

Green Technology in Space Management of Libraries: An Overview

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Abstract: Libraries serve as symbols of the attitudes and values of their creators and can serve to extend those attitudes and values to future generations of occupants and visitors. Keeping in view consideration is given to alternate transportation, microclimate, storm water, efficient fixtures, Energy and atmosphere, lighting, Indoor environment quality and role of USGBC to promote Green Technology in the library buildings. This article includes a case study of Ch. Braham Prakash Ayurved charak sansthan's Green Library.

Keywords: Green Technology, USGBC, Green/Sustainable building, Green IT, Embedding Librarian.

1. Introduction:

Green technology is the application of the environmental science to offer economically viable solutions that conserve the natural environment and resources, and curb the negative impacts of human involvement. The adoption of green technology in modern office culture has received considerable interest in recent years as more and more companies realize that going green is in their best interest, both in terms of public relations and reduced cost.

2. History of Green Technology:

Think green technology is new? Think again! In the early 20th century, electric taxi cabs zoomed along Manhattan's streets, solar heaters warmed water for showers in Southern California, and windmills drew up water in the drought-ridden prairie states of Nebraska and Kansas, helping westward expansion as much as the steam engine, but forgotten in the annals of history.

Chronological History of Green Technology:

Year	Technology
1854	Daniel Halladay designed the first windmill with sails or blades that self-regulated or adjusted to the direction of the wind.
1890	Electrical Vehicles
1950	Manhattan's streets and the solar water heaters abundant in 1950s California
1940	Solar homes
1970s	The solar research institute that almost shifted our main energy source to solar.

1920s	The California-based Day and Night Solar Heater company produced solar heaters
1940s	Solar Houses Even the simplest elements of solar houses, for example, installing large south-facing windows, went the way of the solar water heaters.
1970 Early	Modern green roof technology began in the early seventies in Germany when the first green roof systems were developed and marketed on a large scale

3. What is Green Library (Sustainable Library)?

Definition: A **Green library**, also known as a sustainable library, is a library built with environmental concerns in mind. Green libraries are a part of the larger green building movement. There is no univocal definition of a green library. But there are a number of central themes that run through all of them, which seek

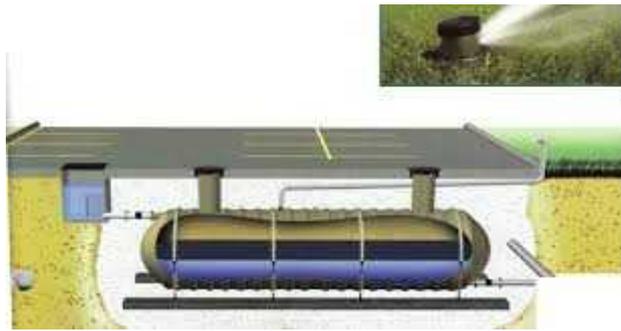
- To minimize the negative and maximize the positive effects the building will have on the local environment.
- To reduce the use of water and energy by designing the building to maximize the use of natural and renewable resources.
- To integrate actual plants into the building design, preferably with drought resistant and/or native vegetation.
- Furthermore, the maintenance of high standards of indoor air quality to help ensure the health of the people who inhabit the building.

4. Applications of Green Technology in Space Management of Libraries:

Libraries should reduce the use of environmentally hazardous material like CFC, lead and others and promoting the use of recyclable materials and minimising the use of non-biodegradable components. Libraries should promote practices such as energy cost accounting, virtualization, e-waste recycling and the like. Some alternative, arrangement of green technology, are useful in space management of libraries are given below:

- (i) **Alternative transportation –**
 - a. Use of Bicycles and
 - b. Electric Car with charging stations.
 - c. Limit automobile use by reducing available parking and providing preferred for carpools and van pools.
- (ii) **Microclimate -**
 - a. Try to pave as little as possible and shade as much of the paved area as possible.
 - b. Parking should be underground to absorb storm and retain little heat.
 - c. Use of vegetated roof or green roof.

- (iii) **Storm water** – *Storage of water for use in landscaping, flushing of toilets etc. Where water is precious resource.*



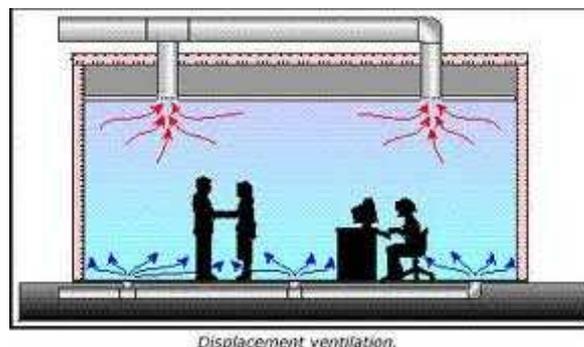
Source : <https://www.google.co.in/search?q=Collection,+Storage,+and+Reuse+of+Storm+water&source>

