

# High Performance Building **Delivers Results**

**Communicating  
Productivity Benefits  
of  
Sustainable Building  
to  
Decision Makers  
in the  
Seattle Development Industry**

# Sustainable Demand Project

**A Project of the  
Urban Consortium Energy Task Force  
of Public Technology, Inc.**

City of Seattle  
**Seattle City Light**

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City of Seattle Justice Center Building  
a LEED Silver candidate to be completed Spring 2002

## PROJECT SUMMARY

While sustainable building can yield substantial economic, environmental and social benefits to building occupants and society as a whole, very few new buildings are being designed and constructed using sustainable methods and materials. This gap between the benefits and demand for sustainable building may be related to a lack of knowledge of those benefits by building decision-makers: developers, tenants and architects.

The Sustainable Demand Project was designed to evaluate whether providing information about productivity gains from sustainable design and construction can increase the likelihood that key decision makers will choose sustainable design and construction methods, thereby increasing energy conservation and emission reductions.

Extensive research uncovered 31 projects that documented productivity, increased retail sales and improved student learning, all linked to the use of specific sustainable building techniques. See Appendix A. Promotional and educational fliers and case study reports were prepared and presented to key decision makers in the Seattle development community to get their reaction and critical advice.

### Major Findings

1. What we found, in general is that this issue is not so much about the need for effective information as much as it is about the need for effective communication. Simply giving decision makers information is insufficient to motivate reading it. We found that it was the interview itself that appeared to elicit interest in the topic.
2. Both from market transformation research and from the interviews themselves we found that there are significant barriers within the decision making structure of the industry that stand in the way of adopting new and innovative techniques.
3. Profit is the motivating driver in decisions made. Long term value, tenant comfort and operating efficiencies are secondary to cost, and primarily first cost, which is the metric by which profit and success are measured.
4. End users – tenants and building managers – those most affected by early design decisions, are only loosely involved, if involved at all, in those early decisions.

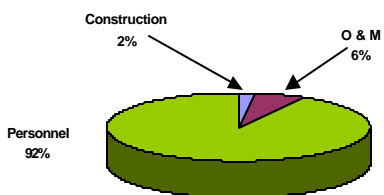
### Lessons Learned

1. The decision making process in the construction and development industry is dynamic and complex. Who participates in building decisions and when is determined by a well established social context of conventional practices and professional relationships. This social context relies on predictable performance of the actors and on reproducing previously successful building forms and models and is resistant to innovative practices, new designs and unfamiliar technologies.
2. Integrating decision making is critical to effectively incorporate parameters of tenant comfort, sustainable building techniques and energy and operating efficiencies into early project decisions. Conventional intervention techniques of building codes and financial incentives modify details of final building design but do not fundamentally alter the decision making process. A High Performance Building Team appears as one method to facilitate early intervention and integration of decision making.

## BACKGROUND INFORMATION

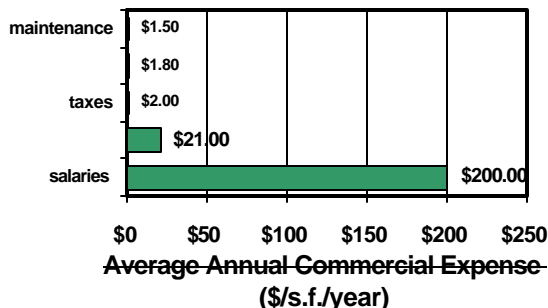
The design, construction and maintenance of buildings have a tremendous impact on people and nature. Buildings consume 40 percent of the world's total energy, 25 percent of wood harvest, and 16 percent of water consumption, according to the U.S. Department of Energy's Center of Excellence for Sustainable Development. The building industry is the nation's largest manufacturing activity, representing more than 50 percent of the nation's wealth and 13 percent of the Gross Domestic Product.<sup>i</sup> Energy and material consumption in building construction and operation can contribute significantly to global climate change.

### 30 Year Costs of a Building



Or...looked at another way,

“Only 2 percent of the 30-year costs of a building are in its initial construction....Another 6 percent is expended on operations and maintenance and the remaining 92 percent is spent on the people who work there.”<sup>ii</sup>



Or, looking at annual operating expenses of commercial space on a dollars per square foot basis, by far, the largest item is salaries, followed by rent. Maintenance, energy costs and taxes are relatively insignificant.

