



## SERVICE PROVIDER GUIDE

### Guidelines for Selecting an Indoor Environmental Quality (IEQ) Consultant

---

#### Intent

This guide will help you learn more about what services are typically performed by IEQ Consultants and help ensure you select a qualified professional that will compliment the project team on a sustainable or “green” project.

#### Background

Much of the information in this guideline will address IAQ concerns in existing buildings. This may be applicable for a sustainable design retrofit project. It is also instructive in increasing awareness of problems to be avoided in new construction. The first issue to understand is that there is generally not one consultant who can provide all IAQ-related consulting. Further, IAQ is only part of the issue. There are impacts in this arena that go far beyond air quality, such as lighting, product off-gassing, environmental pollutants, and acoustics. Therefore the term Indoor Environmental Quality (IEQ) is more appropriate in many situations. Also, the “IEQ Consultant” is more realistically an “IEQ Team”. This will be explained further below.

Indoor environmental quality problems have been around for centuries, but scientific understanding of the indoor environment is in its infancy. The knowledge and skills of individuals providing indoor environmental quality services vary considerably. There are no federal regulations covering professional indoor air quality services (except where it involves asbestos, lead or radon). Some professional organizations, such as the American Board of Industrial Hygiene (ABIH) offer certifications in indoor environmental quality, but law does not require these certifications.

Many indoor environmental quality (IAQ) problems can be detected and corrected by building maintenance personnel. For guidance in resolving the problem in-house, refer to the American Industrial Hygienists Association’s (AIHA) Operation Outreach publication entitled “*Do I Work in a Sick Building?*” The National Institute for Occupational Safety and Health (NIOSH) and the Environmental Protection Agency (EPA) have also developed “*Building Air Quality*”, a guide for building owners and facility managers.

A typical IAQ investigation involves the following steps:

1. Determine who is affected, and when and where they are affected
2. Inventory potential sources of environmental agents that may be related to indoor environmental quality problems
3. Look for locations and sources of moisture intrusion or water damage
4. Investigate heating, ventilating and air conditioning (HVAC) system problems and air movement pathways.

#### IEQ Consultants

A Variety of Professions may be of assistance with certain kinds of aspects of Indoor Environmental Problems. Indoor environmental quality consultants vary in their training and experience. For example, a consultant may be trained in architecture, heating and ventilation, medicine, engineering, microbiology, toxicology, ergonomics, environmental and occupational health, or industrial hygiene. The ideal consultant for a particular problem has a basic

understanding of all of the above, with a specialized knowledge in the particular issues present in the case at hand. Some types of professionals and how they can help are as follows:

### **The Indoor Environmental Quality Team Approach:**

In many indoor environmental quality assessments, it may be helpful, if not essential, to form a team of professionals drawn from the appropriate disciplines. For sustainable design projects that do not involve an existing IAQ problem, the IAQ Team may be a sub-set of the project Design Team (which includes the Owner). Specialists may be added to that team depending on the expertise within the team and any specialized concerns of the particular project. Many green or sustainable technologies have a relationship to indoor environmental quality. The success of the building in achieving indoor environmental quality goals is not solely dependent upon good design. Rather it often requires that the design be integrated into the building's other systems than for most traditional designs. A typical IEQ Team for a new or renovation construction project might include mechanical engineering, lighting/daylighting, architectural (materials), and acoustics consultants. A remediation project will typically include the above plus an industrial hygienist and other specialists as warranted.

#### **Mechanical Engineers and Contractors:**

Engineers can provide an understanding in the intended design parameters of HVAC systems. They can also design retrofits to existing HVAC systems to improve indoor air quality. Mechanical contractors can implementing changes to air-handling equipment and provide practical recommendations, especially in retrofit applications.

#### **Architects:**

Architects generally have an overview understanding of how building design can affect indoor environmental quality. They are also responsible for specifying interior building finishes and building components, which are part of the total IAQ equation. Some architects also have formal training or experience in preventing indoor environmental quality problems.

#### **Lighting / Daylighting**

Lighting is a specialty that is often a sub-set of the electrical engineering service, but not necessarily. It is important that the lighting consultant be abreast of the latest understanding and technologies in lighting efficiency and effectiveness. Not all electrical engineers specialize in this area. Daylighting is an even further specialization that is also not necessarily a sub-set of the electrical engineering or lighting services. This specialty requires a cross-over understanding of not only architectural interactions, but also interface and integration with mechanical systems.

#### **Acoustics**

Acoustics and acoustical engineering are specialties that are sometimes included at a general level in normal architectural and mechanical (and electrical) engineering disciplines, however not necessarily so. Many architects and engineers do not specialize in these areas. In addition, specialized situations often require more than a general understanding of acoustics. In these cases, it is often wise to include an acoustical engineer with a specialty/ expertise in the specific application or concern.

