



# THE BUSINESS CASE FOR LEED GREEN BUILDING/FACTORY

*A Review of the  
Green Buildings Costs, Benefits and Measures*



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## EXECUTIVE SUMMARY

Bangladesh is an emerging country and Bangladesh's economic growth has shown commendable performance for the last 20 years. Impressive private sector led growth of above 5% for last two decades have indeed taken the economy to a new trajectory - contributed by steady Agricultural Production, increased Exports Earnings (led by RMG sector), healthy Remittance and vibrant Domestic Demand.

Economic Outlook of Bangladesh is look very impressive. Positive Sovereign Rating by Moody's Investor's Services and Standard & Poor's (S&P), Bangladesh has included in "The Next-11" by Goldman Sachs, new PWC 30 list by Price Waterhouse Coopers (PWC), "Hottest emerging market" by Investor Chronicle, and "Frontier Five" by JP Morgan.

It is obvious that sustainability is no longer optional for Bangladesh. It's an economic and environmental imperative for government, all companies and organizations, all individuals and a necessary response to our growth support, energy crisis, water issue and global warming.

In recent years, a wide range of studies and reports have outlined elements of the 'business case' for green buildings, but this report is the first attempt to synthesize all credible evidence from around the world into one definitive resource, complete with global examples and thought pieces from leading experts.

Research clearly shows that there are a large number of compelling benefits from building green, which are received by different stakeholders throughout the building life cycle. Yet, one issue that has remained controversial is whether it is possible to attach a financial value to the benefits of green buildings – crucial information for real estate lenders and the investment community. Do green buildings attract a financial premium in terms of rental and sales value? Are they more attractive to tenants and occupiers? Are employees occupying greener buildings more productive?

This report investigates the business costs and benefits of green building in five vital categories and finishes with an exploration into the both the impacts that a greener built environment can have at a macro scale and how this can be achieved.

## GREEN BUILDING BENEFITS FOCUS

### Operating Costs

Green buildings have been shown to save money through reduced energy and water use and lower long-term operations and maintenance costs. Energy savings in green buildings typically exceed any design and construction cost premiums within a reasonable payback period.

### Workplace Productivity and Health

Research shows that the green design attributes of buildings and indoor environments can improve worker productivity and occupant health and well-being, resulting in bottom line benefits for businesses. Despite evidence of its impact, improved indoor environmental quality has not been a priority in building design and construction, and resistance remains to incorporating it into financial decision-making.



