Chasing Air

MONROE FRITZ
TSI ENERGY SOLUTIONS
4650 Kilarney Dr., Carmel, Indiana 46082
Phone: 800-481-5748 • E-mail: mfritz@tsienergysolutions.com
ABSTRACT

Over the past ten years, there has been an explosion of building science and practical air barrier knowledge. Not surprisingly, one of the results of this explosion has been the need to “chase air” in dysfunctional buildings. “Chasing air” is techno-slang for the occupant-driven process of diagnosing deficiencies in the air barrier of an existing building. This presentation examines the techniques and processes necessary for detecting and solving air-barrier-related problems in existing buildings based on a standard of success as defined not by engineers and scientists, but by the “customers” of building science: building owners, operators, and occupants.

SPEAKER

MONROE FRITZ — TSI ENERGY SOLUTIONS

MONROE FRITZ is a certified infrared thermographer and has been an Energy Star® building professional for 13 years. His professional credentials include such diverse groups as the American Air Barrier Association, RESNET, the Infraspection Institute, and the Building Analyst Professional program. He has conducted energy audits, blower door testing, and building diagnostics in more than 7,000 buildings. He is the author of Chasing Sacred Air, a handbook for energy efficiency in churches.
Over the past ten years, there has been an explosion of building science and practical air barrier knowledge. Not surprisingly, one of the results of this explosion has been the need to “chase air” in dysfunctional buildings. “Chasing air” is techno-slang for the occupant-driven process of diagnosing deficiencies in the air barrier of an existing building. There is a critical need for a holistic approach to quantify and solve the problems of deficient air barriers in existing buildings. As a natural consequence of the evolution of air barrier knowledge in new construction, we have simultaneously created an enormous secondary market for specialized building diagnostic processes driven by the understanding of the effects of air barrier performance on sustainability, costs of operation, and occupant health and comfort. What are the techniques and processes necessary for detecting and solving air-barrier-related problems in existing buildings? What kind of marketing is required to create a standard of success defined not by engineers and scientists, but by the “customers” of building science: building owners, operators, and occupants?

In the 1990s, public awareness of energy efficiency in buildings began to grow steadily. The convergence of environmental concerns and energy costs was matched by a steady increase in the knowledge of building science. Academic curriculums, public awareness, and the building industry itself are now a reflection of a continuing evolution in “green” themes. There now exists a very distinct and successful energy efficiency industry in the United States based upon an ever-evolving knowledge of building science and carried forward by a significant group of energy-efficiency service providers. However, service providers (with no particular strategic planning) now find themselves working within the boundaries of a default business model to which nobody has paid any particular attention. This business model has some very specific risks and limitations that deserve a closer look.

Energy service providers are often small companies with limited expertise in market research. If they have failed to do their homework in regard to the size and business potential represented by the existing commercial building market, that would be understandable. However, there is a wealth of information available for those who are willing to take the time and do the research. According to the National Institute of Building Sciences (NIBS), there are 5.6 million commercial buildings in the United States. They represent 87,400,000,000 sq. ft. of floor space, and more than 90% of these buildings are 50,000 sq. ft. or smaller.1 The primary reason the business model for the typical energy service provider deserves a closer look is because it does not take into account the tremendous size and scope of the opportunity represented by the existing commercial building market.

Energy-efficiency service providers, whose primary product is the practical application of building science, are also providing services that are based on a similarly narrow and self-limiting model. Together, these two models—a business model and a technical service model—have created a risky comfort zone of operations for energy-efficiency service providers. A healthy dose of self-analysis and a willingness to undertake some traditional creative business risks are the keys to an entirely new level of opportunity for energy-efficiency service providers. The new level of opportunity that is presenting itself is based on the country’s existing infrastructure of commercial buildings.

The application of building science to existing commercial buildings is where building science should have been prioritized since day one. In particular, the application of air barrier science (as a specialized subset of building science) has been grossly underutilized for enhancing sustainability, increasing comfort, and managing costs of operation in commercial buildings. The high profile and glamorous applications of building science to the construction industry have stolen center stage. If the hypothetical goal for building and air barrier science is to have everyone living and working in the most efficient and sustainable buildings possible, then we have to stop pretending that new construction makes sense as a first priority. It is absolutely imperative that we set new standards for new construction and improve our building processes as we go forward.

