



Absolyte Battery



Lithium Iron Phosphate (LFP)



Lead Acid Battery



UPS



Wet Nicad



EV Battery

Portland DoubleTree (Questions Already Asked/Answered):


- No solar
- No-idling policy in back/lower level only (not applicable for for guests, buses, etc.)
- No compressed air onsite
- Outsourced laundry
- Outsourced landscaping
- No fleet/owned vehicles
- Facility located next to Tri-Met (transit)
- Food waste landfilled ☹️
 - *Used to compost*
 - *Possibly a local farm for veggie scraps? Fertilizer WISErg?*



A Few Examples: Product Labels/SDS

Label or SDS with **Prop 65**

Prop. 65 Warning for California Residents




WARNING: This product may contain chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm.

Label or SDS with signal word **“Danger”**

CAUTION. Slightly toxic /irritating
WARNING. Moderately toxic /irritating
DANGER. Highly toxic /severe irritation or damage

Quaternary “quat” disinfectants
 (Look for **“ium chloride”** in ingredient names)



INGREDIENTS:

Water, Hexoxyethanol, Isopropanol, C12 - 14 Alcohols Ethoxylated Propoxylated, Alkyl C12 - 14 Dimethylethylbenzyl Ammonium Chloride, Alkyl C12 - 18 Dimethylbenzyl Ammonium Chloride, Sodium Bicarbonate, Citric Acid, Fragrance

Forever chemicals (PFAS)
 (Look for **“fluor”** in ingredient names)

Ingredient	C.A.S. No.
Water	7732-18-5
Fluorochemical Urethane	Trade Secret



Chemical Name

Dipropylene Glycol Monomethyl Ether
 Poly(difluoromethylene), .alpha.,.alpha.'-[phosphinicobis
 (oxy-2,1-ethanediy)]bis[.omega.-fluoro-, ammonium salt

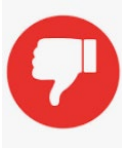
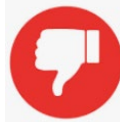
CAS-No.

34590-94-8
 65530-70-3

Product Change to Reduce Toxicity and Waste Generation



Fragrance
+
Solid waste



Protecting Water/Wildlife From Stormwater Pollutants





Hotels: P2 Checklist



Today's Checklist

Checklist Items Pulled from



California Green Business Network - Hotel Checklist

<https://greenbusinessca.org/why-get-certified/>



EnviroStars - Hotel/Hospitality Sector Certification Checklist

envirostars.org/wp-content/uploads/2020/03/Hotel-Hospitality-Checklist.pdf

Note – today's checklist tailored/narrowed for scope of assessment we can conduct today.