Advancing the Green School Movement
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Building a Greening Template for Private K-12 Schools

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Spring 2010

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Executive Summary

The green building revolution that is taking place across the country is a progressive vehicle addressing climate change. Changing building practices alone can, "offset up to 6 billion tons of carbon emissions annually."[1] Over the past fifteen years, green school building has started to contribute to the fight against anthropogenic climate change. From 2006 to today, the educational construction market has dramatically expanded. Of the $125 billion educational construction market approximately 64% goes to K-12 construction. Private schools account for 17% of the total educational market.[2] With such an impressive and burgeoning educational market, it is surprising that private K-12 school greening is left out of the literature and discussion and often neglected adequate resources to "go-green."

In order to create a stronger, more cohesive green school movement, private K-12 schools must be included in the greening discussion and literature. Without incorporating these schools, the movement misses thousands of facilities, unique greening strategies, innovative funding methods appropriate during an economic recession, thoughtful examples of curriculum incorporation, and illustrations of a whole-systems "sustainability" approach to school greening (see Appendix A).

This paper will investigate how private K-12 schools are going green. To develop a thorough understanding of current private school greening I attended the Green California Schools Summit and Exposition, conducted an on-line survey, performed on-site and phone interviews with private K-12 greening leaders, and analyzed six private K-12 schools as case studies.

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[1] Yudelson, Jerry. *The Green Building Revolution*. Washington: Island, 2008.
[2] Yudelson, Jerry. *The Green Building Revolution*. Washington: Island, 2008.

Findings reveal that private K-12 schools are greening but are isolated from most other educational institutions. These schools rely on low-cost green technologies to support the purchasing of necessary high-cost green technologies. Private K-12 schools emphasize student-run environmental programs and organizations to create a sense of environmental stewardship. These schools rely on unique funding methods that illustrate that campus greening is feasible and appropriate during an economic recession. Finally, these private institutions stress the important of curriculum incorporation to create an environmentally focused educational experience.

Private K-12 schools offer the green school phenomenon invigorating freshness. To create a cohesive green school movement, private K-12 schools must increase greening visibility. The following recommendations are ways private K-12 schools can capitalize on unique greening methods to become leaders of what could be a very powerful movement: increase visibility of greening strategies, emphasizing low-cost green technology purchasing and student-run environmental programs and organizations, increase visibility of unique funding methods that do not rely on state funds, increase relationships with other private schools as well as with other community businesses, increase greening communication with national organizations, and invest in highlighting green achievements on the school's website.

Introduction

I have become a professional student. Looking back, this does not surprise me or anyone who knows me. Every year, a month before the school year started, I made my way to Staples to purchase the necessary pens, pencils and paper for the forthcoming school year, acquiring the newest "green" or "100% recycled" merchandise as my plight to *save the Earth one pencil at a time.* My educational enthusiasm coupled with an environmental awareness foreshadowed my college studies and life perspective.

My senior thesis integrates two personal defining features—my education and environmental respect. My parents have called me a "professional academic" since homework assignments shifted from circling even numbers to thirty minute calculus problems. My "Earth-loving" mother instilled in me a deep admiration of the natural world.

Born and raised on the coast of Los Angeles, I attended the private middle and high school, Rolling Hills Preparatory School. It was here I realized my desire to transform educational space into an healthier environment; moreover, that my school could be a green leader. After years of environmental studying and acquiring skills to create change at Occidental College, I now better understand what it takes for a private school to transform itself into a green leader in the 21st century.

This paper investigates the green school building phenomena within the green building movement. In 2008, the educational construction market, "[was] the largest single market sector in the building industry. About 64% of all new-building and renovation construction spending on education [went] to K-12 schools, with the balance going to colleges and universities; *about 17 percent of total education construction [went] to private schools and universities*, with the balance going to public schools and colleges."[3] These general educational spending and construction trends exist today despite the current economic slump.[4]

Unfortunately, private K-12 schools are often left out of the literature and have little information available of how to "go-green." In order to build a stronger and more cohesive green school movement, private K-12 schools must be included in the green school discussions on a local and national level. This paper will attempt to determine the current role of private K-12 schools and provide a set of recommendations to encourage and increase in private K-12 school greening visibility and stronger leaders in the green school movement.

[3] Yudelson, Jerry. *The Green Building Revolution*. Washington: Island, 2008.
[4] Orr, William "Bill." *2009 Green California Schools Summit and Exposition*. Green School Conf., December, 2009.

Methodology

Research for this paper included a variety of methods—an overview of the green school building phenomenon within the broader green building movement, case studies of private K-12 schools, interviews of school and green movement leaders, attendance at the 2009 California Green Schools Summit and Exposition in Pasadena, California, and an on-line survey.

The green building movement and green school phenomenon literature review synthesizes environmental implications of the built environment, specifically schools, as main contributors to carbon emission levels and anthropogenic climate change. Specific green building topics reviewed include: the scope of the built environment, conventional building practices and its historical roots, benefits of green buildings, and the driving forces including the economy, progressive policy and leaders, and the construction market. Specific green school topics reviewed include: the current quality of U.S. school infrastructure indicative of environmental degradation and poor occupant health and productivity, the current educational construction market, benefits of green school building, and driving forces including progressive leaders and policies as well as a fundamental shift in sustainable thinking.

An obvious gap revealed itself after conducting a thorough investigation into the green school phenomenon—private K-12 schools are most often left out of green school literature and discussion offering minimal visibility their role and green efforts and achievements; also, minimal information is available to private K-12 schools who wish to "go-green." To address this gap, I engaged in a number of research methods. I participated in the 2009 California Green Schools Summit and Exposition. The

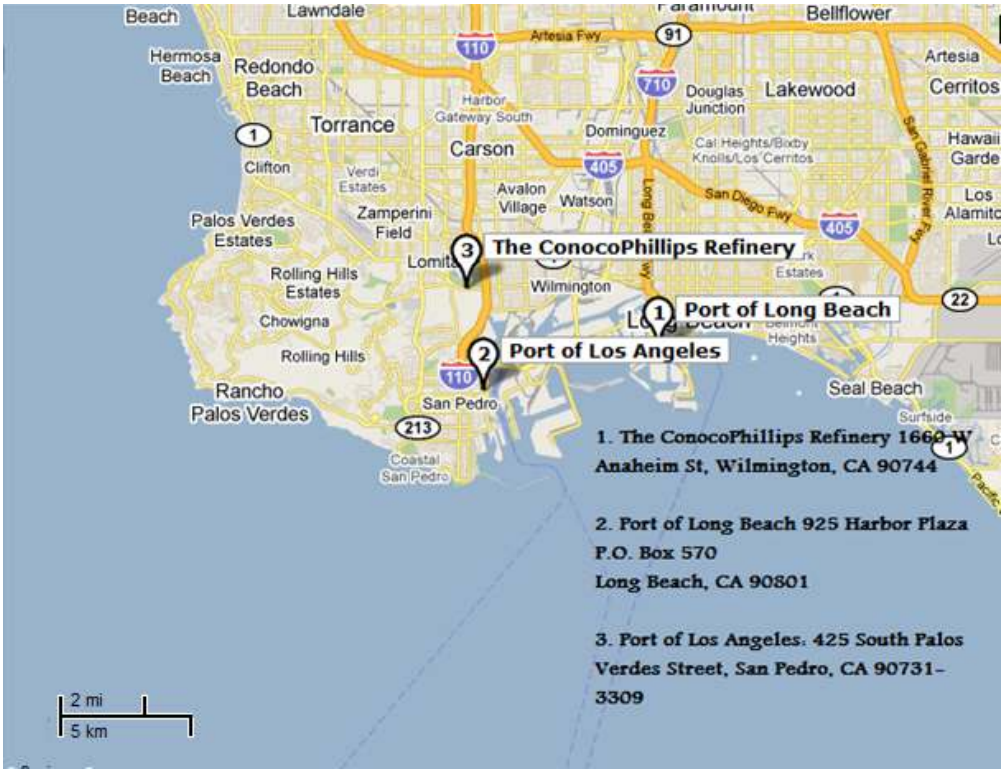
conference helped explain the current level of green school success nationwide. It also revealed the lack of private K-12 school involvement. I was able to make contact with Tom Duffy, the Legislative Director and Chief Lobbyist for Coalition for Adequate School Housing (C.A.S.H.) and William "Bill" Orr, Executive Director of C.A.S.H. I was also made aware of current and emerging green technologies, like the GEN7 classroom (See Appendix B).

