Sustainable Commercial Interiors

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Abstract: Like every other industry, Construction has also been experiencing intense changes. Sustainability has become the keynote in modern building design and operation. Considering this, commercial tenants are showing increasing interest as they seek out healthier environments for their employees, because a healthy building is a more productive place. Although the concept of sustainable building appears to be catching on among commercial developers, debate remains over whether the system for tagging buildings as “green” provides a true standard of environmental sensitivity for builders. A case study has been carried out to investigate investment details and total energy savings anticipated per annum. Comparison between LEED green building cost -Gold rating, Platinum rating and Conventional building cost is also made. Sustainability is not a burden like it has been projected, in fact going green & sustainable practices lower the cost of operation & increases the returns on investments made.

Keywords: Sustainability, healthy building, green, environmental sensitivity, LEED

Introduction:
India is witnessing tremendous growth in infrastructure and construction development. The construction industry in India is one of the largest economic activities and is growing at an average rate of 9.5% as compared to the global average of 5% [2]. As the sector is growing rapidly, preserving the environment poses a host of challenges. The growth and development of our communities has a large impact on our natural environment. The manufacturing, design, construction, and operation of the buildings in which we live and work are responsible for the consumption of many of our natural resources. According to the National Academy of Sciences, the Earth's surface temperature has risen by about 1 degree Fahrenheit in the past century, with accelerated warming during the past two decades. There is new and stronger evidence that most of the warming over the last 50 years is attributable to human activities. According to the National Academy of Sciences, the Earth's surface temperature has risen by about 1 degree Fahrenheit in the past century, with accelerated warming during the past two decades [3]. The IPCC predicts global temperature change of 1.4-5.8 degrees C due to global warming from 1990 to 2100. In recent years, several weather events have caused large losses of life as well as a tremendous increase in economic losses from weather hazards. These life and property losses helped raise the alarm over the possibility that the recent increases were due to a shifting climate. Climate change represents an important additional stress on those systems already affected by increasing resource demands, unsustainable management practices and pollution, which in many cases may be equal to or greater than those of climate change.

Statistics:
1,000 giga tonnes of human-emitted carbon emissions leads to about 1.75°C (3.15°F) increase in global average temperature [1]. Cumulative carbon emissions to date (2010) are about 500 giga tonnes. Nearly irreversible for more than 1,000 years. Focusing on the significant social and environmental impacts caused due to rapid expansion of Asian cities, the concept of sustainability emerged towards the end of 20th century, in Asia as a solution to reduce the environmental impacts of cities, minimize their usage of natural resources and cut their generation of greenhouse gases and various forms of pollution. China, India and Japan, the region’s three largest consumers of energy, have started to introduce policies and initiatives to promote energy efficiency in buildings, while green building rating systems have gradually been introduced in a number of other countries across the region.

Today, action is occurring at every level to reduce, to avoid, and to better understand the risks associated with climate change. The green building movement in Asia has gained momentum in recent years as government and the private sector recognise the role that buildings contribute towards climate change and begin to take action to mitigate the impacts of the built environment.

Rating Tools:
Over the past few years countries have been introducing rating tools to improve the knowledge about the level of sustainability the buildings posses. Rating is a tool to measure the greenness or sustainability of a building. The current era of rating tools commenced in 1990 with the introduction of the BREEAM rating tool. This was followed by the French system HQE and then by the U.S. LEED in 2000 [7, 8].

http://basharesearch.com/wcset2014.htm
The criteria of each of the rating tools depends on the climate, different land uses and type of building stock, extent of sustainable necessity for the local surroundings. Many of these tools measure sustainability of the built environment and have been developed to determine if any capacity exists for further development, or whether a development is sustainable, or whether progress is being made towards sustainability.

**Case Study:**

The findings of the case study is summarized in Table 1.