Figure 1: Collection, Storage, and Reuse of Storm water

- (iv) **Efficient fixtures** – *Plumbing fixtures e.g. waterless urinals, Sensor faucets and gray water plumbing systems reduce consumption rates for library building while not acceptable in some cities.*
- (v) **Energy and Atmosphere -**

- a. Heating, Ventilation, and Air Conditioning* – Strategies that reduce energy use of mechanical systems can be passive – using effective envelope design natural ventilation strategies in the design of spaces – as well as active – relying on developing technologies such as underfloor air or displacement ventilation.

Due to the specific environmental parameters that a library environment must maintain in order to sustain the physical condition of the books, relying entirely on natural ventilation strategies might be viable in only a few select environments with steady temperatures that wouldn't threaten the library's treasures.



<https://www.google.co.in/search?q=Displacement+Ventilation>

Figure 2: Displacement Ventilation makes best use of zones of use in a space, placing the fresh air where it is needed, near the occupants – using the natural stratification of air temperatures to its advantage.

- b. **Water Heating** – *Solar water heaters are very useful and economical for the library building where demand of hot water is very less. On demand water heating system is also cost effective when hot water is not being used in the library than a regular tank heater cost.*
 - c. **Lighting** – *Use of day light sensor to control the lights in day lit spaces. Using photo sensors in day lit spaces to control dimmable ballasts will allow a system to work without being actively operated by occupants. The importance of dimmable ballasts is in the way that the system operates on a cloudy day. With dimming lights, the change would still be in response to ambient light levels, but it would be subtle and not distracting to occupants, as well as consuming less energy in the turning off and on.*
5. **Green IT** - Green IT is a set of practical measures designed to ensure that Information Technology is developed, delivered and used in a way that is environmentally friendly, sustainable and energy efficient.
- Procure IT equipment and other infrastructure products based on both their power consumption efficiency and their embedded emissions. Use standards such as EPEAT and ENERGY STAR to help with buying decisions

For organisations and individuals

- Prolong the life of IT equipment, or when appropriate move to lower energy consumption products
- Move to duplex printing as the default
- Move to cloud computing and software as a service where appropriate
- Turn off unused equipment
- Recycle IT consumables

For organizations only

- Put Green IT high on the agenda, with board representation
- Structure the organisation to support Green IT initiatives
- Change IT processes (such as Service Asset and Configuration Management) at the micro level to embed Green IT
- Manage data centre power efficiency. Review metrics to ensure that they help to manage energy consumption reductions effectively
- Move to server virtualisation, cloud computing and software as a service where appropriate
- Implement server (and PC) power management
- Use renewable and cleaner power sources

6. Role of Embedded Technology in Green Libraries:

Embedded librarianship takes a librarian out of the context of the traditional library and places him/her in an “on-site” setting or situation that enables close coordination and collaboration with researchers or teaching faculty” (Carlson & Kneale, 2011).

Embedded = An integral part to the whole. An element without which the whole could not be what it is. David Shumaker (2011) refined this to mean that librarians become integral parts to the units and groups in which they work.

Embedded Librarian will access World Wide Web data from a computer using an OLE compliant application is by connecting the World Wide Web with the computer through a network. The computer has a processor, a memory having an operating system, the OLE compliant application, a presentation mechanism and a data access mechanism. A capability of communication is provided between the OLE compliant application and the World Wide Web using the presentation mechanism and the data access mechanism as a conduit between the OLE compliant application and the World Wide Web. The present invention uses an OLE surrogate server and an OLE surrogate container of the presentation mechanism for delivering World Wide Web data to the OLE compliant application.

7. Role of Indoor Environmental Quality in Green Libraries:

This aspect of green Library is one that is influenced not only by the science of physiological response to environmental factors, but also our psychological response – recognizing the link between the physical and emotional.

Studies have shown that people’s psycho-physiological response to a natural environment is conducive to improved ability to focus, to be productive, to maintain health and to heal.

Day lighting, fresh air and Vantilation for Green/Sustainable library Design is an indoor environment that is not only safe, but healthy and inspiring for occupants will take several environmental factors into consideration: fresh air, light, views or connection to the outdoors, thermal comfort, and the ability of the occupant to control their environment.

Library building has no intrinsic limitation to achieving any of the above goals. Not only that, but libraries are an apt opportunity for providing a rich indoor environment that is inviting, safe, and conducive to concentration. By A healthy indoor green environment occupants are able to :

- ❖ reduce their risk of liability,
- ❖ reduce absenteeism and
- ❖ improve their work productivity.