I developed and conducted an on-line survey. The survey questions were sent to private school officials and green school leaders. The questions focused on private school greening—motives, advantages, and obstacles (See Appendix D). Approximately 15 surveys were sent with 4 replies. I phone-interviewed private schools (Green Acres School, Sidwell Friends School, Darrow School), one public school (Northern Guilford Middle School), the director of the Association of Independent Schools in Washington D.C., Tom Toch, and conducted an on-site interview with Jeff Chapman, the Center Director at the Audubon Center at Debs Park, CA (See Appendix B). I interviewed Green Acres School, Sidwell Friends School, Darrow School and Tom Toch to gain knowledge about current greening techniques and challenges private K-12 schools encounter. I interviewed the public school, Northern Guilford Middle School solely for its cutting-edge green facility. I interviewed Jeff Chapman to learn about a water/sewage filtration system that the Audubon Center uses that could be used on private K-12 school campuses (See Appendix B).

My case studies targeted Green Acres School, Sidwell Friends School, Darrow School, The Branson School, Besant Hill School, and The College Preparatory School. These schools were chosen because of similar educational features to Rolling Hills Prep

School— student population (relatively small student populations ranging from 100-1,200 students), campus size (ranging from 15-20+ acres), funding obstacles, and use of low-cost technologies while actively and successfully implementing campus sustainability.

From each case study, best technologies, student-run programs, funding methods, policies, and curriculum practices were collected to create a greening template for Rolling Hills Preparatory School (RHP). RHP is an independent private school that accommodates grades 6-12. Today, it is also home to RHP's sister school, the Renaissance School for Arts and Sciences and Peninsula Heritage's Early Learning Center. In 2007, the school moved to its new 20+ acre campus in San Pedro, California (previously it was home to the Palos Verdes Naval Housing site) from Malaga Cove in Palos Verdes Estates, California. The new campus is located near the ConocoPhillips refinery and the Los Angeles/Long Beach ports.



The school's proximity to the refinery and ports indicate poor air quality and environmental degradation. Thus, it is important for the school to make greening decisions to protect its occupants.

Current enrollment is 235 students (grades 6-12) with 30 full-time and 9 part-time faculty. The school has no endowment but annual tuition is $24,460.[5] The school wishes to green its campus to the extent finances deem possible, prioritizing an environmental friendly fix to a degrading sewage/water piping system and pollution generated by the school's proximity to the refinery and ports (See Map Above).[6] The recommendations in this study are aimed toward RHP and other small, private K-12 schools that wish to "go-green." These recommendations indicate the necessary steps to green a small, private K-12 school on a low-budget and the potential for private schools to become leaders, building a stronger and more cohesive green school movement.

[5] *Rolling Hills Preparatory School*. April 2010. 14 April 2010. <http:///www.rollinghillsprep.org>.
[6] Dye, Barbara and Peter McCormack. "Rolling Hills Preparatory Interview." November 2010.

Literature Review

History of U.S. Building Practices: Schools Learning form Conventional Practices

Understanding how to green private K-12 schools requires a look at the history and growth of the green building movement. Conventional building practices, including school building, produce staggering negative environmental impacts. In 2009 the U.S. Environmental Protection Agency (EPA)—Green Building Workgroup documented approximately 223,114 establishment/ businesses, 128 million residential housing units and 4.9 million office buildings totaling 300 billion square feet of surface area.[7] The Council for American Private Education (CAPE) states that private K-12 educational facilities total more than 33,740. The negative environmental impacts of conventional building practices influence approximately 55 million students, 6 million of which attend private K-12 schools.[8] Conventional building practices include wasteful extraction, construction and operation periods. Considering the entire life-cycle of a building, approximately 100 years, buildings are the leading contributor toward carbon dioxide emissions and anthropogenic climate change in the U.S..[9] Buildings account for approximately 40-48% of total energy use and nearly 39% of CO2 emissions, just over 2,200 million metric tons every year.[10] Additional negative environmental impacts of conventional building practices include[11]:

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[7] EPA's Green Building Workgroup, comp. *Buildings and Their Impact on the Environment: A Statistical Summary*. U.S. Environmental Protection Agency, 2009. Print.
[8] *Council for American Private Education: Facts and Studies.* 2007. January 2010. <http://www.capenet.org/facts.html>.
[9] U.S. Green Building Council. *Building Momentum: National Trends and Prospects for High-Performance Green Buildings*. Proc. Green Building Roundtable, 24 April 2002. Washington D.C.: 2003. <http://www.asid.org/NR/rdonlyres/41D8F661-EF76-4061-BFD2-2980665B4C18/0/BuildingMomentum.pdf>.
[10] United States. U.S. Green Building Council. *Buildings and Climate Change*. 2009. < http://www.documents.dgs.ca.gov/dgs/pio/facts/LA%20workshop/climate.pdf>.
[11]U.S. Green Building Council. *Building Momentum: National Trends and Prospects for High-Performance Green Buildings*. Proc. Green Building Roundtable, 24 April 2002. Washington D.C.: 2003. <http://www.asid.org/NR/rdonlyres/41D8F661-EF76-4061-BFD2-2980665B4C18/0/BuildingMomentum.pdf>.

- ~68% total national electricity consumption
- ~33% municipal solid waste streams
- ~46% sulfur dioxide emissions
- ~19% nitrogen oxide emissions
- ~10% fine particulate emissions
- ~12% total water consumption
- ~88% potable water supplies
- ~30-40% raw material supply

In response to the older building model and anthropogenic climate change, green buildings have become new vehicles to transform the built environment into an healthier space. Changing building practices—material extraction, construction and operation—can considerably reduce a building's negative environmental impact creating a role model design for schools to follow. The green building relates the built environment to the natural environment and to human health and productivity. An expert in the green building field, Jerry Yudelson offers a complete definition of a green building:

> *"A green building is a high-performance property that considers and reduces its impact on the environment and human health. [It's] designed to use less energy and water and to reduce the life-cycle environmental impacts of the materials used. This is achieved through better siting, design, material, selection, construction, operation, maintenance, removal and possible reuse."*[12]

Green buildings aim to address climate change by closely examining location, site orientation, design, water conservation, energy efficiency, renewable energy use, material selection and indoor environmental quality. If only, "half of new commercial buildings were built to use 50% less energy, it would save 6 million metric tons of carbon dioxide annually for the life of the buildings—equivalent to taking more than 1 million cars off

[12] Yudelson, Jerry. *The Green Building Revolution*. Washington: Island, 2008. Print.

the road."[13] This new thinking represents a fundamental shift in U.S. building history which is also eloquently explained by Yudelson:

> *"The Green Building Revolution is part of a paradigm shift toward sustainability, a growing realization that current ways of living, made possible largely because of cheap and abundant fossil fuel, are not sustainable in the long term."*[14]

Overall, by closely examining the building process and operational phase, green buildings, as well as school facilities, can greatly restrict carbon emission levels and rethink the conventional building or educational landscape.

Green buildings rely on effective energy-saving technologies to reduce building consumption and waste patterns, also useful in green school building. For example, the first 200 LEED-NC (new construction) certified projects emphasized never-before-seen technologies. Technologies were divided into three categories: highly likely to be used (in 67% or more of projects), somewhat likely to be used (in 33-67% of projects) and less likely to be used (in <33% of projects):[15]

Highly Likely:

- Low-VOC-content paints, coatings/adhesives/sealants,
- Low-VOC-emitting carpeting
- 10% or more recycled-content materials
- Views to the outdoors from 90% or more of spaces

Somewhat Likely:

- A two week flush out period prior to occupancy
- CO2 monitoring
- Detention/ retention ponds and storm water controls
- Green and/ or reflective roofs
- Indoor air quality management
- Temperature and humidity monitoring,
- Day lighting for at least 75% of spaces
- Lower ambient lighting
- Water conservation fixtures like waterless urinals
- No added urea-formaldehyde in composite wood or agrifiber products

[13] U.S. Green Building Council. *Buildings and Climate Change.*2009. January 2010. <http://www.documents.dgs.ca.gov/dgs/pio/facts/LA%20workshop/climate.pdf>.
[14] Yudelson, Jerry. *The Green Building Revolution*. Washington: Island, 2008. Print.
[15] Yudelson, Jerry. *The Green Building Revolution*. Washington: Island, 2008. Print.