#### **Industrial Hygienists:**

Most industrial hygienists have college degrees in engineering or one the natural sciences, such as biology, chemistry, biochemistry or microbiology plus specialized training in industrial hygiene. The science of industrial hygiene is dedicated to anticipating, recognizing, evaluating, and controlling the causes of occupational illness. Industrial hygienists are trained to evaluate environments for factors that affect health and comfort. Industrial hygienists also have basic training in ventilation engineering, environmental health, toxicology and microbiology.

#### Medical Professionals:

Occupational physicians and occupational health nurses have specific training in aspects of the work environment, and can help IAQ investigators target potential sources of health complaints. An occupational physician can be very helpful whenever a specific disease (such as Legionnaires' Disease) is believed to be attributable to indoor air.

#### Other Professions:

Building occupants often report nonspecific symptoms, such as headaches, eye discomfort or muscle aches. Although occupants may identify these symptoms as being related to building air quality, some of these reports may actually be associated with lighting, acoustics, or workstation layout. For additional expertise, consider adding illumination engineers, acoustics specialists, or professional ergonomists to the IAQ Team.

Some services an IAQ Consultant / Team might provide for a green or sustainable building project include the following:

- ❖ Design of Heating, Ventilation, and Air Conditioning (HVAC) systems addressing IAQ issues
- ❖ Evaluation of IAQ impacts of lighting system applications as well as building design alternatives (energy analysis)
- ❖ Testing, Adjusting, and Balancing of mechanical systems
- ❖ Commissioning of mechanical systems
- ❖ Measurement and Verification or Testing of systems

Firms specializing in indoor environmental (or air) quality consulting may have more depth of knowledge and experience in evaluating a wider range of project issues.

#### **IEQ and Sustainability / LEED**

The EQ (Environmental Quality) section in LEED addresses control, effectiveness, and monitoring of outdoor air; control / elimination of environmental tobacco smoke; lighting, daylighting and views; pollutant control, ventilation, and filtration during construction; use of low-emitting materials, adhesives, sealants, paints, coatings, carpets, and composite woods; control of indoor chemical and pollutant sources; comfort, controllability and monitoring of HVAC systems;

Indoor levels of pollutants may be two to five times – and occasionally more than 100 times – higher than outdoor levels, according to the U.S. Environmental Protection Agency.

IEQ strategies include issues related to indoor air quality (IAQ) such as increased ratios of filtered outside air, ventilation effectiveness, moisture management, and control of contaminants.

Prevention of air quality problems is generally less expensive than investigating and resolving problems later. For example, it is relatively inexpensive to sequence construction activities so that materials are kept dry and those that absorb contaminants are installed after other materials have had the opportunity to off-gas contaminants. Specifying materials that release fewer and less harmful contaminants is even better. It is also important to protect air-handling systems during construction and perform a building flush-out prior to occupancy.

Many other IEQ issues are also important as they impact occupant comfort and productivity.

#### **Project Scope of Work**

Have a clear project scope of work and description of the project and the sustainability and indoor environmental quality goals and provide this to prospective consultants. This essential document may alert consultants who do not have the requisite experience or interest to decide not to participate, thus assisting with the selection process.

## **Interview**

A major component in the success of any project will be the chemistry among the individuals involved in the project. Thus it is recommended the interview be conducted by a team that includes those in your firm who will be working directly with the consultant. Also request that the consulting firm send to the interview those individuals who will be communicating with your personnel.

The interview will also allow you to judge the sincerity and knowledge of the interview team, however be aware that good interview skills do not necessarily translate to good design skills. Look for a personal commitment to the profession and in particular to green and good indoor air quality principals. That commitment to green and IEQ principals can be extremely valuable, and may provide the added energy which is often needed to come up with creative solutions to making the green concepts work for the project.

Have a discussion of some cutting edge green or IEQ concepts. Develop an impression of the consultant's level of knowledge and expertise in these areas.

Talk about budget impacts of green and good IEQ design.

## **Qualifications**

Verify that the consultant has appropriate training and project experience. Ask for references and contact clients to verify that the consultant has helped them solve their IAQ problem. Find out whether the most experienced personnel will be onsite or in direct contact with the site investigation staff. Many qualified IAQ consultants are self-employed or work for small firms. Nationally recognized certifications or accreditations help to ensure that firms of varying size can produce results of similar quality. Be wary of contractors who may overstep the bounds of their expertise or who have a financial stake in the outcome of the investigation. For example, a duct-cleaning contractor may have seen a lot of IAQ problems, but that doesn't qualify him or her to diagnose and remedy all IAQ problems. Also, be aware of applicable state or federal certification requirements if the work involves asbestos, lead or radon. In addition, some states have special requirements for persons involved in ventilation modifications in schools.