But what about all of the buildings we are living and working in every day—buildings that were designed and constructed to a standard of “best practices” for their time, but that often suffer from severe mechanical shortcomings? This is a critical issue for the simple reason that the total square footage of the existing commercial building infrastructure (specifically those buildings designed and built without regard to any “green” standards) is greater than the annual square footage of new commercial construction by a factor of many magnitudes.

To engage building science as a primary application for new construction only is like playing with building science in a fishpond while ignoring an ocean of building science opportunity right next door. The current business model, which overemphasizes the application of building science to new construction, is intrinsically flawed. In terms of actual real-world opportunity for the application of building science, we are just stirring around the edges. We think we are making significant progress in the areas of energy efficiency and sustainability because we can build a highly efficient new building; but the fact that we live, work, eat, and play every day in poorly constructed, inefficient buildings should give us second thoughts. We will not make truly significant progress until we can address the overwhelming size of the challenge represented by the existing building infrastructure.

Both the business and science of energy efficiency are currently defined by some surprisingly limited models. The business of energy efficiency is dictated by the overwhelmingly dominant influence of government regulation and utility conservation programs. The science of energy efficiency (and specifically the science of air barriers) is dominated by the science of engineers and researchers working in the field of new construction. Notice that neither one of these models is specifically centered on tra-
ditional consumer markets designed to meet the needs of individual customers involved in the maintenance and operation of existing commercial buildings. Energy-efficiency services are typically developed to meet the demands of a type of artificial market created by government policy (such as building codes and energy-efficiency tax incentives).

While the success of government-based strategies to promote building efficiency has varied from program to program, their overall positive impact has been truly significant. However, the success of these programs has created an unintended consequence. The private sector now relies almost exclusively on government policy for leadership in the field of applied energy efficiency. In a near-total failure of creative marketing vision, the private sector has almost completely deferred to government programs for applications of building science to the country's vast collection of commercial buildings.

The current business model, defined and driven by government regulation and utility company programs, is both dangerous and unpredictable for private business owners. As an alternative, the need for energy-efficiency services in the commercial building sector represents a marketing opportunity firmly grounded in private enterprise.

Identifying opportunities in the commercial market and selling air barrier science to this market using innovative field applications is not necessarily an easy process. However, the market itself is overwhelmingly large and represents a predictable, definable, and sustainable sales and service opportunity. Success with this business model requires something different than success with the building model required for work with government and utility programs. The traditional business skills of marketing, market research, customer knowledge, and customer service must replace the regulatory and organizational knowledge required for service to the governmental and quasi-public organizations typically served by today's energy-efficiency providers. Making this change in business models puts the energy-efficiency business back on track as a participant in the traditional free enterprise system. An extraordinary opportunity exists for energy-efficiency service providers who would like to do something more with their skills and knowledge than serve the needs of government and utility-company program specialists.

Air barrier field applications are also in need of a new model. The history of analyzing buildings for their energy efficiency is the history of the energy audit. In the past 15 years, armies of energy auditors have been given their basic training in building science and sent out into the world to do battle with energy-guzzling homes. The training and experience of these energy-efficiency soldiers varied greatly, but they usually had one thing in common. They were very effective at producing massive quantities of energy-related data for the utilities and private contractors that sponsored their efforts. The data were generated by the use of extensive checklists—detailed lists of items to be documented by the auditors at each location on their daily schedule. The audits were the most basic tool of the trade, and little thought was given to any shortcomings the audits represented for applications with the more complicated issues of energy assessments for commercial buildings, or energy assessments performed in the private market without the political influence of utility companies.

An audit is an accounting of details—a documentation of items to see if they are present. Not surprisingly, the one thing that distinguishes an energy audit (either commercial or residential) is the use of checklists, but as useful and necessary as checklists are when examining a building, they can be a service provider's worst enemy when it comes to understanding the importance of the actual items on the checklist. To seek to understand how a building is actually operating by using a checklist is a classic setup for missing the forest for the trees. Details never provide the total perspective on the operations of a building. A comprehensive perspective requires details, the interpretation of details, analysis of relationships documented by details, and attention to the consequences of the cause-and-effect dynamics described by details. Audit details are the required raw materials for understanding a building, but they are not the understanding itself.