- Two year green power purchasing agreement resulting in a minimum of a 35% energy use reduction.

Less Likely:

- Solar photovoltaic systems
- High-efficiency ventilation and underfloor air distribution systems
- Operable windows for thermal control
- Native plant use to restore sites
- Certified woods products
- Renewable resources like cork and bamboo flooring.

These new energy-saving technologies became problem-solvers for the built environment. This project represented a fundamental shift toward sustainable thinking. As more projects wanted to become green, the cost of the technologies competitively dropped, making green building (and school building in particular) even more viable.

Green building methods and technologies provide numerous benefits that can translate to educational building benefits. Green building benefits include: a 30-40% carbon emissions reduction, 30% energy savings, 30-50% water savings, and a 50-90% reduction in construction and operational waste.[16] Improved occupant health and productivity are additional green building benefits that are also useful in addressing student absenteeism and academic performance.[17] Recent reports state that annually approximately $58 billion is lost due to building-related sickness yet $200 billion can be made by increasing natural lighting and improving ventilation and indoor air quality.[18] Overall, with an increased positive community image, along with previously described

[16] U.S. Green Building Council. *Building Momentum: National Trends and Prospects for High-Performance Green Buildings.* Baltimore, Maryland: April 2002. January 2010. <http://www.asid.org/NR/rdonlyres/41D8F661-EF76-4061-BFD2-2980665B4C18/0/BuildingMomentum.pdf>.

[17] Kats, Gregory. *Greening America's Schools: Costs and Benefits.*2006. January 2010. <http://www.usgbc.org/ShowFile.aspx?DocumentID=2908>.

[18] Secretariat of the Commission for Environmental Cooperation. *Green Building in North America: Opportunities and Challenges*. 2008. < http://www.cec.org/files/PDF//GB_Report_EN.pdf>.

benefits, green building is instrumental in transforming the built environment (including schools).

Private schools can benefit from the green building assessment strategy. While it is desirable to include every green technology on each building, it would not be financially feasible. By assessing the building location, climate and needs, buildings—especially private K-12 schools—can maximize benefits and money savings. The following two green buildings illustrate the importance of assessing location, climate and needs when "going-green." The Twenty River Terrace located in Battery Park City, New York, takes advantage of the limited space in the city. Building vertical, the tower accommodates little space. However, because of New York's seasonal patterns the building is equipped with natural gas absorption chillers and captures waste to provide heat and air-conditioning appropriate for the warm and cool months. Because green space is limited in the city, the roof was transformed into a green roof. Due to the amount of individual occupant water use, the building incorporated a black water recycling system; recycled water is used for irrigation and the cooling system.

On the other hand, the VeriFone headquarters in Costa Mesa, California applies different green technologies based on its west coast location and temperate seasonal patterns. As the distribution headquarters, employee absenteeism and productivity were green building priorities. Concrete was oriented in a tilt-up pattern allowing more natural lighting. Accessible window opening improved indoor air quality. Water conservation was targeted as opposed to heating and cooling systems. Ultimately, both buildings incorporated technologies that would maximize benefits based on needs and location. Private K-12 schools, like Rolling Hills Preparatory School, must do the same.

Green building and green school building progress has been document by Leadership in Energy and Environmental Design (LEED). The following numbers illustrate current LEED figures for both U.S. buildings and educational buildings:

LEED Projects (2006-2009 figures)[19]*:*

Buildings:	Total
LEED registered projects (2009)	19,524
LEED certified projects (2009)	2,476
Schools:	Total
LEED registered projects (2007)	500 (245 K-12 schools)
LEED certified projects (2006)	12% of all LEED certified projects in educational sector

Source: USGBC and Jerry Yudelson, *The Green Building Revolution*

Comparing LEED figures to the number of total building (mentioned earlier), it is obvious that while the green building movement is popular it still has room to grow. This trend is also seen in the educational sector.

Building the Green School Concept: Learning from Green Building Drivers

To understand why this fundamental shift regarding building practices occurred, it is important to understand the progression of events, organizations, policies and leaders that influenced the green building movement. Without these drivers, green school building would cease to exist.

The historical progression of conventional building practices to more green building practices illuminates an important lesson for future green building in the educational sector—conventional practices can change with enough pressure from progressive leaders and policies. A combination of unique events and formalization of environmental organizations represent the driving forces that changed the 1930s toxic,

[19] Yudelson, Jerry. *The Green Building Revolution*. Washington: Island, 2008.

"glass box" building style into a more environmentally friendly practice.[20] These events and organizations include: the success of the first Earth Day and formation of the U.S. Environmental Protection Agency in 1970, representing the fundamental shift toward environmental and sustainable thinking in the U.S., the creation of the Montreal Protocol, limiting the use of toxic materials that were known to break down the ozone layer (chlorinated fluorocarbons), creation of the formal definition of the word "sustainability" by the United Nation's World Commission on Environment and Development in the early 1980s, and the development of the Committee on the Environment with the American Institute of Architects in the late 1980s, targeting the importance of building design and impact. Additional significant events and organizations include: the first Earth Summit in Rio de Janeiro signifying a global effort to make the word cleaner and "greener," and the formation of the U.S. Green Building Council (USGBC) designating a resource toward sustainable building practices and efforts in the 1990s. USGBC developed the Leadership in Energy and Environmental Design (LEED) in 2000. LEED has been the third-party source of green building policies, guidelines and official certification in the U.S. Ultimately, these events and organizations created the fundamental platform for the green school building concept.[21]

[20] "Glass box" building practices were predominant starting in the 1930s. The term "glass box" was used because of how buildings were constructed. Buildings were constructed using steel and reflective glass since both materials were abundant and cheap. Buildings were erected higher into the skyline and out to accommodate a growing population. Buildings utilized extensive lighting and air-conditioning/ heating systems by burning fossil fuel which was also abundant and cheap. Due to material scarcity, limited resources of fossil fuel, and increasing prices, building practices changed to adapt to the new context. Thus, green building is reflective of a necessary shift toward sustainable thinking.

[21] U.S. General Services Administration and the United States Department of Energy. *Building Design and Construction: White Paper on Sustainability*. 2003.

Green Building Policies Lead to Green School Platform

Progressive leaders and policies also contributed to the greening future of green school building. The following leaders and policies helped incorporate schools into national and state policies. Bill Clinton, U.S. president from 1993-2001, is responsible for federal government building responsibility—the Energy Policy Act (formally addressed energy efficiency, conservations and management for buildings as well as required states to set minimum energy building codes), and Executive Order 13123 (aimed at decreasing federal facility energy consumption by 35% by 2010 through sustainable building design).[22] While president, Clinton's "greening of the White House" saved $150,000 in energy and water costs and removed 845 metric tons of carbon emissions each year by implementing roof, window and wall retrofits and by purchasing energy-efficient refrigerators and automobiles.[23] Federal buildings have continued its green success. As of 2002, energy costs of government buildings have decreased by 23% per square foot since 1985, saving $1.4 billion.[24] Ultimately, Bill Clinton produced the first formal language of green building policy, making state building energy codes a requirement. This green building milestone allowed the green building movement to go beyond federal buildings and into the educational sector.

During George W. Bush's presidency, green building policy furthered the potential for a green school movement. The Energy Policy Act of 2005 was signed into law to combat pressing energy issues including scarcity and increasing prices of fossil

[22] U.S. General Services Administration and the United States Department of Energy. *Building Design and Construction: White Paper on Sustainability*. 2003. January 2010.
[23] U.S. Green Building Council. *Green Building: History of Green Building-Historical Buildings.*
[24] U.S. Green Building Council. *Green Building: History of Green Building-Historical Buildings.*

fuel.[25] One component of the act specifically mentioned a tax incentive program and loan guarantee for energy production and green building. Executive Order 13423 reinforced energy maintenance and building life-cycle costs. These green building policies provided a platform for the 2007 America Competes Act and the 2008 Green High-Performing Public School Facilities Act (which was not signed into law until it was incorporated into the American Recovery and Reinvestment Act of 2009).[26] The America Competes Act aimed to increase the competitiveness of U.S. schools by increasing investment educational facilities. The High-Performing Act was designed, "to direct the Secretary of Education to make grants to state educational agencies for the modernization, renovation, or repair of public school facilities, and for other purposes." It is evident that without green building policies, green school policies would not be on the political agenda.

