



IAQ in Large Buildings

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Budgets and Accounts

IAQ Building Education and Assessment Model (I-BEAM)

Text Modules: IAQ Budgets and Accounts Module

This module is *interactive* on the CD-version (which is no longer available for ordering or to download). This module allows you to catalogue all of your IAQ activities and IAQ expenses, and assess the impact of those activities on your bottom line. Further, you can use this module to document your IAQ actions and expenses, and to develop a marketing plan. By marketing IAQ, you take advantage of the evidence that IAQ affects employee moral and performance, and the evidence that an IAQ program can be an attractive feature for existing and prospective tenants.

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What Can I Do With This?

Occupants and tenants are becoming more interested in IAQ. With this module, you can document your IAQ program activities, tally up your expenditures, and assess the potential productivity and revenue impacts of your IAQ program.

Here is how this model works.

Expenses

I-BEAM Text Modules

- Fundamentals of IAQ in Buildings
- Heating, Ventilation, and Air-conditioning (HVAC)
- IAQ Maintenance and Housekeeping Programs
- Indoor Air Quality and Energy Efficiency
- Diagnosing and Solving Problems
- Renovation and New Construction
- Managing for Indoor Air Quality
- **IAQ Budgets and Accounts**

- Overview of I-BEAM
- Overview of Text Modules
- Overview of Visual Reference Modules
- IAQ Budgets and Accounts
- I-BEAM Forms

IAQ Budgets and Accounts (PDF, 14 pp, 79KB)

You will need Adobe Reader to view some of the files on this page. See EPA's PDF page to learn more.

Indoor Air Quality (IAQ)

- Catalogue your IAQ activities in HVAC maintenance, general maintenance, housekeeping, remediation, and capital expenses.
- Identify and breakdown the cost of each activity for this year and over the long term.
- Allocate IAQ activity expenses between those which are new, and those which are already part of your baseline budget.
- Develop an IAQ budget and identify the impact of IAQ expenses on your total budget.

Revenues

- Assess the potential for retaining existing tenants because of your IAQ program and your marketing efforts.
- Estimate the value of potentially improved tenant retention on leasehold expenses and net revenues

Productivity

- Assess the potential impact good IAQ may have on the morale and productivity of your building occupants.
- Determine the value of potential productivity improvements to occupants, and the resulting rate of return on your IAQ investment.
- Develop data to help market your IAQ program to prospective tenants or to your own management.

Why Should I?

So what's all this about IAQ? In the mid 1970s, nobody heard about IAQ. Now, you can't open a building-related professional magazine without seeing some article about IAQ.

- New diseases with names like *Sick Building Syndrome* and *Building Related Illness* all related to IAQ have emerged.
- Occupants and tenants are suing architects, builders, and building owners for health and business costs associated with poor IAQ.
- Industrial hygienists can now acquire a specialty certification in IAQ.
- Guidelines, websites, chat lines, and other information resources proliferate, and the market for IAQ consultants is growing.
- Major HVAC equipment manufacturers now offer solutions to IAQ problems. From duct cleaners to air cleaners, ionizers and air purifiers—everyone wants a piece of the pie.
- ASHRAE has developed an IAQ ventilation standard. OSHA has proposed an IAQ regulation. And EPA is publishing major guidance documents like I-BEAM.
- Five to ten major domestic and international conferences a year are devoted solely to IAQ.

Why? Because occupants, tenants, and building owners, health authorities, and lawyers are beginning to take notice.

Occupants

Why do occupants care? Consider the following:

- Failure to follow simple risk avoidance guidelines in the design, construction, and operational systems of buildings is the prime cause of "sick buildings" or complaint buildings, where illness rates are 2 - 6 times higher than average for symptoms of the lower respiratory tract, 3-5 times higher than average for inflammation or irritation of mucous membranes, and 2-3 times higher than average for central nervous system health effects.
- Substantial performance losses can be subtle and occur even though people do not

overtly complain. Poor IAQ increases absentee rates and loss of human performance while at work. About half of surveyed office workers complain that poor IAQ accounts for some productivity loss at work. The average reported loss for all workers is approximately 3%. This includes those who report no loss, those that report a modest loss, and those whose IAQ is very poor and whose loss is reported to be substantial.

- Several major IAQ lawsuits in the past decade have resulted in multimillion dollar settlements, where everyone from the builders, the equipment manufacturers, and the building owners were named as defendants.
- Estimates of annual savings that could be achieved by following good practice guidelines which are incorporated in I-BEAM range from \$50 billion to \$150 billion.

So occupants care and they expect to get good IAQ. Breathing clean air is considered a right, not a privilege.

Tenants Want Good IAQ But Are Not Yet Negotiating For It

Tenants desire for improved indoor air quality is widespread. Two independent surveys of major building tenants place indoor air quality and component issues of thermal comfort and HVAC performance high on the list of major tenant complaints. Consider the results of surveys by both BOMA and IFMA.

