

Buildings are an integral part of our environment. They are a basic need and reflect the residents' activities. Does labeling a building *green* make it any different? It can. Obviously, buildings have a long history but somewhere in the latter part of that history a paradigm shift occurred that was more like a paradox. Was it really the "policy of cheap energy" (Vale, 189) that allowed the design of buildings to become disconnected with the vary ground they anchored themselves in and the climate that surrounded them? Perhaps it is this tainted authors view of the current political power but I fear that it could be the issue of energy. Whatever the reason, conscious or unconscious, my parent's generation and mine stepped away from feeling invested in most buildings with the exception of the interior. We lost logic. We lost respect for the surrounding and tried to dominate the space by shear power of electricity and fossil fuels. We used air conditioning and heating systems to control our climate, landscape to cultivate non native species and the current fad, storm water was piped to sewer infrastructure, and so on. Green design is really only the return of logic, creative use of technology and returning people to be the focus of a building's purpose, not the power some think they can wield over nature.

The U. S. Green Building Council has put forth a guideline, a framework for green architecture and design entitled Leadership in Energy and Environmental Design (USGBC). LEED provides a national standard. This paper will look at the Clearview Elementary School as an example of a LEED rated building. LEED and other guidelines like it are still going through growing pains but have the intention of returning focus to basic "green" or ecological standards for building design. It has both its advantages and drawbacks, both will be discussed in this paper by using Clearview Elementary School (CES) as a case study when appropriate. LEED stemmed from a larger movement that's start is rather blurry but can be placed in and around the late 1980s and had a strong presence in the early 1990's with the U. S. Green Building Council establishing the LEED standards in 1994 (Kibert, 498). LEED, again, must be stressed as a guideline and not an end all solution.

Clearview Elementary School is located in Hanover, PA roughly 125 miles west of Philadelphia and is a Gold rated certified building. Gold is one of four levels of certification – certified (26-32 points), silver (33-38), gold (39-51) and platinum (52+).

Each level has a numbers of points that correlate with five areas of focus – Sustainable Sites, Water Efficiency, Energy and Atmosphere, Materials and Resources, and Indoor Environmental Quality (USGBC). The points system is one of the most heavily contested aspects of the Certification. It does not allow for the flexibility needed in certain situations depending on the tenants of the building. For instance, a scientific laboratory building would loose points for using necessary adhesives for floor tiles because a water based adhesive would be inadequate in the lab setting. Here the technology is not there yet and therefore the best (perhaps not most environmental friendly) must be used that also fits the budget. However, the LEED system has certainly been revised to fit the variety of new buildings and retrofitted buildings such as schools, government agencies, residential spaces etc.

Clearview Elementary School (CES) has been a case study for many organizations such as the Slag Cement Association (SCA), Portland Cement Association (PCA), Greener Buildings (Greenbiz) and the Office of Energy Efficiency and Renewable Building Technologies Program part of the U.S. Department of Energy. The owner in CES was the Hanover Pennsylvania School District and the Architecture and Engineer were from the L. Robert Kimball and Associates located in Harrisburg Pennsylvania. The building is a two story newly constructed building it has a LEED Gold rating of 42 points.

The site for the CES, which opened in 2003, was not a key component of any additional points, it was not a Brownfield site nor was it an urban redevelopment site. The superintendent, at the time, was keen on making the new elementary school green and therefore pushed it forward. The building was constructed on the same site as the pre-existing elementary school. CES is a Kindergarten through Fourth grade facility that houses 378 faculty, students and staff for roughly 45 hours per week and is occupied for on average 44 weeks per year (GreenBiz).

The key element in its Gold rating was its use of materials and the induction of a new “creation of an Innovation Credit to assist in LEED certification, paving the way for other project designers to earn similar credits for innovative concrete mixes”, said Scot Horst. Horst was a member of USGBC materials and resources technical advisory group and is a “project consultant and principal of 7group” (SCA). The concrete mix used to

build CES was slag cement concrete. An excerpt from the Slag Cement Association Website news section explains the building process best reads: “CES was built with insulating concrete forms (ICFs), a building system consisting of foam forms stacked in the shape of the structure. The ICFs are filled with steel-reinforced concrete to create a solid wall with excellent thermal mass and structural strength.” The use of slag is part of sustainable development and the easy construction saved money to balance out other green features. These ICFs used “as much as 60 percent” of high slag cement. The Portland Cement Association (PCA) has this to say about ICFs, “ICF structures offer energy efficiency, durability, and design flexibility at a competitive cost traditional construction techniques.” According to the Office of Energy Efficiency and Renewable Building Technologies Program, 70% of the material was “locally manufactured”. They used hemlock siding, a local and relatively renewable resource. Wheat board, made from agricultural waste (wheat stalk and chaff), was used as particleboard. It is also important to note that 50% of the construction waste was recycled or reused.

