

Analyzing the Cost of Obtaining LEED Certification

Prepared for:

The American Chemistry Council
1300 Wilson Boulevard
Arlington, VA 22209

Prepared by:

Northbridge Environmental Management Consultants
319 Littleton Road, Suite 208
Westford, MA 01886

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The LEED program (Leadership in Energy and Environmental Design) represents the efforts of a coalition including the US Green Building Council (GBC) to establish a nationwide standard for constructing so-called “green” buildings. Obtaining LEED certification requires compliance with a minimum number of criteria affecting many aspects of a project, from site selection to the recycled content of building materials. Projects earn points for criteria that they fulfill; those that earn more points are awarded a higher level of certification.¹ Project managers have discretion over which criteria they choose to meet in order to accumulate the necessary number of points.

Thus far, participation in the LEED program has been mostly voluntary, but some government entities have implemented requirements that publicly funded projects apply for LEED certification. Expanding these requirements to additional jurisdictions would raise the cost of these projects, and the potential benefits of certification may not justify these costs. This analysis represents an initial effort to quantify the incremental costs of LEED certification compared to standard design and construction practices.

The federal government has begun adopting LEED as a standard. The General Services Administration requires LEED certification for its new buildings, as does the Department of the Navy and the Army Corps of Engineers. New York, Washington, and Oregon have adopted some green building requirements and Maryland has officially adopted the LEED system for all new state construction and renovations larger than 7,500 square feet. Local governments have also adopted the LEED standard including Los Angeles, San Jose, and San Mateo, California; Portland, Oregon; and Seattle. Other states and municipalities such as Connecticut, Minnesota, California, San Francisco, and New York City are considering requiring LEED certification for new construction and renovations.

Another way in which LEED is expanding its reach is through the involvement of design and building professionals such as architects, engineers, contractors, and consultants. Many professionals are seeking training and accreditation in LEED to be able to offer LEED-related services to clients. Also more and more professionals are dependent on LEED because of their role as LEED consultants who assist with the certification process or who provide commissioning services – a kind of outside auditor of the project to monitor compliance with the LEED system.

¹ The minimum level is simply called “certification” and requires applicants to earn 26 of the 69 possible points. Projects that receive 33 points receive silver certification, those with 39 points earn gold, and those with more than 52 points earn platinum.

Summary

LEED is gaining momentum. It provides a standardized and flexible tool for measuring the degree of “greenness” of a building. It has developed a following, which is growing weekly as more and more architects and consultants sign on for training and certification so they can offer LEED services to clients. The number of states and localities that are requiring LEED certification for construction projects is also growing.

LEED certification adds to project costs.² While empirical and projected data vary widely, we have determined that obtaining LEED certification adds from four to eleven percent to a project’s construction costs. More than half of these costs are for “greening:” investments in alternative systems, practices, and materials that earn points under the LEED system and go beyond standard practices. The remaining costs fall outside of the range of construction costs; we refer to these as “soft costs” and they include incremental costs for design, documenting compliance, and verifying compliance through the commissioning process.

There is some uncertainty about how many of these costs are truly incremental to the LEED process. It is clear that all of the soft costs are attributable to LEED. Some of the greening costs, however, may reflect standard construction practices in certain regions or may reflect compliance with local codes and standards, rather than additional costs imposed because of the decision to seek LEED certification.

At the current rate of LEED registrations, the incremental cost of obtaining certification for public buildings will add at least \$900 million per year to the cost of these projects; the annual figure may be as high as \$2.2 billion. If all public building projects were required to comply with LEED, costs would rise an additional \$4.3 billion to \$11 billion per year. Over time we expect the cost impact of LEED certification to decline as a percentage of total construction costs as architects, contractors, and consultants become more familiar with the process. At the same time, LEED is an evolving set of standards. To the extent that the criteria change or become more stringent, the cost of obtaining LEED certification would increase.

Developing Cost Data for the Analysis

We began our analysis with a review of the cost elements associated with LEED certification. Once we established reasonable ranges for the various cost components, we applied the cost factors to national construction activity to estimate aggregate annual costs.