Most consultants working in the field received their primary training in other areas. A variety of investigative methods may be employed, many of which are effective only for specific situations. Carefully designed studies are needed to avoid conclusions that are either false negative (e.g., falsely concludes that there is no problem associated with the building) or false positive (e.g., incorrectly attributes the cause to building conditions). Diagnostic outcomes to avoid include: an evaluation that overemphasizes measuring concentrations of pollutants and comparing those concentrations to numerical standards, and a report that lists of series of major and minor building deficiencies and links all the deficiencies to the problem without considering their actual association with the complaints.

## **Drawings and Specifications**

Many green or sustainable technologies or energy efficient concepts are above and beyond the normal standard of care for the construction industry. The success of the building in achieving sustainability and indoor environmental quality goals will therefore be highly dependent upon having a process of education for the contractors as well as an effective methodology for enforcement of the project requirements.

## **Questions to Ask**

When selecting an IEQ Consultant, review the general guidelines for selecting a green design professional. Then review the questions below specific to IEQ Consulting (not including the engineering and architectural specialties that are covered in other sections). This guide should

help you create a more thorough selection process. Some of these questions relate to information discussed above.

***Q1: Describe your general approach to indoor environmental quality (or to resolving the specific concern at hand).***

Ask the consultant for his or her general approach to assuring good indoor environmental quality or resolving the specific problem. A general but systematic approach is usually more effective than relying on extensive air testing in the absence of complaints or observations indicating the value of such testing.

***Q2: Ask about nationally recognized certifications or accreditations and their relevance to this project.***

Not all accreditations, certifications or professional society memberships are equivalent or applicable to particular concerns. Be wary of consultants or contractors who may overstep the bounds of their expertise or who have a financial stake in the outcome of the investigation. For example, a duct-cleaning contractor may have seen a lot of IAQ problems, but that doesn't qualify him or her to diagnose and remedy all IAQ problems. Also, be aware of applicable state or federal certification requirements if the work involves asbestos, lead, or radon. In addition, some states have special requirements for persons involved in ventilation modifications in schools.

***Q3: Take careful note of the questions the Interviewee asks.***

Competent professionals will ask questions about your situation to see whether they feel they can offer services that will assist you. The causes and potential remedies for indoor air quality problems vary greatly. A firm needs at least a preliminary understanding of the facts about what is going on in your building to evaluate if it has access to the professional skills necessary to address your concerns and to make effective use of its personnel from the outset. Often a multi-disciplinary team of professionals is needed.

***Q4: How much IAQ work and what type of IAQ work the firm has done.***

An EPA survey of firms providing IAQ services found that almost half had been providing IAQ diagnostic or mitigation services in non-industrial settings for ten or fewer years. Ask for qualifications of the firm and the individuals who will be assigned to the project.

***Q5: What is the relative importance of Testing and Observations?***

The proposal for the investigation should generally emphasize observations over measurements. There are four types of information that may need to be gathered in an investigation in order to resolve an indoor air quality problem: the occupant complaints, the HVAC system details, pollutant pathways, and pollutant sources. There is also a discussion of the role of monitoring within an investigation. Non-routine measurements (such as relatively expensive sampling for VOCs) is normally not appropriate without site-specific justification.

***Q6: What is the relationship between ventilation and indoor environmental quality issues?***

The team responsible for building investigation should have a good understanding of the relationship between IAQ and the building structure, mechanical systems, and human activities. For example, lack of adequate ventilation is at least a contributing factor in many indoor air quality problem situations. Evaluating the performance of the ventilation system depends on understanding the interaction between the mechanical system and the human activity within the building. Beware, however, of proposed solutions that increase ventilation without addressing the possibility of contributing sources of moisture or pollutants.

**Q7: Describe the goal(s), methodology, and sequence of the investigation, the information to be obtained, and the process of hypothesis development and testing, including criteria for decision-making about further data-gathering.**

The proposal should include an explanation of the need for any proposed measurements. The goal is to reach a successful resolution of the complaints, not simply to generate data.

**Q8: Who will be the person(s) performing the mechanical design and communicating with the rest of the project team?**

Ask to get the personal resume for all people who will be involved in the mechanical design as well as description of each person's core skills and value added to the project. See above discussion titled "Interview".

**Q9: What is the role of the Owner?**

Identify any elements of the work that will require a time commitment from the Owner's own staff, including information to be collected by the Owner.

**Q10: What additional tasks (and costs), which are part of the solving the IAQ problem, are outside of the scope of the contract?**

Examples might include medical examination of complainants, laboratory fees, and contractor's fees for mitigation work.

**Q11: Describe the schedule, cost, and work product(s).**

Describe project deliverables including tasks and deliverables such as a written report, specifications, and plans for mitigation work; supervision of mitigation work; and training program for building staff.

**Q12: Discuss communication between the IAQ professional and the client.**

How often will the consultant discuss the progress of the work with the client? Who will be notified of test results and other data? Will communications be in writing, by telephone, or face-to-face? Will the consultant meet with building occupants to collect information? Will the consultant meet with occupants to discuss findings if requested to do so?