While detail-based energy audits driven by formulated checklists became the standard for home energy evaluations, the commercial sector has been left with few options in the area of energy-efficiency assessments. Most commercial business owners are forced to cope with chronic operational problems by using highly specialized trade partners whom they know and trust. However, roofers, plumbers, insulators, and heating/cooling experts (just to name a few) are limited by the very nature of their specializations. They lose their effectiveness when asked to solve problems outside of their normal experience. One-size-fits-all energy audits similar to those used in the residential market have never been as widely used in the commercial sector as the residential. There is way too much variation in size and complexity of the buildings. However, without the availability of a simple standardized tool for commercial energy assessments, the commercial portion of the nations' infrastructure has been subject to a dysfunctional, piecemeal collection of energy-efficiency approaches. Insulators approach the commercial market with insulation, HVAC companies sell new equipment with higher efficiencies, electricians install high-efficiency lighting, and energy management companies offer new levels of automated control.

It is safe to say that the commercial building market is virtually overrun with an overwhelming supply of the parts and pieces of energy management; but in the midst of all these parts and pieces, who pays attention to the total building? Does anybody have any idea how all of these components, processes, and products work (or fail to work) together? Is anybody paying attention to the forest in the midst of all this work on the trees?

There will always be a place for the standardized energy audit, especially in the residential sector. However, the commercial sector is much better served by the comprehensive building science process referred to as diagnostics. Building diagnostics is a process of discovery, not an exercise of data gathering based on a set of checklists. Classic dictionary definitions of the term “diagnostics” often describe the process as both an art and a science. Building diagnostics is an art in the sense that it requires human intuition, logic, creative association, and problem solving. Building diagnostics is a science because it is based on an in-depth understanding of physics and, in particular, a knowledge of the real-life applications of the laws of thermodynamics. Building diagnostics is decidedly “high-tech,” involving such activities as pressure analysis, smoke and gas tracing, and infrared inspections; and it is necessarily holistic—a comprehensive, “big-picture” view of the interactive dynamics within a building.

Practitioners of building diagnostics...
must have plenty of old-school people skills and be talented interviewers and listeners. (Nobody knows and understands the idiosyncrasies of a building better than those who live and work in it.) In addition, building diagnostics requires advanced experience-based observation skills and exceptional deductive reasoning—two important items that are often totally missing in a traditional energy audit.

Energy-efficiency assessments for the commercial building sector should always begin with a process of discovery that is both more rigorous and comprehensive than the common energy audit. Building diagnostics represents a distinct evolution above and beyond traditional building assessments. Companies that specialize in energy diagnostics have learned to ask if building owners and facility managers have experienced persistent problems that their regular trade allies seem unable to solve. Such problems are a common indicator of the need for a broader application of building science. Air barrier assessments, the indispensable foundation of comprehensive building diagnostics, are often entirely neglected in the course of a simple energy audit.

Energy-efficiency service providers are a distinct group of businesses. However, there is an enormous amount of specialization (and therefore variation) in the way they conduct their business. Almost all energy-efficiency service providers engage in some form of building assessment or testing as part of their typical product offering. Many providers go on to supply products and remediation in buildings, while other providers specialize in testing and evaluation only.

A good example of a class of energy-efficiency service providers who are doing a better-than-average job of serving existing commercial buildings are the suppliers of energy automation programs. After an initial assessment, these programs project energy savings for their customers based on control and automation of energy consumption in their clients’ buildings. Any point of energy consumption is a candidate for this type of automation and control. HVAC services and lighting lead the list. Engineers have a popular saying: “If you can measure it, you can control it”; and that is exactly what these companies do in regards to energy consumption in commercial buildings. First they identify and measure the various points of energy consumption, and then they proceed to control the consumption by means of automation.

Energy service providers who specialize in the testing and analysis of air barrier issues are not nearly as successful in serving existing commercial buildings as their automation counterparts. Because the approach to energy efficiency in a building is easily separated into seemingly unrelated issues, many building owners and operators believe they have achieved true efficiency in their buildings when that is not often the case. It is quite possible, and fairly commonplace, for building operators to automate their energy consumption and experience a gratifying drop in utility bills. However, automating and controlling energy consumption does not affect the loss of energy from a building due to a defective air barrier. Building owners who have automated their energy consumption usually believe that they have successfully created a “green” building, but if there has been no air barrier testing for the building, nobody really knows exactly how efficient the building is in regard to total energy consumption.