Given the wide range of building types, regions, sizes, and criteria involved in a commercial project it is understandable that the cost data are highly variable. Project designers and contractors have latitude in the criteria they choose to pursue, so while there are common

² We refer to project costs as the total cost of a project including land acquisition, site work, permitting, design, construction costs, furnishings and finishes. In most cases, the data we had available relate to construction costs – the cost incurred by the general contractor and his subcontractors to build the building to the design specifications including any change orders. Construction costs typically do not include design, land, finishes, and other items included in project costs.

elements found in all LEED certified buildings, many differ in the paths they follow to obtain certification. It is also significant that LEED is still evolving and settling in with building professionals. With time and familiarity, some of the costs incurred today should decrease as a percentage of project costs. At the same time, we identified many instances in which contractors and designers were not recovering or documenting their full costs of compliance, both because they could not reliably estimate the costs without more experience and because they were investing company time in order to gain experience with LEED. If these costs were included, the cost of obtaining LEED certification would be higher than what we have estimated.

We relied mostly on estimates derived from secondary research that captured multiple projects and used consistent methods for documenting costs. We also relied on ranges given by professionals in the green design and consulting fields to help confirm the numbers from these studies. We also checked these estimates against case studies of buildings that have already earned LEED certification. The costs also assume that future versions of LEED remain unchanged. As the criteria change or become more stringent, costs would increase.

Soft Costs

We use the term soft costs to include those activities associated with LEED that fall outside the range of construction costs. The soft costs we have identified include incremental design effort by the architect and design engineers, commissioning the project, documenting compliance with the various criteria selected, energy modeling for the project, and LEED application fees. Sources we reviewed estimate these costs variously in the range of one percent to five percent of construction costs, with the smallest projects falling at the higher end of the range. Two examples provide estimates for aggregate soft costs:

- Maryland's Green Building Council estimates that soft costs for buildings attempting to achieve LEED's Silver rating contribute an additional three to five percent to construction costs.
- The Jean Vollum Natural Capital Center in Portland, Oregon is a 70,000 square foot building that attained LEED's gold certification. The aggregate soft cost estimate for this project was \$322,000, representing about 3.2 percent of construction costs.

These costs do impose a burden on building owners and designers. To address this, the City of Portland, Oregon provides a local tax credit to help offset the cost of applying for the LEED rating and the associated extra design and commissioning costs.

In many cases, we found information on individual components of soft costs, so we have broken the category down into these components and describe our findings for each. The major categories are design costs, commissioning, documentation, and energy modeling.

Design Costs

LEED imposes incremental requirements on architects and engineers because these designers must assess how a project could best attain certification and prepare the design and specifications to reflect these additional requirements. (An outside LEED consultant, rather than the core design team, may also perform these tasks.) In either case, participating in the LEED process adds time and effort to the design and specification phase of a project.

R.S. Means, which provides costing data for all aspects of the construction industry, estimates that additional design costs for “greening” a building represent five percent of the project’s design costs.³ Using that estimate and assuming that traditional design costs range from eight to twelve percent of construction costs, then the additional design costs for green buildings are in the range of 0.4 percent to 0.6 percent of the total construction cost (see Exhibit 1).

- The Donald Bren School of Environmental Science and Management in Santa Barbara, California was constructed for \$20.2 million. Design costs were \$1.95 million or 9.7 percent of the construction costs. The portion of design costs attributable to greening was \$137,400. This incremental cost represents about 0.7 percent of total construction costs, slightly higher than our “typical” range.

Commissioning

Commissioning is a prerequisite of the LEED process. Commissioning involves an outside team of individuals that is not part of the design and construction team. Their primary area of responsibility is to ensure compliance of “fundamental building elements and systems” with the LEED guidelines. LEED also awards an extra point for additional commissioning.

This requirement comes at a significant cost. Various sources estimate commissioning costs to be in the range of 0.5 percent to three percent of construction costs.

- R.S. Means estimates commissioning costs at between 0.5 percent and 0.75 percent of construction costs.
- A study on LEED projects conducted by the Weidt Group found that commissioning costs ranged between 0.75 percent and 1.5 percent of total construction costs.⁴
- A case study of a middle school in The Dalles, Oregon found that commissioning costs were 0.55 percent of construction costs, but the Oregon Office of Energy stated that a typical range for commissioning was 0.5 percent to 1.5 percent of total design and construction costs.

³ *Green Building: Project Planning & Cost Estimating*, R.S. Means Company, 2002.

⁴ “Introducing Comparative Analysis to the LEED System: A Case for Rational and Regional Application,” The Weidt Group *et al.*, submitted for publication at ACEEE 2002 Summer Study on Energy Efficiency in Buildings.

Commissioning costs depend in part on the size of the building and on its complexity. These costs typically represent a higher fraction of construction costs for smaller buildings and for more complex buildings such as laboratories.