Energy efficiency went much further than the structural walls. CES has an exceptional use of sunlight, as day lighting and heat source. “Students and staff are better at focusing on learning rather than the environment, they’re not distracted with the cold temperatures, squinting to see the board and other daily stresses”, said Principal Josephine Bookwalter. The location and design of windows, skylights, staircases, classrooms and hallways were completely influenced by the sun. There are large north facing windows and high south facing windows, the walls of the classrooms (light colored paint) evenly distribute the natural light. Sunlight has been shown to enhance learning according to a California Board of Energy Efficiency Study (Highlighting High Performance). Due to all the natural sunlight electric lights were used less and were on dimmers and/or sensed for movement.

The Heating and cooling system also promotes healthy ventilation at CES by using floor-mounted diffusers. The system uses the Earths stable temperature of 55° to heat and cool. “Each classroom has a ground-source heat pump connected to a series of thirty 350ft deep geothermal wells” (Highlighting High Performance). Having floor-mounted diffusers for the heating and cooling system is important for indoor air quality “because fresh air comes up from the floor (closer to where people breathe) rather than

above” and the “air change effectiveness is greater than 90%” (Highlighting High Performance). Attention was paid to not use volatile organic compounds (VOCs) in paints, adhesives and carpets.

Water was also conserved in a variety of manners but surprising little was done for stormwater management. Low flow showerheads; waterless urinals and push button faucets were all installed to combat excess water consumption. Push button faucets alone accounted for “more than 40% reduction” (Highlighting High Performance) in water use. Native species, adapted to the climate and geology in this region in Pennsylvania, were used as to reduce irrigation needs. Stormwater management on the site was minimal. Tony Grimes, the Facilities Engineer at CES, said that the roof was hooked to conventional drains and piping that led to the boroughs sewer system. The Design team was heavily pushing a green roof at this site but Grimes was against it. He thought it was illogical from a maintenance perspective. “We didn’t get the points because it just didn’t make sense” (paraphrasing: whoever heard of such a thing). What the school lacks in stormwater management on the site, it makes up for in daylighting alone. These storm water abatements can easily be remedied in the future through rain gardens or barrels.

CES is surely a positive example of a green building. The parents, previous and current principals, as well as Tony Grimes feels that the building has and is living up to the expectations. The curriculum has also been adjusted to incorporate the buildings green features and to teach environmentalism. The breakdown of annual cost saving and percent energy reduction when compared to a conventional school is where you can quantify the experience. There has been a 30% reduction in overall water use and a 40% reduction use in energy (Greenbiz, Highlighting High Performance). A number of sources quoted the total annual saving in energy costs to be 34,000 dollars per year (PCA, SCA). The PAC said that 40% of the materials were local and 75% of all material used had a high recycled content. An impressive fact is hat the building cost 6.35 million dollars, which is only 150,000 dollars over a conventional school in the Hanover Pennsylvanian District.

LEED although it has its drawbacks such as cost for certification and limitations to the points system, provides a structure for groups interested in going green. It is one protocol for producing green safe buildings. LEED is the outcome and collaboration of

every aspect of the building profession. It has all of their input, which makes it a holistic approach to the problem. Just as Wangari Maathia said at a recent lecture (October 16, 2006) at the University of Pennsylvania, a building must make sense in its surrounding. She gave the example of a large skyscraper that was to be built in Nairobi. The city, which often experiences water shortages and cannot produce enough electricity as it is, would have never been able to provide water past the 4th floor. This speaks volumes of the dichotomy of some peoples mind set. LEED is not a universal solution but a universal standard, which does not seem to take into account the diversity of the climates here in North America but does get a larger group thinking about a more holistic approach to building.

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Bolded Terms are those used for citing purposes.