There is a simple method for avoiding the pitfalls of a piecemeal approach to building energy efficiency. That simple method is the application of building diagnostics, the most effective tool available to any energy-efficiency service provider for ensuring that the efficiency of a building is properly evaluated and understood in a comprehensive manner.

Avoiding a piecemeal approach to building energy efficiency must be reflected in the way an energy service provider makes use of his tools and testing procedures. The typical energy service provider has a history of performing highly specialized tests for customers whose request for a specific test is often very shortsighted and poorly informed. The use of blower doors to test air infiltration is a good example. Inevitably, using a blower door to measure air infiltration in a building creates many more questions than it actually answers. Where is the infiltration coming from? What effect does the infiltration have on insulation performance? Is the infiltration more important or less important than upgrading an HVAC system?

The poster child of energy service providers, infrared scanning, is another major culprit in the tendency to provide piecemeal testing to commercial building owners. Infrared anomalies (the targets detected during an infrared scan) often require experienced interpretation. Does an anomaly in a wall system indicate a deficiency in the thermal barrier or the presence of moisture? How can the results of an infrared scan be used to establish budget priorities for a large-scale remediation project? While there may occasionally be a justifiable reason to perform a single specialized test for a building owner, those situations are actually very rare. When we take our cars to a mechanic, we expect the mechanic to follow diagnostic procedures and use whatever tools are necessary to identify and correct problems. The same model should be applied to energy efficiency work in a building.

The service model for comprehensive building diagnostics requires an experienced technician arriving on-site with a full complement of tools and equipment. Because the diagnostics are driven by a customer-centered problem-solving approach, there is no preconceived notion as to what actual tests will be used on any particular building. Even more important, many of the energy service providers’ diagnostic processes are complementary. Infrared scanning, in combination with blower door operation, is a highly effective diagnostic tool. Pressure analysis, duct testing, and smoke tracing are another example of complementary diagnostic processes. Whatever processes are ultimately used should be determined by the comprehensive objectives represented by building sustainability, occupant comfort and safety, and costs of operation.

More than anything else, building diagnostics is characterized by a holistic approach to the application of the concepts of building science and the specific concepts of air barrier science. The holistic theme is recognition of the fact that a building is more than the sum of its parts. The holistic theme also recognizes that each building component must be considered for its relationship to the rest of the building. There is no such thing as a “stand-alone” building component or system. To attempt to solve building sustainability issues, comfort issues, or energy-efficiency issues without regard to their interrelatedness is to invite disaster. Building diagnostics is not about gathering more and more data from a building; it’s about acquiring more and more knowledge from the data gathered. The role played by air barrier investigations in the diagnostic process is unique because air barrier performance is the epitome of a
Figure 1 – A continuously running rooftop exhaust in February weather.

holistic building concept. The functionality of a building air barrier affects the performance of every other building system. It has been said, “You can’t control anything in a leaky building.” This is the reason why air barrier evaluations (“chasing air”) are the cornerstone of good building diagnostics and the first priority for most professional energy-efficiency service providers.

The synergy between the concepts of the holistic building assessment, building diagnostics, and applied air barrier science is best illustrated by taking a look at some of the findings from a typical building diagnostics project. Figure 1 shows a rooftop ventilator in the month of February in central Indiana. Note that the area around the ventilator is completely dry and devoid of snow. Since this ventilator is exhausting heated air from the building, the melting and drying effects are not necessarily unusual. However, the technicians who were performing diagnostics at this commercial facility associated this observation with two other items of information: one observation provided by their own testing, and a second observation gleaned from their interview with personnel working in the building.

Before seeing the rooftop ventilator, the technicians had pressure-tested the main building and documented that the building was operating at a significantly negative pressure. In addition, they had noted complaints from the building occupants concerning disagreeably dry air in the building. This complaint was verified by confirming that the relative humidity inside the building was in the single digits—way below the comfort zone for building occupants. Using the deductive reasoning required by building diagnostics, the technicians were able to draw some comprehensive conclusions about what they were seeing and hearing.

The air barrier in this building was significantly compromised, which was allowing excessive amounts of cold outside air into the return system of the furnace. Heating the exterior air was drastically lowering the relative humidity inside the building.