We estimate that a typical range for commissioning costs is 0.5 percent to 1.5 percent with a most likely estimate of one percent of total construction costs (Exhibit 1).

Documentation to Meet LEED Requirements

A significant burden of the LEED system is the need to document compliance with the various criteria in order to submit a package to the GBC for review and a decision on certification. This requires the establishment of a tracking and reporting system (often performed by a LEED consultant, rather than the design and construction team itself) and the tracking down of information that otherwise is not standard practice in specifying or sourcing systems and materials.

Surveys and articles report that documentation is the largest obstacle that project teams have encountered in working with the LEED process. In one survey, an average of 226 work hours was required in order to complete all of the proper LEED documentation necessary for certification. Anecdotally, we found that architects and contractors are still learning how to provide proper documentation and many of their costs are going unreported and undocumented.

- Our research identified documentation costs between \$8,000 and \$70,000 per project, with the range highly dependent on the experience of the team documenting the LEED process. The size of the building does not appear to influence the amount of money being spent on documentation.
- In an article by GBC and NRDC, documentation was reported at \$30,000 to \$60,000 for teams working on their first LEED project, although costs could be as low as \$10,000 for an experienced team. For smaller projects, the costs can be a significant burden.⁵

We have included with these fixed documentation costs the fees required to register and then certify a project. These fees to GBC vary with the size of the project and range from \$2,250 to \$11,250.

We derived an estimate of documentation and application fees as a percentage of total construction costs by applying these estimates to a database of currently certified LEED projects. We found that these costs averaged 0.7 percent of construction costs with a range from 0.05 percent for a very large project to 3.8 percent for a very small one. For our extrapolation (see Exhibit 1) we assumed that typical projects would fall in a narrower range – from 0.5 percent to 0.9 percent.

⁵ *Environmental Design and Construction*, July 12, 2002.

Energy Modeling

As with commissioning, energy modeling is a prerequisite for LEED certification, but it accounts for a much smaller part of the soft costs we identified.

- Means estimates a cost of \$0.05 to \$0.45 per square foot, depending on project size.
- Natural Logic, an environmental consulting and design firm that has assisted on LEED projects, estimates energy modeling costs of \$15,000 to \$30,000 per project.

To relate these costs to construction costs, we applied the estimates to a database of fifteen certified projects and found that energy modeling adds about 0.1 percent to total construction costs.

Total Soft Cost Estimates

Our best estimate of soft costs of obtaining LEED certification is 2.3 percent of total construction costs with a range of 1.5 percent to 3.1 percent (Exhibit 1). While this falls in the lower end of the overall range we cited earlier (1 to 5 percent), we believe the higher values are indicative of atypical projects (higher levels of certification, limited experience with the process, and small scale projects) and are therefore not appropriate for use in the extrapolation we developed to assess nationwide impacts.

Exhibit 1

Soft Cost Estimates

(Incremental cost as a percentage of construction costs)

| | Best Estimate | Range |
|----------------------|----------------------|--------------------|
| Design Costs | 0.5% | 0.4% - 0.6% |
| Commissioning | 1% | 0.5% - 1.5% |
| Documentation & Fees | 0.7% | 0.5% - 0.9% |
| Energy Modeling | 0.1% | 0.1% |
| Total | 2.3% | 1.5% - 3.1% |

Sources: see text

It is important to distinguish here between the experience of a “typical” project and a weighted average of costs. Across a list of projects, we could derive a sample average of values to estimate what the typical project experience was with respect to these costs. Later in the analysis, we have applied the cost factors in Exhibit 1 to nationwide levels of construction activity in order to project aggregate cost impacts of LEED. The basis for that extrapolation is

the dollar value of construction projects, not the number of individual projects underway. As a result, we need to use a cost factor that is weighted based on total construction activity, not based on the number of individual projects. Because many of these costs exhibit increasing returns to scale, the soft costs represent a smaller fraction of construction costs for larger projects. We therefore have used averages weighted by the size of the projects, rather than the number of projects. That is why our estimates fall near the lower end of the overall range for soft costs.

Greening Costs

Besides soft costs, the main incremental cost component of LEED certified buildings is the cost to “green” the building. This cost represents the premium over traditional construction that a green building would have imbedded in its construction costs. The elements of these costs vary as widely as the LEED certification criteria. They may include additional site work and structures; additional infrastructure costs related to transportation; different heating, cooling, and ventilation systems; roofing; lighting; water use; recycling services at the site; and sourcing specific construction materials (from regional sources, recycled content, or certified forests).