BOMA Survey: Office Tenant Moves and Changes (1988)

Worst Problem	% of Responses
HVAC and Indoor Air Quality	30%
Elevators	12%
Building Design	7%
Loading Docks	6%
All Other	45%

Source: Office Tenant Moves and Changes: Why Tenants Move, What They Want, Where they Go. Building Owners and Managers Association International. Washington D.C. 1988.

IFMA Survey: Top 5 Complaints of Corporate Tenants (1991)

Ranking	Complaint
1st	Too Hot
2nd	Too Cold
3rd	Storage and Filing Space
4th (tie)	Indoor Air Quality
4th (tie)	Janitorial Service

If tenants care, why are they silent during lease negotiations? It seems that tenants look for, and owners market their space according to its location, its appearance, parking, and other items that are visible and tangible even though they identify such items as IAQ, thermal comfort and janitorial services as major problems. So why aren't they asking for good IAQ?

Turn this question around. What would you expect a tenant to negotiate for if he/she wanted

guarantees of good IAQ? IAQ doesn't have a convenient metric or tangible quality. It is not like parking, or location, or elevator services which are easily described. Rather, it is wrapped into the fabric of the design, construction, operation, and maintenance of the building in hundreds of different ways, as is described in I-BEAM. So even if tenants want it provided, how would you expect them to negotiate for it?

Traditionally, products like IAQ become negotiable items when they are represented by specific protocols or standards of practice. Unfortunately, IAQ protocols have not been available. However, much has been learned over the past 15 years and guidance such as I-BEAM or standards such as ASHRAE Standard 62-1999 are beginning to provide specific protocols that tenants can ask for. The process is just beginning. So tenants who look at I-BEAM or similar guidance and who become familiar with the ASHRAE Standards will be asking for items such as adequate outdoor air flow, documented source control protocols, IAQ stewardship principles in housekeeping, and good HVAC preventive maintenance program for IAQ related items. They will want to know *specifically* what you are doing about IAQ. Are you prepared to present your IAQ program?

Market Your IAQ

But why wait for tenants to ask for your IAQ package? Owners of products don't wait for customers—they take the initiative to market their product to gain a competitive edge. Now that you have used I-BEAM to develop a specific IAQ program, you can use I-BEAM again to document it, package it, cost it out, and market it.

Will tenants respond? Parking, location and appearance will always mean a lot, but in a competitive market, knowing that the building will support the health and performance of their workers and that the building manager is prepared to respond knowledgeably to a potential IAQ problem is an attractive feature.

And what if tenants do begin to ask for your IAQ package? How will you respond? I-BEAM can give you the tools. Remember, managing for IAQ is often more a matter of doing it right within your budget than increasing expenditures beyond your budget. So use I-BEAM to achieve a cost-effective, tailor made IAQ program for your building.

How Do I?

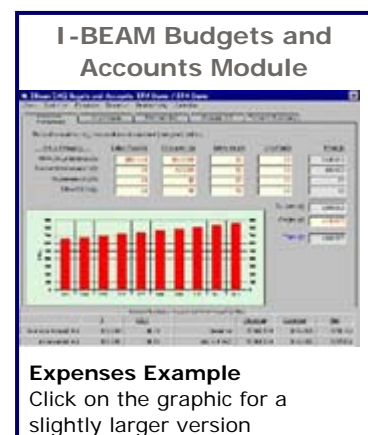
The **Budget and Accounts module** provides an easy framework for developing, assessing and modifying your IAQ budget. Here the steps you can follow.

1. Click on Building Parameters.

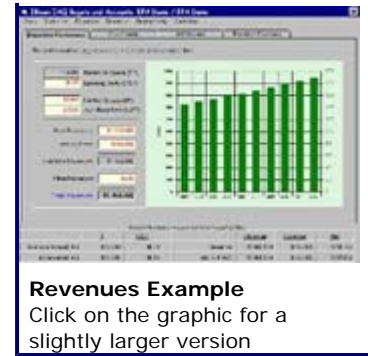
- Enter the name and size of your building or set of buildings. Name a scenario and choose an inflation rate, a start year and the number of years you wish for your analysis. If you choose, you can also enter names for "Non-Categorized" and "Other" expenses that appear on the baseline expense screen (See Expenses in #2 below).

2. Click on Expenses (see graphic at right for example).

- Enter the annual operating and annual capital expenses that you budget for by the major categories provided. These will be saved as your baseline annual



expenses. Some expenses that you already undertake but that are important for IAQ will be included in your baseline. If you choose, you can identify these separately later in the IAQ expense windows. You can break down your baseline expenses by labor and material categories, or you may enter just the totals in the non-categorized column. Enter the annual budget for capital expenses and the annual budget for extraordinary expenses (e.g., unusually large repairs) that you regularly budget for, but that are not included elsewhere.



- The accounts bar at the bottom of every screen will record the annual average expenses and revenues over the years you have specified (in constant start-year dollars). Thus, your total average annual baseline expense will be recorded on the accounts bar. This bar keeps a running total of your expenses and revenues as you make changes on each screen.

3. Click on Adjustments.

- This window gives you the opportunity to adjust your baseline for particular years based on anticipated extraordinary activities in any years that you had not included in your annual average baseline budget. I-BEAM will automatically calculate the average annual expense in base year dollars and insert it into your baseline budget.