8. Role of USGBC to promoting Green Technology:

The US Green Building Council is a national non-profit organization, founded in 1993, to promote "the design, construction, and operation of buildings that are environmentally responsible, profitable, and healthy places to live and work." The USGBC is concerned with educating the public about green building, and with creating a standard for measuring a building's greenness. Before the USGBC, and without a consistent means of measurement, the potential for *greenwashing* was great. [Green washing is the practice of covering up aspects of a product or service that is unsustainable, by distracting consumers with a claim that it has some attribute that is environmentally preferable.] Many could claim that they had a green building, and there was no system in place for one to measure that claim.

The USGBC promotes not only reducing a building's dependence upon energy, but in improving the sources of what energy it does consume. LEED™ promotes the use of onsite alternative energy sources as well as the brokering for green power to use for the building.

9. Role of LEED™ Materials in Green Technology:

LEED™ gives credit to projects that show that they have reduced the resource consumption of the building by specifying products that are renewable, recycled, salvaged, certified wood, or that are low-emitting materials. This impact category of LEED™ also is concerned with appropriate waste management during construction of the building and during operation of the building. By putting an advanced plan into place for the effective recycling and salvage of building materials during construction, projects can reduce significantly the burden placed on landfills, as well as reducing the demand for raw materials for use in new materials.

10. Green Library Challenges:

While green libraries are related to the overall green building movement, libraries have specific needs that raise some extra challenges.

a. Sun Light:

For the preservation, books must be kept away from sunlight as well as moisture and temperature changes. However, many individuals find sunlight to be the most enjoyable light for reading. Sunlight also plays a major role in green design, because it can be used to reduce the reliance on artificial lighting.

b. Weight of books:

Another, often overlooked, challenge the library presents is the weight of the books. A common strategy in green design is to raise the floors to increase circulation, but the weight of the stacks can be an impediment to this strategy. To deal with this challenge, many designers have resorted to zoning the library into designated areas, so these strategies can be enacted in certain areas and alternatives can be used in others (Lamis, 2003).

11. Role of Green design Library:

Green design helps it do that three different ways:

- i. First, a sustainable building makes a statement that the library is investing in the future of the community.
- ii. Sustainable buildings are smartly designed, aesthetically pleasing, and are powered by state-of-the-art technology. When people see these emerald marvels they will no longer be able to maintain false stereotypes regarding libraries as anachronistic relics from an analog age.
- iii. As more people take environmentalism seriously, a green image can improve an institution's image.

In addition, many green libraries are actively educating the community about environmental concerns through their collection development and public programs.

12. High profile Green Libraries:

In the 2000s a number of high-profile green libraries have been built in the U.S. and in the rest of the world. The list of green libraries is growing all the time. For an up to date information on green libraries and green library projects in the U.S. and Canada see green libraries.

- i. Seattle Central Library, May 2004
- ii. National Library, Singapore, July 2005
- iii. Minneapolis Public Library, May 2006
- iv. Public Library of Charlotte and Mecklenburg County, 2006
- v. Children's Museum of Pittsburgh, 2004

13. Case Study:

Chaudhary Braham Prakash Ayurved Charak Sansthan(Institute) Library, Khera Dabar, New Delhi, India.

Architect: SAM India private Limited.

Established: 2010

This enormous and state of art ayurveda medical library contains approximately 10000 texts including some rare books and Thesis. Total area of central library is 1055.75 square meter. This library holds 14 departmental libraries which contains all reference books required for the concern department. Rising up through the massive library is a D shape, which houses a number of study rooms. Green Technology using by this library:

1. The daylighting and vantilation is provided through its 16 windows and a tomb of library premises.
2. Use of floor tiles works as an energy saver which makes library sound proof, neat and clean, and instant cooling of indoor environment.
3. The cooling is provided using Cassettes Air condition 2 tonne each for 588.69 square meter area with single drainage and Split Air condition for the area 467.06 square meters.
4. Gypsum board and fall ceiling works smartly and beautifully in space management.

All electric wires and pipelines for AC and fire can be installed inside the fall ceiling. It also makes fast cooling as compared to roof due to less height of the library hall/room. This work ceiling assists in the reduction of glare from the light and broadcast the light throughout the interior space.

5. Fire Sprinkles has been installed in case of emergence. Water will come out automatically from fire sprinklers in case of emergence.
6. Smoke detector alarm secures and control indoor environment of the library.

7. Aluminium glass door work also save the electricity of the institute.

14. Conclusion:

Communities with the opportunity to build a new library or update an existing library should prioritize sustainable design measures. Sustainably designed libraries would be built to last, to flexibly respond to changing functional demands, to provide an environment that is inspiring and safe, as well as to perform efficiently, providing great financial value to the community that supported its creation.

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