President Obama offers another example of a progressive leader creating green building policies that support the green school phenomenon. In December 2009, representatives were sent to COP15 to discuss green buildings and its role as a climate change contributor.[27] Under the 2009 American Recovery and Reinvestment Act, President Obama emphasizes green building but specifically green school building under the State Fiscal Stabilization Fund. This act, "will award governors approximately $48.6 billion by formula. . . in exchange for a commitment to advance essential education reforms to benefit students from early learning through post-secondary education," as well as specific allocation of funds toward student and teacher performance improvement

[25] United States. *Energy Policy Act 2005.* January 2010. < http://www.epa.gov/oust/fedlaws/publ_109-058.pdf>.
[26] United States. *The 2009 American Recovery and Reinvestment Act.* January 2010. < http://www.recovery.gov/Pages/home.aspx>.
[27] U.S. Green Building Council. *COP15 Blog*. 2010. January 2010. < http://www.usgbc.org/DisplayPage.aspx?CMSPageID=2125>.

by modernizing educational facilities.[28] The Elementary and Secondary Education Act acts in a similar manner, depending on school modernization to improve student performance in order to encourage individuals to get an higher education. The U.S. also sent representatives to the COP15 conference to discuss green buildings and carbon emissions President Obama not only symbolizes change, but encourages dramatic educational change through progressive building policy.

Due to the hard work of federal leaders enacting green building policy, green school policy now exists on the state level. For example, Governor Schwarzenegger stresses "Environmentally Preferable Purchasing" and tax cuts for green technology manufacturers which benefits both private schools and public school districts. Schwarzenegger supported the 2000 Healthy School Act, which requires schools to record all pesticide use, and the 2006 Proposition 1D, "which [made] available $100 million for adding green elements to new school building plans."[29] By passing green school policies, state governments define green schools as the future of educational success—green schools address climate change, provides a healthier learning environment making students more competitive for global and green jobs, and saves the state and school money.

The green building policies set the foundation for the success of green school organizations—both for private schools (although limited) and public school districts. Public school districts and private schools benefit from the USGBC and the new LEED program targeting K-12 schools. The USGBC is a nonprofit organization comprised of

[28] U.S. Department of Education. *State Fiscal Stabilization Fund.* 7 Mar 2009. January 2010. < http://ed.gov/policy/gen/leg/recovery/factsheet/stabilization-fund.html>.
[29] Office of the Governor. *Energy and the Environment*. 2010. January 2010. < http://gov.ca.gov/issue/energy-environment>.

leading environmental thinkers developing strategies to certify green buildings. The new K-12 program provides a third-party certification program and resource guides specifically for K-12 schools.[30] U.S. Energy Star and the Collaborative for High-Performance Schools (CHPS) only benefit public school districts. Energy Star is supported by the U.S. EPA and U.S. Department of Energy to provide information regarding energy efficient products and practices and to produce savings. CHPS is a non-profit organization that addresses public schools design, construction and operation funding and allocates state funding to school districts.

Private K- 12 schools do benefit from a handful of organizations like the National Association of Independent Schools (NAIS), and the Earth Day Network (EDN), Global Green USA and private initiatives like the Green Schools for Southern California Initiative (See Appendix G). The development of green school organizations and policy is due to previous efforts by green building leaders. Green building leaders laid the groundwork for the success of green school building (See Appendix F).

The Green Building Market: Transforming a Movement

The green building construction market is the most powerful driver of the green school movement. In 2004, the design, construction and operation of buildings accounted for 20% of economic activity, equivalent to 13.4% of U.S GDP.[31] The green building construction market has expanded to the educational sector because of it long-term money savings and human moral obligation. Yudelson approximates that between 2006 and 2008 the largest market sector was the building industry; however, approximately, *"64% of all new-building and renovation construction spending on education goes to K-*

[30] U.S. Green Building Council. *LEED for Schools.* 2010. January 2010. < http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1586>.
[31] U.S. Green Building Council. *Green Building Facts*. 2008.

12 schools . . . [and] about 17% of total educational construction goes to private school and universities. . . .”[32] The green school market has become more competitive, making green technologies more affordable. The transforming and expanding educational construction market provides a perfect opportunity to convert the green school phenomenon into a nationwide movement.

The Green School Phenomenon: Schools Address Climate Change and Develop Future Leaders

To understand the importance of green private K-12 schools, it is important to look at existing school infrastructure in the U.S and how green schools can benefit the entire educational experience. Last year the American Society of Civil Engineers determined that in 1999 America’s schools were two years from reaching the desired lifespan of a school building at 42 years. Most schools were built in 1950-1970 in response to the surge of baby boomers.[33] Construction practices included the use of asbestos, lead paint and resulted in horrendous air quality and infrastructure integrity impacting student performance. Educational facilities are old and unhealthy environments that result in absenteeism and depleted academic efforts by student and teachers.

American school infrastructure is also in need of reconstruction due to the increasing student population and decreasing state funding. The 2009 Report Card for American Infrastructure documented 55 million students attending K-12 public and private school. Public schools carry most of the burden with approximately 50 of the 55 million student population.[34] The National Education Association published that $322 billion is “needed to bring all [school] infrastructures into good repair,” but only $142

[32] Yudelson, Jerry. *The Green Building Revolution*. Washington: Island, 2008. Print.
[33] American Society of Civil Engineers. *Report Card for American Infrastructure*. 2009. <http://www.infrastructurereportcard.org/fact-sheet/schools>.
[34] American Society of Civil Engineers. *Report Card for American Infrastructure*. 2009. <http://www.infrastructurereportcard.org/fact-sheet/schools>.

billion federal dollars are available for spending.[35] Withering school infrastructure and financial distress is best illustrated in California. In 2003, the CA Department of Education requested $5.2 billion per year for five years is needed to construct 300 schools annually to accommodate the current and future student population comfortably in classrooms.[36] 2004 was a peak spending year at $29 billion. However, by 2007 there was a $9 billion decrease. Currently, with the economic crisis, spending is even lower.[37] Decreasing educational spending is compounding the negative situation of American schools.

The educational crisis is worsened by projected student population growth. Enrollment is expected to increase 5-10%, depending on whether the institution is public or private, through 2017, resulting in even more overcrowding if not addressed and rectified.[38] America's schools are a calamity riddled with dilapidated infrastructure, too many students, and decreasing federal and state funding. Ultimately, schools are not only harming the environment but student health and educational experiences too.

School greening could be the elusive magic bullet, fixing the educational mess in the U.S. Green schools, or high-performance schools, address climate change, reduce operating costs, increase student and faculty/ staff productivity and provides a creative teaching tool while improving the community image by incorporating green building technologies and a sustainable systems approach. Green schools are based on the precautionary principle, preventing disaster rather than waiting for scientific evidence to prove the disaster occurred. For the purpose of this paper, green schools are defined as:

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[35] U.S. Senate Republican Policy Committee. *Democrats' Spending Expansion Bill Dramatically Increases Federal Role in Education*. 3 Feb. 2009. <http://rpc.senate.gov/public/_files/020309StimulusEducation6.pdf>.
[36] California Department of Education. *Statistics.* 2003.
[37] American Society of Civil Engineers. *Report Card for American Infrastructure*. 2009. <http://www.infrastructurereportcard.org/fact-sheet/schools>.
[38] Yudelson, Jerry. *The Green Building Revolution*. Washington: Island, 2008. Print.

"A community facility that is designed, built, renovated, operated, or reused in an ecological and resource-efficient manners. [They] protect occupant health, provide a productive learning environment, connect students to the natural world, increase average daily attendance, reduce operating costs, improve teacher satisfaction and retention, and reduce overall impact to the environment."[39]

Green school technologies target four main principals outlined by Global Green USA: protect student and teacher health, better student performance, lower operating costs, and provide an unique educational experience. Green school technologies are illustrated in the GEN7 classrooms, approaching a sustainable system rather that just green buildings. Thus, while schools are the problem in terms of failing infrastructure and negatively impacting occupant health and the environment; they can also be the key to unveiling a whole-systems approach to education and addressing climate change.