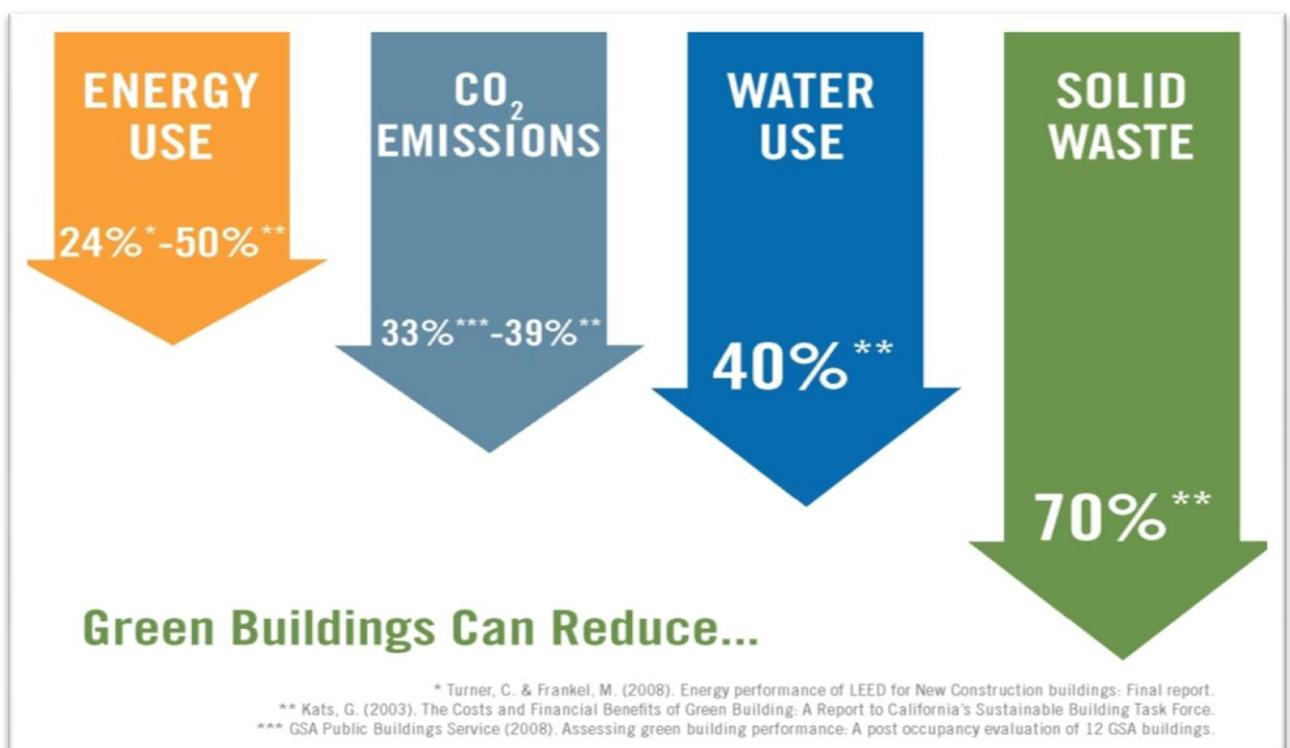
## GREEN BUILDING BENEFITS

### Economic Benefits

- Increased building valuation and return on investment (ROI)
- Improve bottom line
- Decreased staff health cost
- Reduce operating cost
- Energy use reduction
- Water consumption reduce
- Enhance asset value and profit
- Improve employee productivity and satisfaction
- Optimize life-cycle economic performance
- Marketing advantage

### Environmental Benefits

- Enhance and protect ecosystem and biodiversity
- Solid waste reduction
- CO<sub>2</sub> Emission Reduction
- Improve air and water quality
- Reduce solid waste up to 70%
- Conserve natural recourses
- Reduce energy us by 24% to 50%
- Reduce Carbon emissions by 33% to 39%
- Reduce water use by 40% to 70%





## Health & Community Benefits

- Reduced absenteeism and turnover
- Increased staff output and worker performance
- Improve air, thermal and acoustic environments
- Faster patient recovery
- Enhance occupant comfort and health
- Minimize strain on local infrastructure
- Superior retail sales
- Contribute to overall quality of life

## Other Benefits

- It will make the project as a World Standard Building
- It will make the project very unique and superior than other available projects
- It will provide free publicity in the Electronic and Print Media
- This building will improve the company images and create a name in the World Sustainable Community.
- LEED referenced standards includes ASHRAE, EPA, EPact, IESNA, ASTM, SCAQMD, ISO, ENERGY STAR, IPMVA, ANSI etc

## Top Benefit

- Every positive action brings more positive to our lives.
- Very good tools to motivate employee to become positive and productive.

## Key Findings

Using peer-reviewed evidence as the standard for the analysis and guided by a steering committee of experts from around the world, the findings presented in this study represent a critical summation of the most recent and relevant research. The body of the report provides insight into how these findings were reached, including the context of the studies – essential reading for understanding the relevance of the findings to what is found in local markets.





## Design and Construction Costs

Research shows that building green does not necessarily need to cost more, particularly when cost strategies, program management and environmental strategies are integrated into the development process right from the start. While there can be an additional costs associated with building green as compared to a conventional building, the cost premium is typically not as high as is perceived by the development industry.

## Asset Value

As investors and occupants become more knowledgeable about and concerned with the environmental and social impacts of the built environment, buildings with better sustainability credentials enjoy increased marketability. Studies around the world show a pattern of green buildings being able to more easily attract tenants and to command higher rents and sale prices. In markets where green has become more main stream, there are indications of emerging 'brown discounts', where buildings that are not green may rent or sell for less. An understanding of what defines green buildings and drives demand in each context is essential as local market conditions have a significant impact on the valuation of these buildings.

## Operating Costs

Green buildings have been shown to save money through reduced energy and water use and lower long-term operations and maintenance costs. Energy savings in green buildings typically exceed any design and construction cost premiums within a reasonable payback period. In order to achieve their predicted performance, high-performing green buildings need to be backed up by robust commissioning, effective management, and collaboration between owners and occupiers

## Workplace Productivity and Health

Research shows that the green design attributes of buildings and indoor environments can improve worker productivity and occupant health and well-being, resulting in bottom line benefits for businesses. Despite evidence of its impact, improved indoor environmental quality has not been a priority in building design and construction, and resistance remains to incorporating it into financial decision-making.