While this is potentially the larger area of incremental costs (sources we consulted variously estimated these additional costs at up to 30 percent of construction costs), many of the available examples do not isolate these costs and for those that do the data vary across a large range. We believe a reasonable estimate is that greening adds between three and eight percent to the cost of a “typically” constructed building.

Greening is one area where it is particularly difficult to isolate the true incremental costs of LEED *versus* other practices and guidelines followed by designers and contractors. Compliance with local codes may lead builders to exactly the same specifications and practices that the LEED guidelines do, so in that case we should not attribute any incremental cost to the LEED process.

- Steelcase Wood Furniture built a manufacturing facility in Grand Rapids, Michigan. The company estimated that its LEED Silver certification cost them a three percent premium above the normal costs of the \$26 million building.
- A high-end example is the Chesapeake Bay Foundation’s Philip Merrill Environmental Center in Annapolis, Maryland. This 32,000 square foot commercial office building houses the headquarters of the Chesapeake Bay Foundation and is considered one of the “greenest” buildings ever constructed. Premiums spent for green measures in the building represented a 30 percent increase in the construction costs, or \$46 per square foot of the final \$199 per square foot construction cost.

We lacked adequate data to develop a statistically based value for greening costs. Based on our judgment of the information we reviewed, we believe that an appropriate range for greening costs is three to eight percent of construction costs. These costs are particularly susceptible to increases if the LEED criteria become more stringent in future versions of the program.

National Perspective on the Cost Impact of LEED Certification

Thus far, we have focused on the component costs of obtaining LEED certification. To translate this information into a policy context, we now turn to an analysis of how these costs could affect construction spending, focusing on the public sector.

Construction Spending and the Impact of Mandates

While LEED was established as a voluntary program, public policy makers have latched onto it as a standard for greening construction and have included LEED certification as a requirement for public projects (see Background discussion earlier). We have analyzed construction spending data to provide perspective of the impact that these mandates have on public expenditures.

Since some governments have made LEED certification a requirement for new buildings, we wanted to assess the impact of such a requirement on a broader scale: What would be the cost impact of requiring LEED certification for all public buildings? As a first cut at the analysis, we focused on total government construction in the US (rather than state-by-state) since aggregate data are readily available through the US Census.

In 2002, \$116 billion worth of new government buildings were put in place (Exhibit 2). While this is not the same as construction activity underway, it provides an indication of the level of

Exhibit 2

2002 Government Building Construction *(Selected categories in \$ billions)*

| | All Levels of Government | State and Local | Federal |
|-----------------|---------------------------------|------------------------|----------------|
| Residential | \$5.8 | \$4.3 | \$1.5 |
| Office | 8.8 | 6.4 | 2.4 |
| Health Care | 5.6 | 4.2 | 1.4 |
| Education | 64.4 | 63.0 | 1.4 |
| Public Safety | 8.1 | 6.5 | 1.6 |
| Recreation | 10.8 | 10.2 | 0.6 |
| Other Buildings | <u>12.3</u> | <u>12.3</u> | <u>NA</u> |
| Total | \$115.8 | \$106.9 | \$8.9 |

US Census www.census.gov/const/C30/c30tab1.rpt

public buildings coming on line. We focused on commercial buildings since those were the ones where LEED would likely be implemented.⁶ This estimate may not include all categories of public construction that could be subject to LEED mandates, but it includes the vast majority.⁷

Spending on educational facilities represents the single largest category where cost impacts may be felt. This is certainly consistent with our research and qualitative findings suggesting that

⁶ LEED Versions 1, 2.0 and 2.1 have all focused on commercial construction. LEED systems for building operation and other types of construction are in pilot or developmental stages.

⁷ For perspective, these categories represent 57 percent of total public construction put in place in 2002.

colleges and universities are a significant force behind use of the LEED standards. Other important categories are recreation facilities, offices, and public safety facilities. These four categories account for 80 percent of total spending.

LEED Certification and Public Sector Construction Spending

Only a small percentage of construction projects have applied for LEED certification, but the share is much higher in the public sector. An analysis by NRDC and the US Green Building Council estimated that 18.5 percent of public sector construction had applied for certification; another NRDC study cited in the *New York Times* put the percentage at 16.5 percent. By contrast, the percentage of non-public projects applying was only about one percent.