In an effort to explain the low-pressure levels, the airflow from the exhaust ventilator was measured. The airflow was way beyond appropriate levels. Diagnostics approached with a holistic mindset and identified four factors: comfort complaints by building occupants, documented levels of low humidity inside the building, a compromised building air barrier, and excessive rates of exhaust in the building—all dynamically related contributors to an unhealthy, uncomfortable, and inefficient building.

The successful resolution of issues in this particular building is notable for two reasons: The remediation work was accomplished in a very short timeframe, and it was very inexpensive. Controls of the exhaust levels in the building were reduced and automated by an HVAC contractor. Air sealing was accomplished in the identified areas by a professional spray-foam contractor in a process that took less than half a day to complete. It’s true that traditional energy audits often create a list of potential energy-efficiency upgrades that may be dif-
difficult to perform and may or may not produce a return on investment. However, the use of holistic diagnostics in this particular building identified inexpensive opportunities that raised the humidity levels in the building (drastically improving occupant comfort) while simultaneously lowering the heating bill.

In another example, building diagnostics takes the discovery of air barrier issues such as those typically documented by infrared investigations, and uses them like parts of a puzzle to create a more comprehensive understanding of what is taking place in a building. The two infrared images shown in Figures 2 and 3 are very typical for images taken inside and outside of a building during the heating season in northern climates. Both indicate some form of air barrier issue. The first infrared image (with matching digital image) shows the distinctive “blaze” marks that indicate the presence of cold air infiltration into a building.

The second image shows heat loss through the exterior of a building (see Figure 4).

A simple infrared survey of buildings (similar to the kind routinely produced by infrared specialists) would merely provide these visual images as documentation of potential problems. However, in a building diagnostics scenario, these images would not be considered as the final product of an investigation, but rather as an intermediate step to the discovery of what thermodynamic forces were actually at work in the air and thermal barriers of the building. The documentation of heat loss in a building is usually the goal of an infrared investigation, but it is the understanding of that documentation that is the goal of building diagnostics.

Figures 5 and 6 provide still another example of the difference between the findings provided by a standard energy audit and those provided by building diagnostics. The images show the interior and exterior of a segment of ceiling above an exterior stairwell and entryway. A visual examination of the building’s air barrier (a standard process for building diagnostics) discovered a direct break in the air barrier between the attic above the stairwell ceiling and the adjacent wall component. The break was a significant source of exterior air infiltration into the building. This type of discovery is seldom, if ever, the product of a standardized fill-in-the-blank energy audit. In addition, it represents an opportunity for a simple remediation process. The owner of this particular building was able to perform the necessary air sealing with members of his own maintenance staff using foam guns and solid sheathing material.

Why would an energy-efficiency service provider fail to offer building science expertise as illustrated in these simple scenarios? The answer to that question lies with the history of the industry. The typical provider of energy-efficiency services is trapped in a business model created in response to the regulation and money poured into the energy-efficiency market by government and utilities customers. In a similar fashion, the application of energy services has been trapped in a building science model of narrowly based data collection that has severely limited the usefulness of applied building science in existing commercial buildings. However, there are options avail-
Figure 7 was expected to be routine. Within minutes of beginning the blower door test, it became apparent that something was drastically wrong. With each single blower door fan having the capacity to move approximately 5,000 ft.\(^3\) per minute of air, pretest calculations indicated that a successful test should have only required a fraction of the total air-moving capacity of the three-fan system. Surprisingly, with all three fans running at maximum capacity, the building could not be depressurized to the target level. At this point, far too many energy service companies would have provided the construction superintendent with the results of the unsuccessful test and would have packed up their equipment and left the building. The contract between the blower door operators and the builder specified the execution of a blower door test with no additional responsibilities.

As mentioned previously, many of the highest-profile tests provided by energy service technicians create more questions than they answer. Blower door tests can certainly be included in this category. If the education center had passed the blower door test, then all questions would have been answered and no further work would have been necessary. However, the failure of a contractually required blower door test just days before scheduled occupancy not only creates a host of questions, it sends the entire construction team into panic mode. In this particular case, all questions were answered within less than an hour by the blower door technicians, who seamlessly switched from the simple job of testing an air barrier to executing diagnostic processes, which immediately identified the problem.

The following example demonstrates that air barrier issues are common in new construction, as well as older buildings. In addition, it demonstrates the superiority of using a diagnostic approach to solving specific building performance issues.