Green School Benefits

Green schools provide countless benefits by addressing common inefficiencies. For example it is estimated that, "as much as 30% of a districts total energy is used inefficiently or unnecessarily."[40] Thermostats are usually set too high or too low when outside temperatures are uncomfortable. Unfortunately, recent trends show that K-12 school districts spend more on energy—$6 billion annually—than computers and books.[41] Studies show that one green school can decrease carbon emissions by 585,000 per year because they use approximately 33% less energy. Green schools also dramatically reduce nitrogen oxide and sulfur dioxide emissions, which contribute to poor air quality. Water use is reduced an average of 32%. In the Gregory Kats Capital E Report specific green schools in the U.S. were studied and the results included: a

[39] Global Green USA. *Green Buildings: Cities and Schools*. 2010. <http://www.globalgreen.org/greenurbanism/schools/>.
[40] U.S. EPA. Energy Star. *Schools: An Overview of Energy Use and Energy Efficiency Opportunities.* 2010. < http://www.energystar.gov/ia/business/challenge/learn_more/Schools.pdf>.
[41] U.S. EPA. Energy Star. *Schools: An Overview of Energy Use and Energy Efficiency Opportunities.* 2010. < http://www.energystar.gov/ia/business/challenge/learn_more/Schools.pdf>.

decrease in energy costs, improved indoor air quality, and compared with conventional K-12 schools there was increased student performance, reduced student absenteeism, increased teacher retention and an increased community image.[42]

Financial benefits and manageable operating costs are also desirable features of a green school. On average, green schools save $100,000 annually after upfront payments are met. Building green schools typically costs an additional 1-2% more, equivalent to an additional $3 per square foot. Taking into consideration the cost benefits of green schools (seen below) there is a $71 per square foot net gain (over a certain amount of time depending on technology cost and payback period).[43]

Financial Benefits of Green Schools:

Benefit Category	Benefit/ (cost) per square foot
Energy	$9
Emissions Reduction	$1
Water and wastewater utility bills	$1
Increased lifetime earnings of students	$49
Asthma reduction from better air quality	$3
Cold and flu reduction from better air quality	$5
Teacher retention	$4
Employment impact from higher costs	$2
Total	$74
Cost of greening (2% assumed)	$3
Net financial benefits	$71

Source: Kats, Gregory. *Greening America's Schools: Benefits and Costs (Capital E Report)*

Ultimately, green schools do not just decrease carbon emissions but also improve community image, student performance, environmental quality, and provide a progressive environmental teaching tool. Green schools provide an economic and environmental incentive for all educational institutions.

[42] Kats, Gregory. *Greening America's Schools: Costs and Benefits.2006. < http://www.usgbc.org/ShowFile.aspx?DocumentID=2908>*.
[43] Kats, Gregory. *Greening America's Schools: Costs and Benefits.2006. < http://www.usgbc.org/ShowFile.aspx?DocumentID=2908>*.

Green School Phenomenon Mirrors Green School Building Technique to Combat Opposition

Green school leaders have learned from the green building leaders how to address and fight opposition with progressive policy and a resilient belief in the end result: a green and healthier future. Green school opposition revolves are an handful of topics: steep up-front costs and timely payback periods, a lack of organization information accessible to both private schools and public school districts and the current economic downturn that has states running out of money for green school projects. First of all, green building and green school building have increased upfront costs (2-7% of total cost); however, if total life-cycle savings are included, as well as unquantifiable benefits such as reduced student absenteeism, then the cost of a school building is lower than the cost of the conventional building.[44] This common cost debate is best illustrated in the 2008 National Center for Policy Analysis article, "Green Schools Don't Make the Grade." The article affirmed that energy costs are higher at green schools, did not have reduced economic costs and benefits were not always met. While proponents of the movement are justified to spend and/ or invest in green school construction, it is unfair to make judgments using only a handful of pilot schools in Olympia, North shore and Spokane school districts.

Second of all, accessible and organized green school building information has improved with the help of the USGBC/ LEED and other national organizations. Additional scientific analysis is also made available by the American Institute of Architects and the U.S Department of Energy. Reports focus on scientific and

[44] Kats, Gregory. *Greening America's Schools: Costs and Benefits.2006. < http://www.usgbc.org/ShowFile.aspx?DocumentID=2908>*.

quantifiable findings rather than anecdotal evidence. Private K-12 schools, however, are left with little information still. While the economy has declined, state governments have run out of money to fund greening projects. With the slowing of greening public school districts, it is important to capitalize on private K-12 school greening methods since these schools do not receive any state government funding.

The Next Step

The green school phenomenon is on the verge of becoming a movement. However, the literature review reveals that while private educational facilities account for a substantial percentage of current and future green school building, private K-12 schools are left out of the literature and discussion.[45] Ultimately, with private K-12 schools left out of the green school discussion, the phenomenon is fractured. In addition, the green school phenomenon misses the 33,740 private facilities, the unique and nimble greening strategies, the innovative funding methods, and the creative curriculum incorporation. Moreover, it overlooks private K-12 schools whole-system, sustainable building practices compared to isolated building efforts. Private K-12 schools offer the green school building invigorating freshness. Especially today, in an economic recession, private K-12 schools can lead the way in educational reconstruction, making everyone rethink the educational experience in America.

The following investigation focuses on six specific case study private K-12 schools. Findings illuminate common themes found amongst these greening schools,

[45] Private K-12 schools are left out of the K-12 greening discussions because of its fundamental difference from the public school system. Private/ independent schools are single private entities; they do not belong to school districts. Private schools are not governed by state or federal regulations; therefore, they control admission selectivity, tuition and curriculum. Private schools do not receive state or federal funding unless they apply to specific state grant programs. They are smaller institutions that can execute decisions and plans quickly and efficiently because there is not bureaucracy. Because of these differences, private schools and public school districts approach green building differently.

which include: low-cost technology efficiencies, student-run programs, funding methods, green school policies and curriculum use, and unique challenges. These insights will be important not only to create a greening template for RHP, but also to represent the necessary steps for private schools to become leaders in the green schools movement.

Case Studies: Introducing the Schools

The following private K-12 schools were examined because of similar competitive learning environments, student population, campus size, low-cost technology emphasis and similar funding obstacles to Rolling Hills Preparatory School. The schools will be briefly introduced followed by a detailed analysis.

Darrow School

Darrow School is an independent co-educational boarding and day school. It was founded in 1932 and inhabits a 365 acre property located in the Berkshire Hills in New Lebanon, New York. The property originally was home to a Shaker community; the original buildings are still used. The student population is approximately 105 students with 31 faculty members. The faculty-student ratio is 1:4 and the average class size is 9-12 students. While the tuition is unknown, the school has a $2.5 million endowment. Darrow School is actively greening its campus. Darrow School is home to the first-ever private K-12 school implemented the Samson Environmental Center which houses the Living Machine, a sewage and water wetland treatment system. The Samson Environmental Center, run by Craig Westcott, is visited by hundreds of people wanting to see a Living Machine in action.[46]

Green Acres School

[46] *Darrow School*. 2010. January 2010. <http://www.darrowschool.org/>.

Green Acres School is co-educational, prekindergarten-8th grade private schools. The school was founded in 1934. It is currently located in Rockville, Maryland on a 15 acre wooded campus. The student population is approximately 320 students and has 46 faculty members. The faculty-student ratio is 1:6 and the average class size is 12 students. Green Acres is famous for being the first racially integrated school in Montgomery County. The progressive trend continues today. Green Acres purchases wind power from Clean Currents to power the school buildings. In addition, the school emphasizes the importance of student-run organizations that represent student environmental awareness.[47]

Sidwell Friends School

Sidwell Friends School, located in Washington D.C., is a private prekindergarten-8th grade co-educational Quaker day school. The campus is approximately 15 acres. The student population is roughly 1,100 students and has 147 faculty members. Tuition is $30,842 for grades 5-12 and $28,842 for grades PK-4. Sidwell Friends is a hidden green leader. The campus has multiple LEED certified buildings which include: the Middle School Building which was awarded a LEED Platinum rating in March 2007, the first K-12 school in the United States to have a LEED Platinum rating and the first LEED Platinum building in the District of Columbia. The Lower School Groome Addition and Gym, completed in September 2007, was awarded a LEED Gold rating in January 2009. The administration building, Zartman House, underwent a green renovation in summer 2004. It features a geothermal heat pump, low emitting materials, and efficient lighting. Sidwell is also powered 50% by Clean Steps Wind Power.[48] The school represents how

[47] *Green Acres School*. 2010. January 2010. < http://www.greenacres.org/>.
[48] *Sidwell Friends School (Washington D.C.)*. 2010. January 2010. < http://www.sidwell.edu/index.aspx>.

greening technologies can create an entire sustainable system rather than just isolated green buildings.