## Risk Mitigation

Sustainability risk factors can significantly affect the rental income and the future value of real estate assets, in turn affecting their return on investment. Regulatory risks have become increasingly apparent in countries and cities around the world, including mandatory disclosure, building codes and laws banning inefficient buildings. Extreme weather events and systematic changes in weather patterns affect the insurability of real estate and lead to questions about the resilience of assets. Changing tenant preferences and investor risk screening may translate into risk of obsolescence for inefficient buildings.

### Scaling Up from Green Buildings

By greening our built environment at the neighbourhood and city scale, we can deliver on large-scale economic priorities such as climate change mitigation, energy security, resource conservation and job creation, long-term resilience and quality of life.

## USGBC (LEED) GREEN BUILDING MEASURES

The main attraction of the proposed project is that it will be a 100% Green Factory complying all the rule and regulations of USGBC under LEED NC 2009 BD+C rating system. Therefore, they will be able to receive the LEED certification. To make the factory to comply with USGBC, the project will be defined through following aspects and create a healthy, comfortable, durable, energy efficient, and environmentally responsible spaces;



### Energy

#### Energy Efficient Building

Propose project will have the most cost-effective energy efficiency measures. We will design the building envelope and systems to meet highest possible energy savings and we will use a computer simulation model to assess the energy performance and identify the most cost-effective energy efficiency measures. We will quantify energy performance compared with a baseline building.

To establish the minimum level of energy efficiency for the proposed building and systems to reduce environmental and economic impacts associated with excessive energy use project will incorporate High-Performance Building Design Strategy that include;- Building Energy Simulation, Daylight Simulation, Passive Ventilation, Passive Cooling, Wall System, Window Selection, Roof Selection, Plug Load Reduction, Upsize Electrical Wiring, Air Distribution System, Energy Recovery System, Carbon Dioxide Sensors, Lighting System, Lighting Control, Efficient Electric Motors, Renewable Energy System, Smart Building and Energy Management System etc.



### **Energy Efficient Machineries**

The company will select the machinery with very low energy servo motors to reduce power consumption by 50% over conventional factories. State of the art LED lights will further reduce the energy demand by 80% over incandescent equivalent. This reduction in waste heat will reduce the load on cooling systems and will create an excellent working environment. All other machineries such as pumps, motor, generator, boiler, compressor, air ventilation and cooling system etc will be energy efficient model.

### **Renewable Energy**

Propose project will have on-site renewable energy systems to offset building energy costs and reduce energy load on the local infrastructure.

### **Maximum Day Lighting**

The windows and louvers of the factory will be designed in a way to make maximum use of daylight. Moreover, signature series prismatic dome skylights will be installed for ambient lighting during the day time.

### **Reduce Stratospheric Ozone Depletion**

Project will have zero use of chlorofluorocarbon (CFC)-based refrigerants in new buildings ventilation, air conditioning and refrigeration (HVAC&R) systems and it will reduce stratospheric ozone depletion. The company will have to install CFC free refrigerants for chillers, air conditioning and insulation. CFC contains ozone depleting substances that contribute to global warming.

## **Water**

### **Reduction on potable water use**

The company will employ strategies to use less water than the water use in conventional buildings. It will increase water efficiency within buildings to reduce the burden on municipal water supply or ground water reserve and wastewater systems. Water efficiency measures will include using efficient water following fixtures and fixture fittings, waste water treatment technology (WWTP or Gray water harvesting) etc.

### **Rain Water Harvesting**

To further reduction on potable water use, company will invest in rain water harvesting idea and technology. With minimal treatment, Rain Water can be use for toilet flushing and irrigation and it will reduce potable water need by 20% to 25% for the year. Rain water harvesting will reduce storm water runoff significantly and with storm water management system it will have zero sedimentation in local water body and drainage system.

### **Water Efficient Landscaping**

The company will employ strategy to limit or eliminate the use of potable water or other natural surface or subsurface water resources available on or near the project site for landscape irrigation. Project will use only captured rainwater, recycled wastewater, recycled gray water or water treated and conveyed by a public agency specifically for non-potable uses for irrigation and also install landscaping that does not require permanent irrigation systems.



## Sites

### Sustainable Site

During the site selection process, the company gave preference to sites that do not include sensitive elements or restrictive land types. Company selected a suitable building location and designs the building with a minimal footprint to minimize disruption of the environmentally sensitive areas.