A one percent savings in salaries – or a one percent productivity improvement – of \$2.00/s.f./year, exceeds both maintenance or energy costs.

Source: *Indoor Quality Update*, Oct. 1996, Vol. 9, No. 10.

In summary form, the following are the most impressive findings of the financial value of health, productivity and human performance benefits of high performance building. from the 31 case studies:



- ◆ office productivity increases up to 16%
- ◆ absenteeism reductions to 40%
- ◆ far fewer complaints about I.A.Q



- ◆ increased market value up to 100%
- ◆ overall paybacks under a year
- ◆ ROI up to 1000%



- ◆ up to 90% decreased energy costs
- ◆ up to 73% decreased O&M costs
- ◆ reduction in liability insurance
- ◆ reduction in workers comp cases



- ◆ up to 40% increased retail sales



- ◆ up to 26% increased learning rates

Case studies described the following high performance building techniques that have been linked to these benefits:

- daylighting
- daylight control to reduce HVAC loads
- light shelves for shading
- light and occupancy sensors
- narrow floor plans to optimize natural daylight
- high benefit lighting upgrades
- under floor air distribution
- displacement ventilation
- occupant control of heat, light and air
- operable windows and mixed mode HVAC
- exposed thermal mass of building structure
- advanced filtration and good ventilation rates
- properly commissioned and maintained HVAC systems



Verifone – Costa Mesa, CA

Verifone, as a case study example, used some of these techniques. They resulted in productivity improvements of 5%, a drop in absenteeism of 40% and energy savings of 50%, and the positive testimonial below from Will Pape.

*That isn't news to VeriFone, which has made healthy workplaces a top priority since the early 1990s. And while this program is the rare instance in which our tools have been largely low-tech, I believe it has done more to boost productivity than all the bandwidth in the world.*

William R. Pape, cofounder of VeriFone, Inc.  
(1998) *Healthy, Wealthy, and Wise, Technology*, #2, pg 25

**However, in spite of what would seem compelling evidence, few decision makers consider these techniques with the intention of achieving the above benefits.**

In addition to preparing promotional materials for interviews, we investigated market transformation research carried out by utilities, government agencies, universities, professional organizations, and non-profits. Their conclusions and recommendations gave us insight into how we might conduct interviews to find why decision makers resist innovative sustainable or high performance building techniques.

Then we went out and talked to the development community in Seattle. The informational materials were mailed to 158 decision makers. In two rounds, 60 interviews with a total of 87 individuals were conducted. They were all asked for critical advice on the information presented and on the method of presentation. Interview questions are Appendices B and C of this report.

The final promotional products from the grant are:

- Full color promotional flier – **Increase Profits**
- Six case study reports
  - ◆ **Productivity Improvements**
  - ◆ **On The Bottom Line**
  - ◆ **Increased Comfort**
  - ◆ **Increased Market Value and R.O.I.**
  - ◆ **Increased Retail Sales**
  - ◆ **Better Learning Environments**
- PowerPoint presentation
- Web page presentation of case study reports, which is available at:  
<http://www.cityofseattle.net/light/conservesustainability/>

## WHAT RESEARCH AND THE INTERVIEWS TOLD US

One of the major discoveries of the grant was that *both* the *content* – the material presented, and the *context* – the method or process of presentation, must be understood and addressed if sustainability information is to be effectively communicated.

Many decision makers interviewed had superficially reviewed information sent, if they reviewed it at all, even though they agreed to a meeting to discuss the information. Clearly, just giving decision makers information is insufficient to motivate reading it. We found that it was the interview process itself that appeared to elicit interest in the topic.

Interviewees itemized specific types and characteristics of information as important:

### **Content**

#### 1. Format and density

Many interviewees indicated that information presented was a good start. Simple but graphically attractive information is necessary to first get their attention. If this information makes undocumented claims, as the color flier does, then additional information must be available to substantiate the claims.

Grant advisors had suggested that different approaches might be appropriate for different market segments. This now seems a simplification. Different decision makers within a professional market segment will have different levels of awareness and sophistication. Information must be individualized to the extent that it can respond to the knowledge, needs, concerns and reservations of individual decision makers.

#### 2. Cost

In both rounds of interviews, cost was identified as both the primary measure of success of a project and the greatest barrier to considering sustainable building practices.