4. Click on Standard IAQ.

- You undoubtedly already conduct many of the activities listed in I-BEAM as being important to IAQ. This screen allows you to consider the bottom line impact of additional or "incremental" IAQ activities you would like to consider based on your walkthrough inspection or I-BEAM suggestions. In addition, as an optional feature, you may also record your current IAQ budget (IAQ activities already included in your baseline). Since identifying all IAQ activities and their expenses, both current and incremental, may be tedious, it is suggested that you deal with your incremental IAQ activities only at first. Only the incremental activity expenses are used to calculate bottom line impacts of contemplated IAQ activities. The total IAQ activities and expenses (included in baseline plus incremental activities) is useful for documenting your complete IAQ program. This may be important for marketing or for legal documentation, or for other purposes.
- This screen provides IAQ activity "tickler" lists in four categories: IAQ Maintenance, IAQ Protocols and Procedures, IAQ Housekeeping, and IAQ Administrative Expenses. Click on each category and the "View Sample Activities" bar for each list. For your convenience, each list identifies IAQ activities described in I-BEAM to help you in using this window.
- You may highlight an item on the tickler list and then click on "Include Item in my IAQ Activity List" or you may create your own custom activity with the "Add Custom Activity" bar. On the pop up window, name or modify the name of the activity as needed, and identify an account number. Record the expenses or anticipated expenses for this item. You may do this in detail, or simply provide totals in the "Non-Categorized" boxes. At a minimum, you must record the expense you are contemplating as an addition or "incremental expense" to your IAQ program. For example, you may wish to upgrade the HVAC filtration from low to medium efficiency. At a minimum, record that expense under "incremental IAQ". On the accounts bar at the bottom of the screen, this incremental expense will be added to your annual average IAQ expense, your

incremental IAQ expense, and your total with IAQ expense.

- You may also record the total baseline expense for the item in question, and the value of that portion of the baseline expense that you wish to identify as an IAQ activity.
- For convenience, you may also record your current baseline expense for the item in question (e.g., filters). To this, I-BEAM will add the incremental IAQ expense and show you the total expense for this item in the last column. This is solely for your convenience, but does not affect any calculations or reports in I-BEAM.
- In addition, if you choose, you may also allocate some portion of this baseline expense to your IAQ program and record that value in the IAQ portion of the pop-up window under "Included in Baseline". The IAQ "included in baseline" plus the "incremental IAQ" expense will be added to obtain your "total IAQ" expenses. This would add an activity and expense to your overall IAQ program budget, but would not affect the baseline budget, and would not affect the bottom line impact assessment you do in I-BEAM since that assessment relies solely on the incremental expenses and incremental benefits from additional activities. Each activity that you enter will be recorded in I-BEAM. You will be able to review and print these out from the Reports screen in the Overview window.
- A running total of the IAQ expenses and the total incremental IAQ expenses are recorded on the bottom line summary bar at the bottom of the screen. If you are just recording incremental activities at this time, the IAQ expense total will be understated and be equal to your incremental IAQ expense.

5. Click on Special IAQ.

- Record here activities which do not recur annually, but may either be extraordinary expenses designed, for example, to fix problems found in your baseline IAQ audit, or capital expenses which will require financing. I-BEAM will incorporate these into the bottom line calculations.

6. Click on Expense Summary.

- This window summarizes your expenses for each year. Use the slider bar to identify the year of interest.

7. Click on Revenue (for leased space) (see graphic at right for example).

- Enter your average rental rate, lease expenses, and other revenues you wish to record as annual baseline values.

8. Click on Adjustments.

- Record any adjustments to revenue for particular years due to unusual events you have not included in the annual average baseline revenues.

9. Click on IAQ Impact.

- Record differences in rental rates and lease expenses associated with renewing a lease for an existing tenant versus obtaining a new tenant.
- Identify the proportion of leases retained in the baseline, and the potential increase in the proportion of retained leases that might result from your establishing and marketing an IAQ program.
- This screen now records the potential increase in revenue due to IAQ, and the

cost-benefit results of your IAQ program based on potential revenue gains. You can use the slider bar to determine what increases in tenant retention would be necessary to break even, given your incremental IAQ expenses.

10. **Click on Rental Summary.**

- Review your rental income, with and without IAQ for each year.
- The accounts bar at the bottom of each screen now records the annual average expenses and revenues with and without IAQ (in constant start-year dollars).

11. **Click on Productivity.**

- Enter the total wages of employees affected by this IAQ program.
- Enter anticipated or potential productivity improvement due to IAQ.
- This screen now records the productivity value and the cost-benefit results of your IAQ program based on potential productivity gains.

12. **Use the results.**

- Click on Overview and then on "graphics" to obtain graphic presentations of your accounts, and click on "reports" which will provide detailed reports of your IAQ program based on your inputs. You can use these features to market your program to potential tenants, or to develop proposals for an IAQ budget to upper management.
- Go to the file menu and save this scenario under an appropriate name.

13. You can create other scenarios for this building or set of buildings using other parameters and input values.