The building in question was an early-childhood education center at a large university. Per construction specifications, it was scheduled for a routine air barrier test just prior to occupation. The building had been designed and constructed to be extremely airtight. The test conducted using the triple blower door setup shown in Figure 7 was expected to be routine. Within minutes of beginning the blower door test, it became apparent that something was drastically wrong. With each single blower door fan having the capacity to move approximately 5,000 ft.\(^3\) per minute of air, pretest calculations indicated that a successful test should have only required a fraction of the total air-moving capacity of the three-fan system. Surprisingly, with all three fans running at maximum capacity, the building could not be depressurized to the target level. At this point, far too many energy service companies would have provided the construction superintendent with the results of the unsuccessful test and would have packed up their equipment and left the building. The contract between the blower door operators and the builder specified the execution of a blower door test with no additional responsibilities.

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The successful diagnostic process (the answering of the questions created by the failed blower door test) required a combination of two of the most common technologies provided by energy service technicians: blower door depressurization and infrared scanning. The use of multiple and complementary technologies to solve building performance issues is typical of the diagnostic process. The two images shown in Figures 8 and 9 (an infrared image and a matching digital image) illustrate how the issues associated with the leaking air barrier in the childhood education center were immediately located and identified.

The ambient temperature outside the education building was close to 90°F.
The inside temperature was approximately 70°F. Warm air drawn through the broken envelope immediately heated the interior surfaces of the building at its point of entry. The bright yellow and white spots on the infrared image (shown here in black and white) indicate the locations of airflow. (It is important to remember that the infrared technology does not “see” moving air. However, it immediately detects an increase in surface temperature on those surfaces that are in contact with the invading warm air.) This turned out to be a classic case of air barrier discontinuity. Establishing the fact that a building may have wonderful air barrier components does not mean that the building actually has a performing air barrier. Air barriers typically fail at the junction of component systems, such as this case, where the air barrier in the ceiling turned out to be completely disconnected from the air barrier in the wall. In this particular building, the failure was massive. Additional infrared images (shown in black and white in Figures 10 and 11) indicated that the air barrier failure existed throughout the entire building.

Immediately identifying the source of the air barrier failure allowed the construction team to create an expedited remediation plan. Hundreds of feet of soffits were removed from the outside of the building, and a spray foam contractor was able to seal the gap between the roof air barrier and the wall air barrier within 48 hours. The move-in date for the building was not affected, and building performance standards were achieved. Identifying the air barrier issue was actually a very simple diagnostic challenge. What’s important to realize is that the performance of a simple energy-efficiency blower door test left the reader with a crisis situation that required diagnostic procedures. As is typical with most building diagnostics, complementary technologies were required along with experienced technicians willing to approach the problem presented by the failed blower door test with a simple comprehensive check of the dynamic forces at work in the building.

Business opportunities represented by the types of jobs described above can only be realized by energy service companies that have successfully evolved into providers of building diagnostics. The key to the opportunity represented by commercial building diagnostics starts with marketing and sales. An energy service company that represents itself as a provider of an undifferentiated list of high-tech testing procedures is not communicating with potential customers. A brief overview of the websites representing typical energy service providers demonstrates that most of these providers are very proud of their esoteric testing capabilities. The question is, who among the average commercial building owner has any realistic idea of which, if any, of these wonderful tests would be appropriate or profitable for his or her building? If commercial building owners represent the target market, then an approach must be made between the needs of those building owners and the desirability of energy-efficiency test procedures.

The enormous gap between the needs of commercial building owners for answers to their most persistent building operation problems and the a-la-carte sales approach of “testing by request” offered by most energy service providers is breathtaking. Nothing less than a full 180° reversal in marketing strategies will close this gap. Energy service providers must begin the sales process by understanding customer needs. If a commercial building owner has condensation issues on walls or windows, then those problems represent a sales opportunity. The priorities for a building diagnostics sales approach don’t include the technical capabilities of the energy service provider until the sales process is ready to close. The appropriate sales process begins with the commercial building owner and his own individualized problems and then concludes with the energy service provider presenting his high-tech tools and their specific problem-solving capabilities.

Reversing marketing strategies is often simpler than it sounds. A typical tagline to a marketing piece produced by a provider of infrared scanning services might contain the following line: “Serving the Tri-State area for more than 20 years with nationally recognized thermographers using the latest and most sophisticated infrared technology currently available.” Reversing this strategy by emphasizing the potential needs of a commercial building owner would look more like this: “Using the latest in infrared technology to solve building performance issues such as moisture intrusion, insulation failures, and draft detection.”