### Density and Community Connectivity

The owners have selected the location of Pacific A-1 Sweater Composite Ltd carefully. All the essential facilities and amenities are located within 500 meters, including market, school, mosque, and bus stoppage. The site also provides secure bicycle parking facilities and encourages the use of non-fossil fuel transport.

To reduce pollution and land development impacts from automobile use the project is located within 1/4-mile walking distance from 1 or more stops for 2 or more public transportations.

### Maximize Open Space

The land of the project will be uniquely designed by one of the finest landscape architects in Bangladesh. More than 50% land area of the project will be retained as green space which exceeds the requirement of USGBC. The area is enhanced by several uniquely designed green buildings. Open areas will be planted with lush grassland, landscaped gardens, natural water features and fountains. With an area of densely planted with local plants and trees, large lakes, the gardens will create a tranquil haven for both the employees and welcome the visitors.

### Heat Island Effect

To reduce heat islands to minimize impacts on microclimates and human and wildlife habitats the company will employ strategies, materials and landscaping techniques that reduce the heat absorption of exterior materials.

## Materials

### Storage and Collection of Recyclables

The project will introduce complete Storage and Collection of Recyclables System to facilitate the reduction of waste generated by building occupants that is hauled to and disposed of in landfills.

Project will designate an area for recyclable collection and storage that is appropriately sized and located in a convenient area. Company will identify local waste handlers and buyers for glass, plastic, metals, office paper, newspaper, cardboard and organic wastes and Instruct occupants on recycling procedures. Consider employing cardboard balers, aluminum can crushers, recycling chutes and other waste management strategies to further enhance the recycling program and target 100% recycle of waste.





### **Construction Waste Management**

The company will employ Construction Waste Management System to divert 100% of construction and demolition debris from disposal in landfills and incineration facilities and redirect recyclable recovered resources back to the manufacturing process and reusable materials to appropriate sites.

### **Materials Reuse**

The company will focus on possible use of salvaged, refurbished or reused materials, building products that incorporate recycled content materials and rapidly renewable building materials to reduce the environmental impacts. And also use building materials and products that are extracted and manufactured within the region, thereby supporting the use of indigenous resources and reducing the environmental impacts resulting from transportation. To encourage environmentally responsible forest management project may use Certified Wood.

## **Indoor Air Quality**

### **Indoor Environmental Quality**

The company goal is to ensure best possible working condition for its employees and will establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the comfort and well-being of the occupants.

Project will design ventilation systems to meet or exceed the minimum outdoor air ventilation rates as described in the ASHRAE standard. To prevent or minimize exposure of building occupants, indoor surfaces and ventilation air distribution systems to environmental tobacco smoke (ETS) this project will be a Smoke Free entity.

### **CO2 Monitoring System**

To provide capacity for ventilation system monitoring to help promote occupant comfort and well-being project will install CO2 and airflow measurement equipment and feed the information to the ventilating and air conditioning (HVAC) system and/or building automation system (BAS) to trigger corrective action, if applicable.

### **Construction Indoor Air Quality Management Plan**

The company will employ strategy to reduce indoor air quality (IAQ) problems resulting from construction or renovation and promote the comfort and well-being of construction workers and building occupants.

### **Low-Emitting Materials**

To reduce the quantity of indoor air contaminants that is odorous, irritating and/or harmful to the comfort and well-being of installers and occupants the company will use only low-VOC materials. Company will ensure that all paint, general construction adhesives, flooring adhesives, fire-stopping sealants, caulking, duct sealants, plumbing adhesives and cove base adhesives are with acceptable VOC limits as per World Standards.