<table>
<thead>
<tr>
<th>S No</th>
<th>Measures</th>
<th>Measurable</th>
<th>Benefits</th>
<th>Savings in KWH/yr</th>
<th>Savings in USD/yr</th>
<th>Investment in INR</th>
<th>Investment in USD</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CO2 sensors</td>
<td>Tangible</td>
<td>Energy Savings</td>
<td>6771</td>
<td>745</td>
<td>895,000</td>
<td>19202</td>
</tr>
<tr>
<td>2</td>
<td>Heat Recovery System HRW Controls</td>
<td>Tangible</td>
<td>Energy Savings</td>
<td>25619</td>
<td>2818</td>
<td>Provided by the base builder</td>
<td>Nil</td>
</tr>
<tr>
<td>3</td>
<td>Exhaust Fan Controls</td>
<td>Intangible</td>
<td>Better indoor air quality</td>
<td></td>
<td></td>
<td>40,000</td>
<td>858</td>
</tr>
<tr>
<td>4</td>
<td>FA Damper Modulating</td>
<td>Intangible</td>
<td>Better indoor air quality</td>
<td></td>
<td></td>
<td>7500</td>
<td>161</td>
</tr>
<tr>
<td>5</td>
<td>VFD for HR AHU</td>
<td>Tangible</td>
<td>Energy Savings</td>
<td>494736</td>
<td>54421</td>
<td>Provided by the base builder</td>
<td>nil</td>
</tr>
<tr>
<td>6</td>
<td>Exhaust for Reprographic</td>
<td>Intangible</td>
<td>Better indoor air quality</td>
<td></td>
<td></td>
<td>200,000</td>
<td>4291</td>
</tr>
<tr>
<td>7</td>
<td>MERV13 filters</td>
<td>Intangible</td>
<td>Better indoor air quality</td>
<td></td>
<td></td>
<td>890,000</td>
<td>19095</td>
</tr>
<tr>
<td>8</td>
<td>Lighting Power Density</td>
<td>Tangible</td>
<td>Energy Savings</td>
<td>101565</td>
<td>11172.15</td>
<td>5,500,000</td>
<td>118003</td>
</tr>
<tr>
<td>9</td>
<td>Task Lighting</td>
<td>Tangible &amp; Intangible</td>
<td>Energy Savings and occupant comfort</td>
<td></td>
<td></td>
<td>5,000,000</td>
<td>107275</td>
</tr>
<tr>
<td>10</td>
<td>Showers for bicyclists</td>
<td>Intangible</td>
<td></td>
<td></td>
<td></td>
<td>60,000</td>
<td>1287</td>
</tr>
<tr>
<td></td>
<td><strong>TOTAL</strong></td>
<td></td>
<td></td>
<td><strong>628,691</strong> KWH/Yr</td>
<td><strong>69,156</strong> USD/yr</td>
<td>12,592,50 0 Rs.</td>
<td>270,172 USD</td>
</tr>
</tbody>
</table>

**Conclusion:**
With the tremendous growth & improved awareness on the link between green property investment strategies and increased returns on investment, the green approach to property selection has begun to attract investors & has been encouraging green practices. Key factor being that a green property portfolio will offer better long term investment return.

The impact of the social and economic development aspects of sustainability has attracted more multinational business attention lately and needs to be integrated with the concept of environmental prudence before any business value analysis can be performed. Also With increasing concern of use of materials leading to environmental impacts and climatic changes, government mandates developed...
have been imposing developers to make the choice of sustainable versus conventional project.

Additional challenges include the lack of green design expertise, shortage of information on green materials and the perception that environmentally friendly design comes with a cost premium. Improving the understanding of the connections between specific project delivery systems has been a major concern in market which needs to be addressed.

Sustainability is not a burden like it has been projected. In fact going green and sustainable practices lower the cost of operation & increases the returns on investments made.

References:
[3] Kevin Langdo,Human Activity and Global Warming, Published in Gift of Fire (the journal of the Prometheus Society) #140, July 2003