Decision makers link cost to value in ways generally specific to their role in a project. Developers and building owners, who ultimately bear the largest financial risks, focus almost entirely on first cost and return on investment. Architects and engineers link cost and value to building systems. Tenant representatives and facility managers are the ones to focus most strongly on the cost and value of tenant comfort conditions, but they are the least involved in early decisions that can influence those comfort conditions.

Decision makers resolve apprehension about cost by looking backward to past successes to justify decisions, rather than forward to new solutions, and are thus skeptical of new and unfamiliar building techniques.

#### 3. Credibility

Claim such as

- increased productivity up to 16%
- increased market value up to 100%
- increased energy savings up to 93%

were beyond the realm of believability for many decision makers, even though documented in case study reports. Claims that go beyond the boundaries they

understand probably weaken the appeal of more believable claims and the overall presentation. Benefits need to be presented in ways that are congruent with the metrics of cost and value that decision makers understand and accept.

#### 4. Examples

Examples are the best means to lend credibility to the values of high performance building techniques and to reduce fears about costs. Professionals in all categories said they could use good local examples to show skeptical members of a project team how others had used these techniques. Those who had exposure to or experience with new techniques expressed greater comfort considering these techniques.

#### 5. Tools – LCA, software, benchmarking

Some decision makers have strong opinions about how markets operate and why, and resist different ways of analyzing market parameters. Design professionals in particular lament the unwillingness of developers and owners to consider and compare initial cost with long term value and savings.

Many interviewees, however, expressed a desire for good user-friendly, cost accounting tools. They are unaware of available tools, or find that those that are available are too complex and are unnecessary additions to project fees and schedules. Interviewees said that what will prompt them to need, seek out and use new tools will be personal perceptions that market conditions are changing and that new responses are required.

### **Context**

The development community has been characterized as a very traditional, almost fraternal, structure of “business-as-usual” relationships. Beamish, et. al. suggest::

“Little attention has been paid to how ‘conventional practices’ in the commercial construction industry both *organize* and *reflect* participant ideologies, customs, and social ties that stifle the introduction of innovative practices, designs, and technologies.”<sup>iii</sup>

Enduring relationships are often founded on predictability. Financial decisions are made based on a track record of past, safe, proven successes. Innovation in the development community is viewed as untested and unwelcome risk.

Interviewees indicated that productivity information is interesting but that current incentives and rewards are insufficient to motivate use and that the existing decision making structure precludes easy adoption of innovative strategies.

The presentation/interviews outlined a number of criteria important to get decision makers to make use of information they are provided:

#### 1. Getting their attention

Most decision makers are bombarded with information and requests. Persistence was necessary to get an interview with many of those contacted by mail and phone. Though many may not have reviewed information sent, when provided with an avenue to respond to questions and suggestions made and to offer their own opinions, they saw that aspects of high performance building might provide them competitive and financial advantage, particularly if the public sector seemed interested in assisting them.

Many saw the interview as an introductory session, appearing willing to have future



discussions. For sustainable building information to be effectively communicated to decision makers, there needs to be a continuing effort to keep this information on their “radar screens.” Persistence may be necessary to initiate interest. Repetition is necessary to maintain and increase it.

2. Overcoming barriers

Many of the traditional business as usual practices in the development community are deeply imbedded. As asked in an International Interior Design Association study, *Design Ecology*:

“Why, when there appears to be universal acceptance surrounding the importance of sustainable design, do so few designers design sustainable projects?”<sup>iv</sup>

In attempting to answer that question, Beamish, et. al. say:

“Previous attempts to improve the performance of buildings through incentives (i.e., rebates) and appeals to environmental sustainability have thus far neither provoked widespread or deep changes in industry processes or outcomes (buildings and their efficiency). The aversion to what is new and the reliance on past experience starts at the very beginning of a development project with conservative investors seeking to hedge their investments against uncertainty and assure themselves steady and long-term income streams.”<sup>v</sup>

In the first round of interviews, decision makers gave us reasons they, or other members of project teams, are reluctant to adopt new, innovative building techniques. In the second round we asked interviewees to select the top three reasons that specifically applied to them or other members of a team. Table 1. Reasons not to adopt High Performance Building Techniques shows how twelve reasons were ranked and scored:

1. it costs more – it’s not cost effective .....	102
2. these are materials and methods the building industry isn’t familiar with.....	49
3. it’s not in my fee to do more .....	40
4. our time lines are too tight to experiment .....	38
5. there’s no support from the top – they’re too conservative .....	33
6. regulatory officials won’t accept innovation – it will slow approvals and building codes are requiring enough already.....	33
7. increasing rents for a more productive work environment is very questionable .....	30
8. it’s hard to convince the whole team – hard to break old habits .....	24
9. we don’t want to be the guinea pigs .....	22
10. my competitors aren’t doing this.....	20
11. this could increase my liability .....	17
12. this requires education I don’t have time for.....	14

Table 1. Reasons not to adopt High Performance Building Techniques

Cost is by far the primary barrier to innovation. It is a component of the next three items: the cost and risk of unfamiliar techniques, insufficient fees for non-standard design and the value (cost) of time.

Many decision makers identified other members of a project design team as the impediments. Developers identified architects and engineers, architects identified developers, building owners and engineers, engineers identified developers, building owners and architects, etc., etc. Many of these barriers can be explained by the traditional structure of the decision making process in the development community and also by the timing of decisions.

### 3. Timing and a linear decision making process

Research clearly identifies integration of decision making as critical to innovation. Yet, in a typical development project, a chain of linear, independent decisions occurs from project conception through occupancy.

Financial assumptions based on past projects form the substance of program and budget an owner or developer give to the architect, discouraging him from embarking on new design adventures. Engineers enter the process after schematic form and enclosure are largely determined. The end users – tenants and maintenance staff – have minimal input into early design decisions that will affect them the most, and often receive little training in how the building is intended to be operated. Typically, no post-occupancy evaluations are done to test validity of early financial and design assumptions and decisions.

Almost all interviewees agreed that decisions made early tend to become increasingly difficult to change as time goes on. Few, however, made a direct connection between how end users are affected by early decisions and the potential value of involving those end users in early decisions. For many, involving end users was seen as an obstruction or an unnecessary addition to the conventional way of doing business.

Many expressed frustration that the tenants are unknown in speculative office buildings. One developer who had conducted a two day workshop with tenants and facilities managers, noted that there are two distinct tenant types in the Seattle market:

1. Traditional tenants for whom the cost of occupancy (rent) is primary, and,
2. High tech tenants for whom rent is inconsequential compared to amenities.

Not knowing which will be the eventual tenant in a speculative building project makes decisions about high performance building options particularly difficult.

A few interviewees had successfully incorporated high performance building techniques in projects. They had done so by using some of the strategies suggested in the color flier, for example, involving tenants in the decision making process, early design charrettes, and/or some form of life cycle cost accounting. They saw these strategies as new and valuable ways to inform the decision making process.

### 4. Institutional barriers

Beyond barriers within the decision making structure of the industry two types of institutional barriers to innovation were encountered in the interviews.

Educational institutions, with separate capital and operating budgets, have little incentive, and often little ability, to increase capital cost to achieve long term operational savings. Interviewees from these institutions either accept this barrier as the status quo, without remedy, or realize that it will take significant effort to correct.

Institutional barriers imposed by the public sector bureaucracy impeded and frustrated some interviewees who had attempted to incorporate innovative techniques in building projects. They cited difficulties of:

- building department field inspectors imposing additional (and more expensive) requirements after a permit was granted,
- electrical utility incentive programs that slowed design schedules,
- land use and building code requirements that are incompatible with some high performance goals (e.g. limitation on amount of roof tops that can be covered with equipment, preventing installation of solar systems),
- city policies that are not consistently administered, and,
- an energy code that seems to favor some strategies over others.

#### 5. Face to face communication

Most decision makers are willing and even eager to talk about what they do. However, if questions edge them to the limits of standard practice, two things may happen. First they may become defensive, expressing strong opinions to demonstrate that they know how their market and industry operate and why. As an interviewer I did not strongly advocate sustainable building, but only presented suggestions for response and critical advice. Thus, by not presenting a position to defend against, I then found that skeptical interviewees could begin to consider new techniques and even explain what they would need to justify a new outlook.

Those who already view themselves as receptive to high performance building techniques found comfort and support in having others, particularly the public sector, out discussing sustainability issues.

The grant wasn't scientifically conducted with two test groups, i.e., two groups provided with information but only one interviewed. We can't offer statistically supported conclusions. We can, however, reflectively state with confidence that the exchange promoted by the interview itself was that which succeeded in evoking interest in the information presented.

## CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

Most decision makers are willing to discuss new and innovative building techniques in new construction and renovation, but have the perception and often strong conviction that methods, strategies and techniques that are outside the conventional customs of the construction industry will cost more or will not realize a return on investment commensurate with standard practice.

Researchers agree that changes in the results produced by the building and construction industry can be influenced in three ways: codes, incentives and market transformation. Each has unique opportunities and shortcomings.

Codes. Codes have usually been prescribed to achieve environmental and social goals that decision makers are not universally willing to make on their own or don't perceive to be in their financial interest. Codes establish a ceiling of performance beyond which most practitioners will usually not venture because additional effort or expense is not perceived to accomplish additional financial value.

Incentives. Traditionally offered by utility companies rather than regulatory agencies, incentives have avoided capital cost and conserved resources. Many researchers submit that they have accomplished little fundamental change in the industry because once incentives end, building practitioners may revert to standard practices.

Market Transformation. Researchers agree that to achieve fundamental market changes that transcend what codes require or incentives only temporarily purchase, will require convincing decision makers that innovative strategies are in their best financial interest. Standing in the way are the complex relationships, metrics and conventions that the industry has adopted and adheres to. There is security in maintaining established relationships and reluctance (risk) to alter customary roles. However, the enthusiasm expressed by those interviewees who had participated in early, integrated charrettes and workshops to explore new solutions, suggests the first of a number of market transformation recommendations.

### Recommendations

#### 1. Integrate the Decision Making Process - early

Many researchers have stipulated integrated decision making as a key ingredient in accomplishing transformation of the market, yet few have indicated *how* to overcome the inherent resistance of the market as it traditionally functions. Though integrated decision making requires internal change, external intervention can facilitate and accelerate the process. Here, the public sector can play a vital leadership and facilitation role to encourage involvement of architects, engineers, tenants and their representatives, and facility and property managers in *early* decisions about building design. Interviewee responses further recommend:

#### 2. Provide meaningful and carefully targeted incentives

If it is the decision making process itself that is the objective to transform, then incentives should be directed here, not at secondary targets. Examples, coming from

interviewee responses, are:

- Provide developer or development teams incentive dollars up front, before fundamental decisions have been made about building form and systems\*, to:
  - Certify the building as a LEED building, and/or,
  - Conduct a facilitated charette or workshop, involving as many as possible of those affected by building decisions, to develop project goals and define a feedback process to inform and confirm building design decisions, and/or,
  - Conduct value added analysis, life cycle costing, and/or design and research into innovative building techniques.
- Offer reduced utility rates to projects which meet specific high performance building standards,
- Provide building permit review incentives\*\* to:
  - Accelerate the review process for projects that achieve specified energy and sustainable building performance levels beyond code requirements and current standards of practice,
  - Reduce permit fees for energy or sustainable review aspects of building permit applications for projects that provide specified levels of documentation.

### 3. Demystify and simplify the regulatory process

If executing sustainable or high performance building techniques in private sector projects is a publicly established policy, then all interactions a private sector applicant has with public sector agencies need to be clear and consistent in representing that policy. Internally, public sector agencies need to coordinate their efforts to display a unified and cooperative presence. Examples are:

- An interagency team to represent and align the different missions of individual agencies, and to provide consistent public outreach to the private sector,
- Some form of simplified, one-stop method to access multiple agency support, assistance and incentive programs, e.g., a one page, web based application form for all applicable programs available within the permitting jurisdiction.

### 4. Justify financial benefits of sustainable or high performance building

Proactively make available to building decision makers and project teams:

- Local case study examples of sustainable or high performance building projects. Examples should describe techniques used and benefits derived, and preferably should include contact information to facilitate visiting projects first hand, and,
- User friendly analysis tools that can model costs and benefits of these techniques.