Location of Darrow School, Green Acres School, Sidwell Friends School, and Northern Guilford Middle School (public)

The Branson School, Besant Hill School, and the College Preparatory School

The following three California private K-12 schools were examined based on the previous criteria mentioned. These three schools provide examples of innovative student-run programs, funding methods and curriculum incorporation.

Branson School

Founded in 1920, Branson School is a co-educational, independent college-preparatory day high school. The school is located in Ross (Marin County), California.

The campus is 17 acres and is home to a student population of 320 students and 50 faculty members. The faculty-student ratio is 8:1 and the average class size is 13 students. The school has developed extensive environmental student-run programs and communication efforts with the Student Environmental Action Coalition (SEAC), a grassroots coalition of student and youth environmental groups.[49]

Besant Hill School of Happy Valley

Besant Hill is located on 520 acres in Ojai, California. The private, co-educational boarding and day school was founded in 1946. The school has approximately 100 students and 35 faculty members. The faculty-student ratio is 4:1 and the average class size is 12 students. The school has unique funding methods and an established greening rubric, an assessment tool that sets greening goals and determines when the goal is successfully met.[50]

The College Preparatory School

The College Preparatory School is an independent co-educational day high school. The school was founded in 1960 and is currently located near the Oakland-Berkeley line in a green urban valley. The school has approximately 350 students and 52 faculty members. The faculty-student ratio is 8:1. The school's annual endowment is approximately $9 million and annual tuition is $28,600. The school is working toward incorporating a whole-systems approach to create a sustainable environment. Student-programs have been successfully implemented.[51]

Location of Branson School, The College Preparatory School, and Besant Hill School

[49] *The Branson School*. 2010. January 2010. < http://www.branson.org/Default.asp?bhcp=1>.
[50] *Besant Hill School of Happy Valley*. 2010. January 2010. < http://www.besanthill.org/>.
[51] *The College Preparatory School*. 2010. January 2010. <http://www.college-prep.org>.

Key Components of a Green School Strategy

After a thorough investigation of the previously stated private K-12 schools, specific themes were apparent as key components of a green school strategy. The investigation reveals that private K-12 schools emphasize low-cost technology purchasing followed by high-cost technology purchasing, student-run environmental programs, creative funding methods relying little on state funds, environmentally focused mission statements and rubrics, and incorporating curriculum into environmental education efforts.

Targeting Low-Cost Technologies First

Private K-12 schools are capitalizing on purchasing low-cost technologies followed by high-cost technologies and only when financially appropriate. This purchasing philosophy initiated environmental enthusiasm without going bankrupt. This

greening philosophy was expressed by Tom Toch, Executive Director of Independent Schools of the greater Washington D.C. area. He states that, " while private schools do not necessarily have deeper money pocket, they do, however, have the ability to execute decisions quickly. This often leads to effective green purchases."[52] Overall, decisions are made and executed without the hassle of going through a bureaucratic system like with public school districts.

The following table is a compilation of all technologies discussed during interviews (or highlighted on the school website) with the case study schools. By no means is this an all-inclusive list of green technologies present on these specific campuses. Low-cost technologies are defined as technologies paid for by school budget only; middle-cost technologies are technologies paid for by the school budget and by outside fundraising (i.e. capital campaigns, private donations); high-cost technologies are paid for with outside fundraising and are long-term projects:

School Name	Low-Cost Technology	Middle-Cost Technology	High-Cost Technology
Green Acres	▪green cleaning products ▪green field maintenance products (chemical free) ▪100% recycled paper towels/ toilet tissue ▪staff coffee mugs (no throw-away cups) ▪water pitchers at events (no water bottles/ throw away cups) ▪composting		▪geo-thermal heating (planning phase) ▪wind power contract
Sidwell Friends	▪green cleaning products ▪recycling program ▪100% recycled paper	▪native planting, water efficient landscaping ▪green food products	Building Elements ▪peripheral wetlands ▪emphasis on local

[52] Toch, Tom. Personal Interview. 25 Jan 2010.

	towels/ toilet tissue/ napkins ▪composting ▪garden vegetables provide for lunch meals (and homeless shelters)		building materials ▪building orientation for increased daylighting ▪green roofing ▪easy operable windows for natural ventilation ▪geothermal heat pump ▪efficient light fixtures ▪Clean Steps wind power purchasing ▪Carbon Financial Instruments Other: ▪solar trash compactor
Darrow School	▪recycling program ▪weather stripping/ proofing windows	▪Electricity meters	▪Bio mass harvesting ▪Living Machine ▪Solar array
Besant Hill School	▪Baseline energy survey ▪landscaping and farming toxic/ chemical free ▪recycling program ▪water well use ▪composting	▪native and edible plant landscaping ▪local food delivery	▪The Solar Car ▪Living Machine ▪solar array
Branson School	▪recycling program (batteries and ink cartridges targeted) ▪free energy audit ▪interactive blog	▪native landscaping	
College Preparatory School	▪organic gardening ▪composting ▪gardening (provides food for homeless shelter) ▪recycling program ▪energy and water audit		▪20% solar powered

High-cost and low-cost technologies represent different types of achievements on private K-12 school campuses. The high-cost technologies are milestone projects culminating from years of researching, planning, fundraising and implementing. Low-cost technologies, on the other hand, represent the fundamental stepping-stones toward more complex and expensive greening achievements that integrate students, faculty, parents, the Board of Trustees and in some cases, the community. For example, Sidwell Friends uses a wastewater treatment system that cost $24 million. While Sidwell Friends

has an impressive endowment, a long-term capital campaign was initiated to raise money and enthusiasm for the installation. Darrow School capitalizes on weather stripping windows which saves the school 7-13% on heating costs. The school also applies a composting system that makes dirt used for landscaping and saves 15 pounds per week of waste from entering a landfill. On top of which, the students learn how to weather strip and the science of composting by taking part of the application and maintenance of the systems. Due to the high-level of student and teacher enthusiasm, Darrow has implemented high-cost technologies like a Living Machine, funded by alumni and the board of trustees, and an extensive photovoltaic solar system, funded by the New York State Energy Research and Development Authority (awarded $18,000). Besant Hill School also follows this sequence. Only after implementing low-cost technologies did they implement a Living Machine, solar arrays and a "Solar Roller" car that teaches students how solar works (a classroom on wheels). Ultimately, low-cost technologies attract the student's attention and increases overall enthusiasm by incorporating the student into the system. Without these technologies, high-cost technologies are more likely to be isolated projects, leading to possible failure and future funding barriers.

Green technologies must be suited to the school's environment. In other words, the technology must be relevant and necessary to the school's geographical location and need. By assessing what the school would benefit most from due to geographic location, a private school saves time and money. The Besant Hill School uses its climate and large campus for community agriculture farming using all toxic free extraction and maintenance methods. Schools located on the eastern coast of the U.S. benefit from geothermal heating systems and Living Machines at a greater rate because of weather

patterns. With warmer and colder seasons, as well as more precipitation, these technologies save schools like Sidwell Friends, Darrow and Green Acres more money than schools with a mild climate on the western coast. Ultimately, evident in the chosen technologies for each particular school, private K-12 schools understand and appreciate the precautionary principle—without the need of scientific data, to prevent harm to the environment and/ or public, prevention must be initiated no matter the cost. Technologies chosen to suit the school's landscape and environment is indicative of "smart greening."

Low-cost technologies are also more popular on private school campuses because of the current economic climate. Although not influenced by state funding sources, private schools also suffer from an economic crisis: budgets dramatically decrease, strict financial monitoring increases, endowments decrease, and grants and private donors are likely to give out less money. Therefore, low-cost technologies are suitable to smaller budgets. Energy and water audits, recycling programs, composting, gardening, weather stripping windows, computer programs that completely turn off all office computers, and providing reusable water containers for all school occupants save the environment and continue to save the school money. Ultimately, even in a time of economic downturn, greening practices are still occurring because, "[private] schools are becoming increasingly cognizant of the important of "green" practice. [It's] as much a matter of doing what's right as it is an opportunity to save money."[53] Greening practices do not have to stop in the face of monetary clinching.