## **WHAT THESE FINDINGS MEAN FOR BUSINESS**

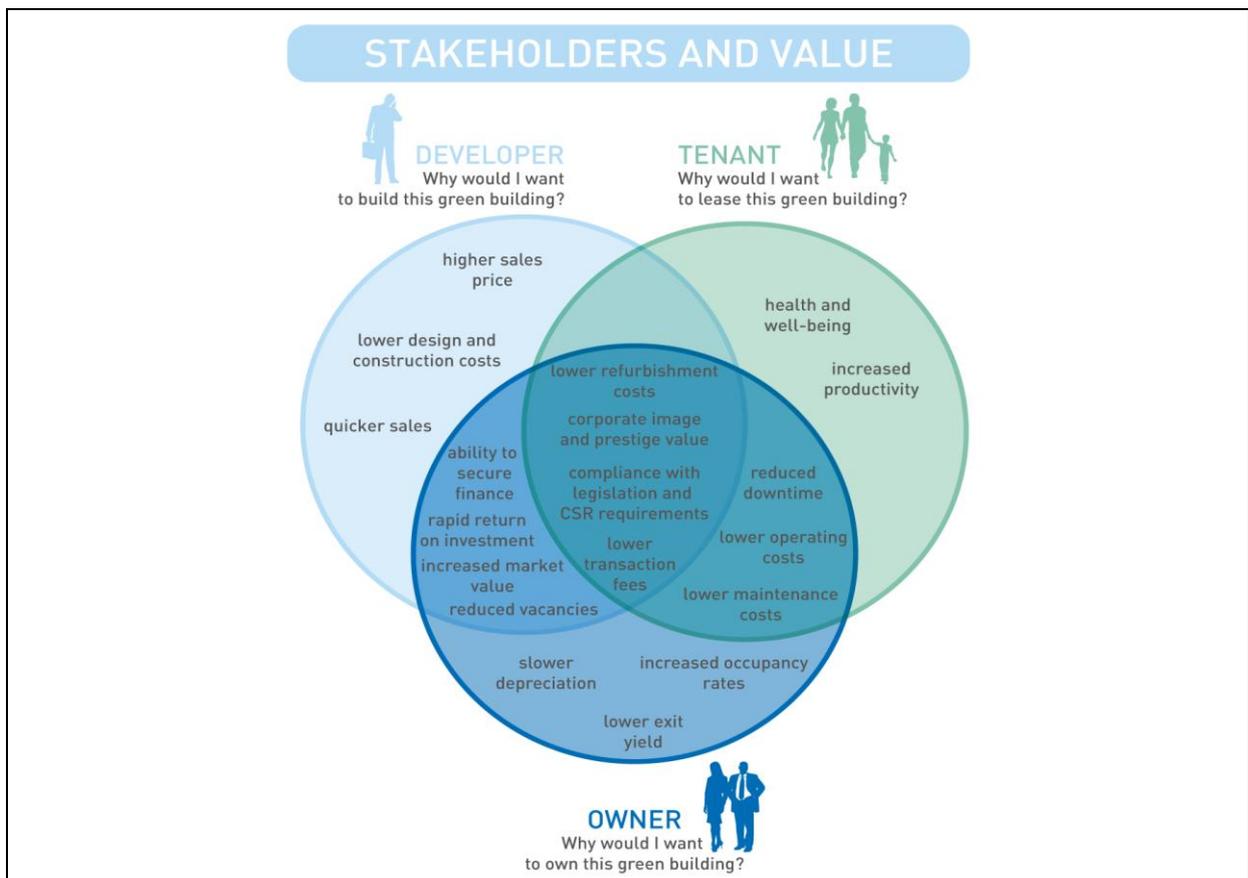
The report points to an increasingly compelling business case for green buildings. The evidence presented highlights that sustainable buildings make clear business sense – it's not just about saving the planet. These benefits range from risk mitigation across a building portfolio and citywide economic benefits, to the improved health and well-being of individual building



occupants. Moreover, green buildings can now be delivered at a price comparable to those for conventional buildings and these costs can be recouped through operational costs savings and, with the right design features, through more a more productive workplace.

Design decisions made at the start of a project will impact the long-term value of the building and its return on investment, meaning a whole-life cost/value approach is needed, from design through building operation. While there is a growing evidence base for all of these findings, the information being gathered is concentrated in certain regions and climates. In order to effectively transform the global marketplace, there is a need for more data and for more case studies from around the world. This presents an excellent opportunity for businesses to partner with each other, and with academia and government, to better understand the financial implications of a more sustainable built environment. We need the right data to spur better financial decision-making.

A key illustration of this point is where due to a lack of financial metrics, many businesses have ignored the potential to improve indoor environments and are now missing a major opportunity to use buildings to leverage broader organizational success. Studies can tell us what has happened in given markets over a specific period of time. Practitioners have to look at local market conditions and at what defines and drives green building in a given location, not just a snapshot of data, to get the complete picture and effectively decide whether investments will ultimately translate into enhanced financial returns.



