

Making the Most Out of an Indoor Environmental Quality Assessment

Considerations and Information to Get Started with your Assessment

This document is for federal agencies, building owners, building managers, and building operators who are considering an indoor environmental quality (IEQ) assessment at their facility. The following information explains how to plan for an IEQ assessment and the value it can provide.

This document is based on lessons learned from the Federal Energy Management Program's (FEMP) experience assessing federal offices, schools, and hospitals. The lessons learned are generally applicable to all building types and owners. This document is meant to serve as a starting point for high-level decisions on how to get started with IEQ assessment. It is not intended to be a comprehensive, step-by-step guide.



How do I get started with a IEQ assessment?

This document explains how to plan for an IEQ assessment and the value it can provide.

What is an IEQ Assessment and Why Does it Matter?



IEQ refers to the conditions of a building—such as air quality, thermal comfort, acoustics, and lighting. An **IEQ assessment** measures a building's IEQ conditions and helps identify opportunities for improvement. IEQ assessments typically use monitors to collect data over a given period. Common metrics include temperature, humidity, particulate matter (PM_{2.5}), and carbon dioxide (CO₂). The measured data is compared to high-performance benchmarks, which represent the levels needed to actively promote optimal occupant health, comfort, and productivity.

Ideally, IEQ assessments also include feedback from the building's occupants, usually through a focus group or survey. This data provides valuable context regarding occupants' satisfaction with their building. This information, combined with the logged IEQ data, can be used to generate a summary of building performance and actionable improvement strategies for the building

Building envelope; heating, ventilating, and air conditioning (HVAC); lighting system; and energy information can be incorporated into an IEQ assessment to evaluate multiple performance objectives such as operation, maintenance, and energy efficiency.

Selecting a Facility to Evaluate

If you manage a large portfolio and have resource constraints, you should identify factors to prioritize which sites to assess. Besides prioritizing facilities with known IEQ concerns, you may also want to consider grouping by geographical region, or choosing sites that address equity and justice priorities. If targeting a specific IEQ issue, the data collection should be focused on the information needed to assess and improve that issue.

To set the assessment up for success, it is important to check that the site has the necessary resources available to complete the data collection. Some considerations include:

- Availability of building information, such as floor plans and HVAC or other mechanical drawings or information
- Building size, as larger buildings will require more time to assess and often have more complicated systems
- Wi-Fi accessibility, which can facilitate or inhibit the data collection process
- Availability of onsite personnel.

Identifying Your Purpose

Having a clearly established purpose for conducting the assessment helps identify which metrics to collect, which determines which monitors to use and where to place monitors throughout the building. Common purposes for IEQ assessments include:

- Benchmarking - Compare a building's IEQ performance against a standard or to a similar building type. This involves collecting data throughout the building, unbiased by locations and metrics.

- Troubleshooting a known concern - Prioritize monitoring certain rooms or specific metrics of concern to address specific complaints from occupants.
- Planning for a facility renovation - Compare IEQ before and after a renovation or building improvement. This involves prioritizing areas that have undergone or will undergo renovation, and/or focusing on metrics that the renovations are intended to address.

Assembling a Strong Team

A successful IEQ assessment requires engagement from building stakeholders and clearly defined roles and responsibilities. A top-down approach with leadership buy-in tends to work best to encourage participation.

Responsibilities should include:

- Project coordination
- Site data and information gathering
- Data monitoring oversight
- Survey/focus group coordination
- Data analysis.

Be sure to identify key staff for each responsibility and ensure they understand the required time commitments and have the necessary bandwidth to support the project. Consider which team members will be onsite versus working remotely, and plan to coordinate communication and activities accordingly.

Planning Your Timeline

It is important to determine expectations for the duration of the data collection process. Ideally, data would be collected in every room for an entire year to fully capture the building performance; however, this may not be reasonable.

A reasonable duration for collecting data to understand building conditions is 1–2 months. However, it is important to regularly review the data being collected to gauge data collection needs—if the data are highly variable each week, you may need more time; if the data are highly consistent each week, you may need less.

The season in which you conduct the study can also impact the data. It is ideal

to measure in summer and winter, but if there is only time to collect data during one season, be sure to include this as context to the results.

Selecting the Correct Monitor

When selecting monitors, it is important to determine how many monitors you will need and what metrics you need to measure. There are many brands and models of IEQ monitors, each with different features and capabilities. Consider the following questions:

- What metrics does it collect? CO₂, PM_{2.5}, temperature, and relative humidity are some common ones, but you may be interested in collecting additional metrics such as noise, illuminance or total volatile organic compounds (TVOC).
- How much do they cost? Prices can range from a few hundred to a few thousand dollars for commercial monitors. The price may be indicative of the quality and capabilities of the equipment.
- How do they store and transfer data? Is there internal storage or does it need an internet connection to store data on the cloud? Does the device connect to Wi-Fi or cellular, or will the data need to be retrieved manually? Consider Wi-Fi availability and reliability, as well as any information technology (IT) rules around connecting unapproved devices to the local Wi-Fi.
- Are there any hardware or software requirements? Some monitors need a gateway device to transfer data and others require a mobile device with an app installed. Consider if this creates IT issues for your site.

In addition to having monitors indoors at your site, measuring outdoor air quality can be helpful for identifying the source of indoor pollutants and thermal comfort issues. Outdoor monitors can be useful in areas with high levels of dust, wildfires, extreme temperatures, low or high humidity, or urban pollution. Measuring outdoor air quality will require a separate outdoor monitor.



Capturing Occupant Perspectives

A survey or focus group is an important source of information about how the indoor environment is affecting occupants. Focus groups provide the opportunity for participants to elaborate on building conditions, but they do require time for the assessors to evaluate responses, as well as more time from the occupants to participate. If time is limited, a survey may be a better option. Consider how many participants for a focus group or survey are necessary for the results to meaningfully represent the entire building.

Next Steps

FEMP's [IEQ Data Collection Guide](#) is a helpful resource for the data collection process with more detailed instructions and best practices. The [IEQ Analysis and Solutions Interactive Training](#) is available for those who want to learn more about IEQ data and solutions.

Interested in collaborating? Reach out to FEMP and Pacific Northwest National Laboratory (PNNL):

- [Allison Ackerman](#) (FEMP)
- [Kevin Keene](#) (PNNL)



For more information, visit:
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