Student-Run Programs Create and Maintain Environmental Enthusiasm

Private schools are also using the creativity, enthusiasm and intellect of its student population. By having student-run environmental programs and organizations, green

[53] Westcott, Craig. Personal Interview. 26 Jan 2010.

school building becomes a teaching tool. The Darrow School has the Hands-to-Work program. Hands-to-Work links campus greening to the community. Students learn how to weather-strip windows, chop wood for bio mass harvesting to use in dormitory fireplaces (rather than burning fossil fuels for heating systems), and even collect fresh maple-syrup to use in the cafeteria. Students also harvest food from the garden and fruit from fruit trees to give as donations to local low-income families and homeless shelters. Students at Green Acres School created the Tree Huggers/ Energy Patrol to ensure all classroom lights were turned off when empty and trash and recycling were in the correct designated bins. The Environmentally Conscious Organization at Sidwell Friends is responsible for the success of campus composting. In addition, students coordinate "eco-challenges" throughout the school year. For example, a recent challenge was to decrease driving time to and from school. Therefore, whoever made the most efficient carpooling system was designated the winner. The Branson School has a student-run organization that is a member in the Student Environmental Action Coalition (SEAC), a youth run national network for environmental communication; another student-run program is the Environmental Action Committee that includes several focus groups: pollution prevention, solid waste and recycling, and water/ energy conservation clubs.

Green student-run organizations create a concrete link between the natural environment and learning. It is how students can become part of the green school building movement rather than onlookers. This concept is clearly emphasized, for example, in Besant Hill's mission: "At Besant Hill, sustainability education engages us all in the active cultivation of a community ethic, an ethic that is committed to preserving and enriching our natural, social, and economic resources to meet our personal needs,

while ensuring that these resources will still be available to nourish and enrich future generations of the school community."* Student-run program ensure that students are learning hands-on about environmental awareness and creates a community ethic for the future.

Student-run programs are developing formal environmental stewardship networks between students, teachers, administrators, parents and even the community. In order to be a program and/ or club on a school campus there has to be student interest, an advisory teacher, a focused mission, and goals have to be communicated to the head of school for approval. By incorporating so many people from different levels of the school, the program affects a substantial amount of people. By demanding a mission and set of goals, students become aware of environmental writing, articulation and responsibility—all of which are not necessarily taught in every classroom.

Lastly, student-run programs are also important for private schools because they act as money-savers. For example, even though a professional installs CO2 monitors, it is not necessary to pay the professional to return to campus to maintain the equipment. Rather, students can perform basic maintenance needs that save the school money.

Creative Funding Methods

Private schools may not receive any money from state allocated funds. However, private schools employ creative funding methods to ensure positive growth. Each of the case study schools employed different funding strategies:

Darrow School: Grant from NYSERDA +SPSN, Capital Campaign, Power Analysis of Alumni (Private Donations), Sustainability Symposium

Darrow School's funding strategy is to concentrate efforts toward grant approval while also always carrying out a capital campaign and symposiums to attract alumni

dollars. The school applied to a New York State Energy Research and Development grant to help fund a solar array on the Samson Environmental Center. The school was awarded $18,000 in the summer of 2003. This grant allowed the school to purchase a high-cost technology. Additional funding methods include an extensive capital campaign targeted specifically to campus greening. Those who run the campaign performed an alumni power analysis to pinpoint alumni who either work in the environmental field or would give money to only environmental projects. By contacting a specific list of alumni, the campaign team save invaluable time and energy. Finally, through the year the school holds Sustainability Symposiums that attract attention to the environmental capital campaign. Environmental leaders, the Board of Trustees, teachers and students attend. This fosters a positive image toward potential private donors.

Sidwell Friends: Capital Campaign, Endowment Investment, Sustainability Symposiums

Sidwell Friends heavily relies on investing its endowment into green projects. This allows the school to spend more freely and to save money to put back into the school's endowment. Just like Darrow School, Sidwell hold an annual Sustainability Symposium, the environmental event of the year. By having one major environmental event, the school attracts a lot of attention and potential donors as well.

Green Acres School: Operational Fund (part of annual school budget), Capital/Replacement Reserves

Green Acres School implements several unique funding methods. By coupling the Board of Trustees to the greening process, the school was allowed to set up an Operational Fund. This fund sets aside a certain percentage of the school's annual budget for green projects. The school can use the money for any type of project as long as it

doesn't go over budget. More expensive projects are approved by the Board of Trustees and funded through capital campaign reserves. Thus, it is vital that private K-12 schools have an ongoing capital campaign that is used for environmental growth.

College Preparatory School: "Eco-charrette" Fundraising Event, Honey Sales

The College Preparatory School's funding techniques include a large-scale event to attract attention and small-scale school fundraisers. The large-scale event, first held in 2009, is called the "Eco Charrette!" Students, teachers, administrators, parents and Ratcliffe Architects attended the event. During the even the school's ecological goals and strategies to meet those goals were defined. Also, Ratcliffe Architects revealed results from the energy audit they had performed earlier in the week. This large-scale event showcases the school's environmental priorities to the families, faculty, and Board of Trustees. It also develops a relationship with the environmental organization or company that is involved. Finally, it gives donors an opportunity to see what environmental goals the school has and how the school plans to meet those goals, instilling confidence in donors.

The school also stresses small-scale on-campus fundraisers. For example, using the honey from the beehives that are located on the campus to pollinate the native plants, a honey sale is one of the most popular fundraising events on campus. The money raised from honey sales goes directly to the next environmental project. Small, on-campus fundraisers develop the school's environmental enthusiasm and provide a fun way to connect students to the natural environment.

Based on private K-12 funding methods, private schools exemplify how green building can be efficient and affordable. Private schools overcome the money barrier by

using both "inside" and "outside" funding sources.[54] Darrow School's funding methods provided for the building of the Samson Environmental Center and the first-ever Living Machine installation at a U.S. private school and continue to provide for low-cost technology purchasing. Sidwell Friends has constructed multiple LEED certified buildings and continues to create a sustainable educational system. Green Acres Operational Fund is a direct testament to greening success on the campus. Adriana Murphy, 7th and 8th Unit Dean/ Humanities Teacher and Service Learning Coordinator, stated, "programmatically, greening the campus forces staff to change the way it thinks about field trips, homework, class projects and even lesson plans . . . students realize that their actions make a difference—positive or negative [and] they not only become can become stewards of the Earth, but agents of social justice. Financially, the improved indoor environmental quality . . .reduces worker sick days. Natural light also increase everyone's exposure to Vitamin D, helping lift everyone's spirits during the dreary months of winter."[55] Thus, the Operational Fund ensures these benefits. Finally, the funding methods at College Prep illustrate how schools can initiate green growth that incorporates students, teachers, administrators, the Board of Trustees and environmental companies the school is working with.

Ultimately, because private schools do not have access to many education monetary allotments, it is necessary to put extra effort into finding the best source of money to continue campus greening. Thus, private K-12 schools are orientated toward long-term funding opportunities, like capital campaigns and endowment investments. However, they also raise money quickly with special events, like the Eco-Charrette and

[54] Lack of money was mentioned in all survey replies.
[55] Murphey, Adrianna. Personal Interview. 1 Feb 2010.

green conferences that attract financial donors as well as small-scale fundraisers to pay for the low-cost and high-cost technologies. Most of all, because the amount of money raised determines the level of campus greening, private schools employ driven, charismatic and educated individuals to raise millions to increase the school's visibility needed to put private schools at the forefront of the movement.