What is clear is that there is mounting evidence that in many markets across the world, part of being a better quality building means being a green building. In premium markets in particular,



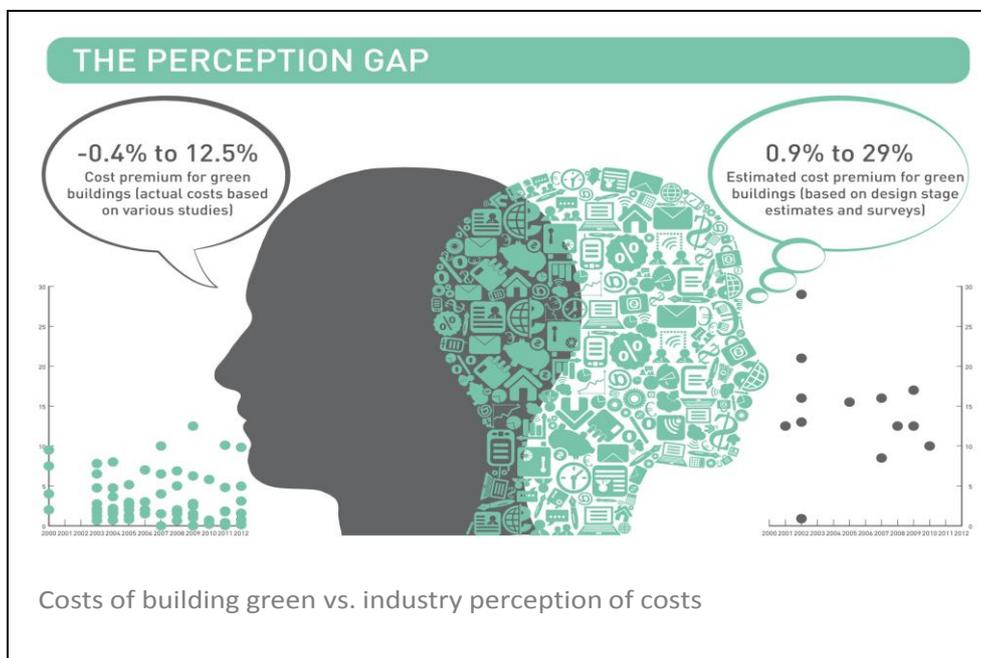
green are increasingly expected by tenants and owners – it is just part of what good ‘quality’ means. With so many drivers for green buildings at play, and many parts of the world still at the nascent phase of green building, there can be no doubt that the business case for green building will continue to evolve as markets mature. Green building is something that tenants, investors and policy makers will come to demand and expect over time – indeed we have already seen this momentum grow globally where in more and more places, green is now becoming the status quo.

This report lays out the best business case evidence we have available today and provides insights into what these findings mean for industry as well as next steps we can take from here. It also shows how governments can leverage green building policies to support local economies and meet their long-term goals. With this foundation, we call on the private and public sectors to use their collective knowledge and strength to move the green building agenda forward, knowing that it benefits people and the environment - and their bottom lines.

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Higher upfront capital costs for green buildings have been found to be proportional to the increased level of environmental certification. However, increasingly, projects are able to achieve higher levels of certification at lower cost compared to less ambitious projects.



There has been an overall trend towards the reduction in design and construction costs associated with green building as building codes around the world become stricter, supply chains for green materials and technologies mature and the industry becomes more skilled at delivering green buildings.

Upfront cost increases in green buildings are often offset by a decrease in long-term life cycle costs, particularly in the case of green buildings that feature high-performance façades and energy-efficient building systems.

**Mythology about First Costs**

Common Perception when we started was +20-30%

**Recent Studies:** Average Premium <2% or \$3-\$5 SF

Most of cost associated with increased architectural and engineering design, time, modeling and integration time. Earlier you integrate the lower the cost.

Recent study has shown the following average increase in project construction costs, on a percentage basis for LEED certification.

❖	<b>Certified</b>	<b>0 – 2.5%</b>
❖	<b>Silver</b>	<b>0 – 3.3%</b>
❖	<b>Gold</b>	<b>0.3 – 5.0%</b>
❖	<b>Platinum</b>	<b>4.5 – 8.5%</b>

**Start Early – Save Costs**

Source: Sasaki Associates 2004

**Life Cycle Cost Assessment**

We use a **Life Cycle Costing (LCC)** approach to evaluate and integrate the benefits and costs associated with sustainable buildings.

Proponents of sustainable design have long held great hopes for **Life Cycle Cost Assessment (LCCA)**, where costs and savings associated with construction, and long-term operations and maintenance, are modelled. Results can be in the form of simple paybacks or more sophisticated models with escalation, predicted utility costs, and time value of money, with results presented as Net Present Value or Internal Rate of Return. The hope has been that LCCA would allow project teams to see that expensive initial design measures can be worth it in the long run.

**Source: [www.worldgbc.org](http://www.worldgbc.org)**