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\* Note that in addition to being suggested by interviews, Portland General Electric has just begun an incentive program encompassing these three items. Together, Pacific Gas and Electric Company, San Diego Gas and Electric and Southern California Edison Company have a similar program, *Savings by Design*, to encourage a *whole building approach* to design

\*\* Note that both these strategies are offered by Santa Barbara County, California, for projects that achieve specified levels of performance beyond California's Title 24 Energy Code

## 5. Recognize Success

Beamish, et. al., point out:

“The building industry reliance on relationships and communities of practice to conduct business and reduce risk can act as a barrier to innovation. This is in part because industry actors are not willing to risk their relationships by suggesting new ideas, technologies, or designs that do not fit expected or accepted conventional practices. However, it is also important to recognize this sword cuts both ways. Innovations can also spread and become accepted through existing relationships and networks. Successful innovations are most likely to be adopted when the members of a development team know and trust one another and come together to develop a response to a market need in a creative and innovative manner. In such cases, the ‘now known’ innovative products/practices are demystified and thus are more likely to diffuse to other projects as the participants move on.”<sup>vi</sup>

In its inherent proclivity to repeat success, the building industry will, although slowly, emulate what leaders do well. High performance building successes, particularly local ones, need to be acknowledged and used as examples to exert peer pressure and to reduce the fears that other industry actors have of being guinea pigs.

## 6. Solicit innovative collaboration opportunities

As sustainability becomes an increasingly popular topic, other organizations initiate programs of their own. Collaborative opportunities should be sought out. Finding and participating with these efforts will consolidate and strengthen individual programs.

Other utilities, municipalities and universities should be a part of recurrent contact to compare programs, successes and failures. Trade organizations are valuable sources of information on new materials and methods for decision makers. They should be patronized to sponsor educational forums on sustainability and high performance building.

## 7. Provide aggressive and comprehensive, educational outreach

Simply providing information is no guarantee that it will be used. A focused and systematic program of outreach needs to be defined and organized. Target audiences should be individual decision makers in all segments of the development community, project design teams where they can be identified, and collaborative opportunities mentioned above.

While informational materials – printed, PowerPoint and web page – are a critical ingredient in communicating a message, an outreach program must concentrate on face to face communication. Outreach needs to be interactive and exploratory, not just a matter of presenting information. Decision makers need to be questioned, encouraged and challenged to engage themselves in the dialogue. Asking them for advice will involve them personally and professionally.

A change agent and intervenor may be needed to initiate market changes. For the City of Seattle, two models have been tested:

- The Green Building Team, formed of representatives of all city agencies involved in construction activities, assistance and permitting. The Team’s original mission

was to assist the City in developing the Sustainable Building Policy. It's current role is as advisor to the City and as facilitator and technical assistant to all City building project teams and project managers which are proceeding through the LEED certification process. The Green Building Team is a proven success in both assisting individual public sector projects and creating an avenue for communication among project teams and city project managers.

- Based on this success, the High Performance Building Team, also formed of representative of city agencies involved in construction activities, assistance and permitting, has been piloted as a way to provide sustainable or high performance building assistance and incentives to private sector projects.

The High Performance Building Team was conceptually advanced in interviews for feedback and critique. It was generally well received as a valuable resource to provide early and impartial facilitation, consultation and advice. Based on the success of the Green Building team approval of the High Performance Build, we recommend an entity similar to these as the most comprehensive way to articulate and execute the preceding recommendations.

### **In Closing, a Word of Caution**

When a political jurisdiction develops a successful model of private sector assistance, it is appealing to then feel that this model is directly transferable to other jurisdictions. An integral part of the success of such efforts is the interaction, investigation, and discovery that went into developing the model. A jurisdiction seeking to achieve the same or similar economic, social and environmental goals needs to create its own solution. Without this process of invention, the ownership necessary to confirm confidence and commitment will not be conveyed.

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<sup>i</sup> National Science and Technology Council, Subcommittee on Construction and Buildings, *Preliminary Report* (Washington D.C., 1993).

<sup>ii</sup> Seattle Daily Journal of Commerce, Friday, June 28, 1996

<sup>iii</sup> Beamish, T.D., Kunkle, R., Lutzenhiser, L., Biggart, N.W. *Why Innovation Happens: Structured Actors and Emergent Outcomes in the Commercial Buildings Sector*. ACEEE Publication # 177

<sup>iv</sup> International Interior Design Association (IIDA), Collins & Aikman Flooring, *Design Ecology, The Project: Assessing the Future of Green Design*. IIDA, Chicago, IL. 2000

<sup>v</sup> Beamish, T.D., Kunkle, R., Lutzenhiser, L., Biggart, N.W. *Why Innovation Happens: Structured Actors and Emergent Outcomes in the Commercial Buildings Sector*. ACEEE Publication # 177

<sup>vi</sup> *ibid.*