The existing mandates and the fact that public spending dominates the education category (from which much of the interest in LEED is coming) suggest that LEED has already had an economic impact. The NRDC/GBC analysis also found that public and educational sector projects account for half of all LEED-registered projects.⁸

For the approximately one-sixth of public sector buildings that have already registered, we estimate the cost of obtaining LEED certification at between \$900 million and \$2.2 billion annually (Exhibit 3).

- Other researchers have taken the inventory of public building projects already underway and determined that about 17.5 percent of them are registered. We have translated that rate into an annual dollar figure of construction activity – it is not the dollar value of the actual projects that have applied for or received LEED certification.
- We have assumed that the current rate of LEED registrations in the public sector (about one-sixth of projects) can be used to compute how much new construction is involved with LEED. While that percentage may be high for projects put into service over the last several years, it will understate the percentage for projects put into service over the next several years, since LEED's presence is growing.

Exhibit 3 shows that at the current rate of LEED registrations \$20 billion worth of public building construction put into service each year is seeking LEED certification. The cost of obtaining certification for that level of construction activity would range from \$900 million to \$2.2 billion based on the percentage cost factors derived earlier in the analysis.

If, through legislative mandates or other means, the remaining public building construction were also to apply for LEED certification, the incremental cost (at current levels of construction activity) would grow by \$4.3 billion to \$11 billion per year. If construction activity grew, the cost would also grow. If more experience with LEED drove down the cost factors, then the annual cost would decline.

⁸ Penetration figures are calculated by analysts based on square footage of projects, rather than dollar value or number of project sites. We have assumed that expenditures are proportional to square footage for our aggregate analysis.

Exhibit 3

**Annual Cost of LEED Certification for
Public Sector Building Construction**
(*\$ billions*)

| Project Categories | Annual Construction Costs | Cost Factors^b | Annual Incremental Cost |
|---|--|---------------------------------|------------------------------------|
| Public Buildings Currently Seeking LEED Certification | \$20 ^a | 4.5% to 11% | \$0.9 to \$2.2 |
| Require LEED Certification for Remaining Public Buildings | \$96 ^c | 4.5% to 11% | \$4.3 to \$11 |
| Totals | \$116 | | \$5.2 to \$13 |

^a Exhibit 2 total public building construction adjusted for the current rate of LEED registration – 17.5 percent of public building projects

^b Exhibit 1 for soft costs plus 3 percent to 8 percent for greening

^c Remaining 82.5 percent of public building construction not currently registered

State-Level Estimates

Decisions to mandate the use of LEED may occur at the state level, so we explored data sources to provide state-by-state estimates of public building construction. Unfortunately, neither the Census Department nor commercial services like F.W. Dodge track public construction at the state level. Obtaining total public construction estimates from state-level agencies is complicated by the numerous agencies involved and the fact that local and federal dollars are also used in many of the projects.

We found estimates for Massachusetts and Maryland, which provide at least an indication of the state-level impact of requiring LEED for public buildings. Annual public building construction in Massachusetts is estimated to average \$230 million per year according to the Division of Capital Asset Management. Requiring LEED certification would add \$10 million to \$25 million to the annual cost of these projects.

In Maryland, an analysis by the Department of Legislative Services projected \$260 million per year in new building construction. We would estimate an annual cost of \$12 million to \$29 million attributable to LEED. Put another way, the five-year capital improvement plan for Maryland that is projected to cost \$1.3 billion would instead cost between \$1.36 billion and \$1.44 billion plus any additional debt service incurred on the additional borrowing.

Private Construction and Public Policy

LEED has not made as many inroads into the private sector. Private building construction put in place in 2002 was about five times larger than the corresponding figure for the public sector, so there is significant potential for LEED in this area, especially if residential home construction were affected by new versions of LEED.

The private sector construction is of interest for our analysis to the extent that public policy could influence building owners to pursue LEED certification. As noted earlier, through the use of tax policy at least, some governments are already moving in this direction. The value of private non-residential buildings put into service last year was \$156 billion. Following the same set of assumptions we used for public sector buildings, the incremental cost of obtaining LEED certification for all these buildings would range from \$7 billion to \$17 billion per year.

Interpreting the Ranges

We are confident that LEED certification imposes costs on a project, beyond what would otherwise be required. The soft costs, in particular, are common to all LEED projects and we have illustrated that these may vary as a percentage of construction costs, depending on the size of the project, its complexity, and the experience of the design and construction team. The greening costs are also common to all projects, but it is much harder to narrow the range and to attribute these costs to LEED *versus* other requirements such as state and local codes. We do not think it is realistic to assume no incremental costs for greening. Our range of greening cost impacts has no statistical backing, however, and, cognizant of that, we have chosen to define the range at the conservative end of the spectrum. An important note is that these estimates assume that future versions of LEED are similar to the current version. More stringent criteria would have a direct impact on the costs of achieving certification.