In addition, the case histories of jobs performed by most energy service providers are a gold mine of selling points to which commercial building owners will respond. Reviewing these case histories is a simple process. Every building issue previously discovered in the routine course of energy evaluations can be reviewed for how enthusiastically the building owner/operator related to the problem. A positive reaction from one owner/operator is an obvious clue to what other owner/operators might also appreciate. To put it another way, an energy service provider’s most successful
field discoveries (as judged from the point of view of the customer) usually correspond to the building performance issues most important to commercial building owner/operators.

Customer education is another effective way to approach the marketing of building diagnostics. As mentioned earlier, public awareness of the general concepts of building energy efficiency has been on the rise for some time. However, the concept of building diagnostics (the process of a comprehensive approach to evaluating building performance) is still a novelty. Selling building diagnostics necessarily requires an element of customer education. Commercial building owner/operators are professionals from all walks of life, but they often associate in a variety of trade organizations. Organizations for facility managers, property managers, building engineers, and energy-efficiency/sustainability groups can provide a wealth of contacts for creative educational outreach. Outreach can include everything from vendor displays at conventions to opportunities for formal speaking presentations.

Energy service providers who are anxious to expand into comprehensive building diagnostics also need to undertake one of the most basic of all marketing processes—that of measuring and evaluating the potential size and characteristics of their local market. There are many sources available for developing an understanding of the existing commercial building market. NIBS (previously mentioned) is a great place to start. In addition, state-by-state information is available in the public domain sections of state tax records. Local, regional, and national real estate organizations are also an excellent source for databases that often categorize commercial real-estate properties by both size and use. Anyone who undertakes this kind of basic research will be impressed with the sheer magnitude of the commercial market.

Marketing building diagnostics to the commercial building sector can be done on a grass roots basis, or it can be done as a highly sophisticated marketing campaign. Regardless of the approach used, energy service providers must learn to make the connection between their own highly specialized world of applied building science and the everyday concerns of commercial building owners. An exciting new opportunity for entrepreneurial business success hangs in the balance.

“Chasing air” is the diagnostic process of searching for air barrier issues in an existing building. It represents a first priority in energy-efficiency investigations, and it has been a natural prelude to the holistic concept of building investigations, which expand the applied science from the basic data collection of energy audits into the more comprehensive diagnostic insights of building sustainability, human comfort, and operation efficiency. In the last decade, it has been the art and science of chasing air that has relentlessly led energy-efficiency service providers away from their historically narrow views of building operations into a comprehensive view of a building as a single, integrated, dynamic system. As it turns out, air barriers—as the central component of building envelopes—are both literally and figuratively the “big picture” for understanding building operations.

The change in perspective towards air barrier investigations as a practical applied science has now brought energy service providers to the realization that they have much more to offer as a business service than the documentation of lists of energy deficiencies. The move to holistic building diagnostics as a service product opens the door to every variety of commercial building as a potential market. The well-respected but extremely self-limiting energy audit has the potential to be recreated into an entirely new product. Now is the time for energy service providers to reinvent their business model and expand their marketing methods based on the concept of holistic diagnostics.

The move to building diagnostics and expanded applications for air barrier science is challenging all energy-efficiency service providers to define exactly what constitutes a “successful” building. Sustainability, occupant health and comfort, and affordable operation are usually at the top of the list. However, without the right business and technical approaches, these obvious keys to achieving successful buildings can be lost in a fog of distracting and counterproductive initiatives.

Building science experts who refuse to be dazzled by their own credentials and who can listen better than they talk will usually find success in identifying customer needs for holistic diagnostics. In his book Exploiting Chaos, Jeremy Gutsche instructs business owners in very clear terms: “Don’t speak to your customers, speak with them.” This is the simple strategic key for any service providers who want to evolve beyond the role of energy experts with self-limiting market appeal to the role of building diagnostic entrepreneurs. Building owners and operators are interested in sustainability, occupant health and comfort, and economies of operation. If you don’t believe it, just ask. Energy service providers are always eager to talk about their own expertise, but if they are also willing to listen, they will hear a conversation from millions of commercial building owners that sounds a lot like the question “Does anybody out there know how to chase air?”

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