We are confident that the lower end of the cost ranges (*e.g.*, \$900 million annualized cost for public projects currently seeking certification) defines a conservative, lower-end estimate of the incremental costs of LEED. At 4.5 percent of construction costs, however, this is not a particularly large impact, and the impact would diminish if we compared the cost to total *project* costs.

At the higher end of the range, the costs are more significant at eleven percent of construction costs. This may increase if LEED becomes more stringent. Conversely, this may decline once LEED becomes more widely used and compliance becomes simpler. This is not to say that individual projects may not exceed this level – we have documentation of projects that do. But it is important to remember that many of the projects already undertaken are showcases of green design, not typical projects. So, when applying our estimates to the universe of all public buildings potentially affected, we need to take into account changes in how LEED is likely to be implemented across a much broader range of building types. The higher end of the range therefore represents a realistic upper bound assuming widespread use of LEED in the future.

Addendum: Benefit-Cost Tradeoffs

With our focus on costs, it is easy to lose sight of the fact that many of the investments made to earn points under the LEED system or to green a building pay for themselves over time. We have not analyzed the benefits of LEED as part of our scope, but we believe it is important to balance the discussion of costs with an understanding of the benefits. This assessment can help refine potential arguments against mandating LEED certification and may help craft alternative approaches to achieve similar public policy benefits.

As we have described, obtaining LEED certification triggers many different costs. In Exhibit 4 we have categorized the costs according to the types of benefits that result. The first category contains most of the soft costs, which are effectively the overhead costs of the LEED process. While these costs do not yield any direct benefits they represent the price that must be paid to get into the LEED system and to fulfill its requirements. We excluded design costs from these overhead items; selecting and specifying systems and other components are included in the next two categories.

The second category is for project components that yield economic returns such as avoided maintenance costs and lower energy usage. These investments are most likely to be made where the building owner and operator are affiliated so the longer-term benefits help repay the initial investment. Building owners are not likely to invest in these components if they have no way of recouping the benefits over time. That is why LEED use has not grown in the private sector the way it has on the public side. It is also worth noting that these kinds of public policy objectives (lower energy use, greater efficiency) have historically been addressed through state and local building codes that are tailored to regional conditions (which LEED is not).

These building improvements are also credited with enhanced working conditions and productivity for building occupants. Promoters of green buildings attribute massive benefits to projected reductions in sick time and improved productivity resulting from better office conditions such as lighting and air quality. These are speculative and may not pan out, so they provide a weak justification for mandating LEED or similar systems.

In the third category are expenses for project elements that produce non-market environmental benefits. Reducing runoff or using recycled inputs may provide natural resource benefits, but these are not captured by the market and cannot be recovered by building investors. This is an area where government intervention (tax credits, expedited permitting) may be justified to encourage investment to achieve these broader benefits for society.

Finally, just as with costs, one of the major obstacles to analyzing the benefits of LEED is determining what the incremental impact is, compared with baseline or standard practice in jurisdictions all over the US. Many benefits attributed to LEED, ranging from reduced energy use to improved indoor air quality may be the result of local building codes and standard industry practices, rather than the imposition of the LEED system and its attendant costs.

Exhibit 4

Categories of Costs and Benefits for Green Buildings

| Types of Cost | Types of Benefits | Issues/Discussion |
|---|---|--|
| Soft costs (except design) | None | Documentation, commissioning, and related costs are the “overhead” of the LEED process. The advantage of going through the process and incurring these costs is the “stamp of approval” earned at the end. |
| Greening – improving building and system efficiencies | Tangible economic benefits through reduced operating and maintenance costs Also potential benefits from improved working conditions and productivity | Investments justified if payback time is short and if building owner is in a position to be compensated for his investment. These potential benefits dominate benefit/cost analyses of greening, but proof that LEED certification will improve worker attendance and productivity is anecdotal at best |
| Greening – reducing environmental impacts | Non-market benefits (reduced runoff, more reuse and recycled material) accruing to society at large | No market value on these “externalities” so difficult to justify investment. Failure of market to value these may justify government intervention to promote these investment (e.g., tax credits) |