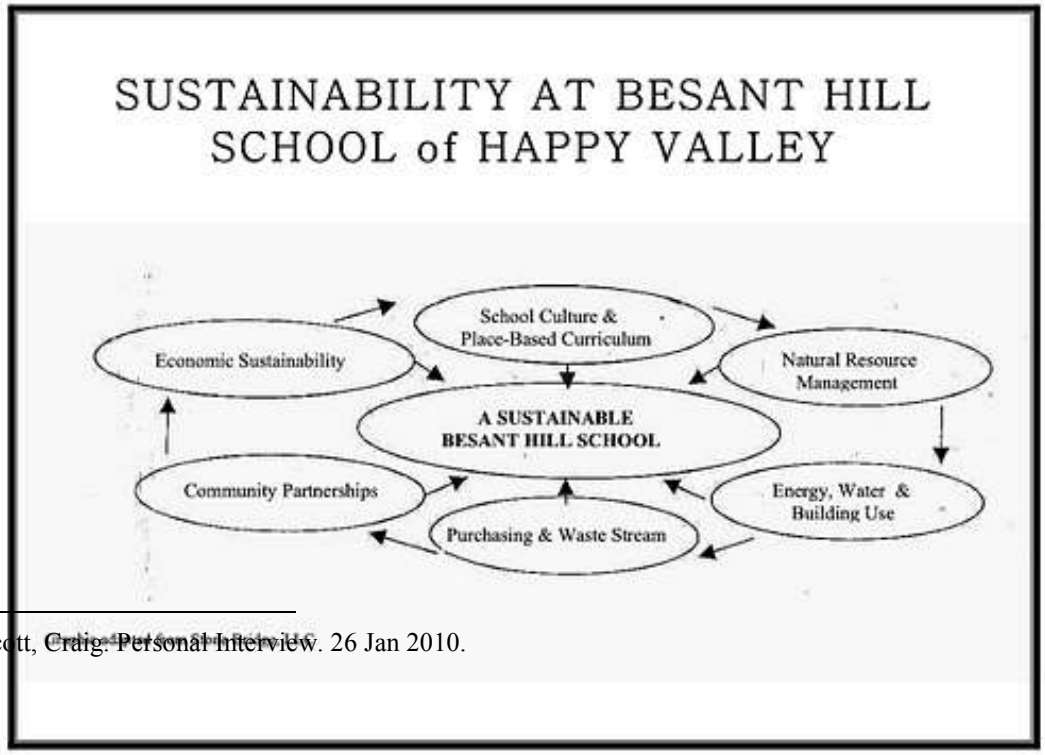
Mission Statements and Assessment Tools (Rubrics): The New Policy

Another green school building element that is unique to private K-12 schools is its ability to transform a school's mission statement and rubrics into institutionalized policy. Green Acres School, Darrow School and Besant Hill School are the best examples of mission statements and rubrics acting as school policy. The significance of campus greening is explicitly evident in Green Acre's Mission Statement: "An environment of trust, cooperation and mutual respect encourages students to become increasingly independent thinkers and responsible contributors to an ever-changing, multicultural world." Adriana Murphy stated, " we believe that to truly help our students become independent thinkers and responsible contributors, we must confront environmental issues head on and use our campus as a starting point. By living up to our Mission, we are teaching students that we say what we mean and that we mean what we say."[56] The school also created an environmental Strategic Plan, a school policy that states, "Promote and practice environmental awareness in all decisions and seek to have Green Acres certified a 'green school'." By writing the school's Mission and Strategic Plan as environmental policy, the school has made green achievements ranging from small-scale changes (implementing a recycling program) to large-scaled changes (purchasing wind power from Clean Currents).

[56] Murphey, Adrianna. Personal Interview. 1 Feb 2010.

Darrow School also has created policy using the school's mission statement resulting in the construction of one of the first and greenest school buildings in the U.S., the Samson Environmental Science Center. Darrow's Mission states, "We are dedicated to serving with diverse backgrounds and abilities, building on each student's individual talents and interests to inspire enduring confidence for success in life." As a guiding force, the mission statement acts as policy guidelines for sustainability efforts—the annual Sustainability Symposium and the maintenance of the original Shaker buildings. Craig Westcott, Director of Samson Environmental Center, declared, "Regardless of profession, we want our students to have a sustainable ethic [beyond time at Darrow]."[57] School policy dictates priorities at a school like Darrow. Therefore, by making school policy environmentally focused, every other aspect of the school becomes environmentally focused.

Another example of how school "policies" communicate environmental focus to



[57] Westcott, Craig. Personal Interview. 26 Jan 2010.

students, teachers, staff, parents, etc. is at Besant Hill School. The school uses the Besant Hill School: Rubric for Sustainability Strategic Planning (2009).

The school policy incorporates environmentalism into every facet of the school and assesses its effectiveness (See Appendix H). Specifically, the rubric states, "our independent schools are ideal movements for introducing an ethic of relationship to our environment, as well as for modeling the positive, creative, and practical solutions that may address the complex challenges our students will face in the near future." In order to educate its students to address these "complex challenges" the school incorporates environmental awareness to all components of the educational experience. Information gathered from the case studies reflects private schools implementing mission statements and sustainability rubrics imitating formal greening policies. Importantly, environmental target mission statements can attract families interested and personally invested in environmentalism, potentially bringing in monetary donors and useful connection. Finally, the schools become empowered by these policies and incorporate its mission into all aspects of the school—building design to curriculum.

Creating a Green Curriculum

A significant advantage of a private school is having curriculum flexibility. The following case study schools illustrate different levels of environmental curriculum infusion, creating a stronger educational experience. Darrow, Green Acres, Sidwell Friends, and Besant Hill have successfully integrated sustainability into its curriculum.

School	**"Green" Curriculum**	**Other**
Darrow School	▪Environmental Literature ▪Environmental History ▪Environmental Economics	▪Math Department: uses data generated from the Living Machine, and other green projects, in algebra class problems and

		homework sets
Green Acres School	Integrated in: ▪Science (topics discussed: solar energy, hydropower, geothermal energy) ▪Math (individual carbon footprint calculations) ▪Language Arts (environmental research papers, reflections) ▪Geography (environmental research papers, reflections) ▪Social Studies (environmental research papers, reflections) ▪World Studies(environmental research papers, reflections) ▪Ethics (environmental research papers, reflections)	▪Pre-K: understanding that school values green building ▪7th and 8th graders must complete a unit where they design their own cities using only environmentally sustainable materials
Sidwell Friends School	▪AP Environmental Science (on-campus water quality labs, invertebrate biodiversity from on-campus green roof lab, stormwater runoff comparison labs) ▪8th Grade Environmental Science (labs use on-campus wetlands to compare nitrogen/ phosphorus levels, wetland purification system lab) ▪8th Grade English (read environmental texts that are controversial, have sparked social action and that connect the school buildings with the outside world)	▪Middle School Environmental Challenges (carbon footprint challenges held several times a year to incorporate more students and to learn how to calculate a carbon footprint)
The Besant Hill School	▪9th, 11th and 12th Environmental Science	▪Integrative Approach focuses on interdisciplinary connection, environmental literacy and experiential

		education ▪4 phases of integration

Having the luxury of a flexible curriculum allows a more complex integration of environmental topics. A "green" curriculum has several significant impacts. Firstly, a curriculum that reflects green technologies and methods taking place on-campus are able to connect students and teachers, working toward a common goal and understanding. Craig Westcott from the Darrow School stated, "teachers have a fundamental affect toward the [sustainability] goal; they have a direct influence on changing minds with exponential growth." In addition, Besant Hill states in its sustainability rubric, "cultivating environmental intelligence by integrating diverse areas of discipline can achieve a 'big picture' understanding for the way environmental sustainability shapes our existence." It is apparent that linking teacher and students together, by using the curriculum, is imperative in the growth of a student's environmental awareness. Without a "green curriculum" students and teachers are disconnected from the mission of the school.

While having a single environmental class is beneficial to its students and meeting the school's goals of integrating sustainability into the curriculum, the most effective curriculum is one that incorporates sustainability across all disciplines. As illustrated above, private schools are incorporating basic Environmental Science (including AP) courses to all different grade levels, but are also incorporating sustainability into English, Math, Social Studies, etc. lesson plans. The more established private schools have a fully integrated curriculum; however, it was accomplished by a step-by-step assessment philosophy that other private schools can adopt. Moreover, this allows greater

sustainability exposure to students with talents other than in the sciences. Finally, a "green curriculum" molds students into environmental conscious individuals and future environmental leaders.

Obstacles

Private K-12 schools are successfully creating complete sustainable educational systems. However, there are particular barriers private K-12 schools encounter. Private K-12 school barriers include: isolated communication, limited community and school partnerships, and lack of data, money, authority, and time. While these are significant obstacles for private K-12 schools, this paper does not address the complexity of these barriers specifically. Additional research is needed on private K-12 obstacles and how to address the issues.

Private schools are most often left out of the larger discussion regarding green school building because they are independent from public school districts and national organizations, isolating its creativity and greening achievements. The following examples illustrate the limited connection private K-12 schools have with other private schools, public school districts and national organizations. The Besant Hill School is a member of NAIS and has partnerships with local conservation groups and environmental learning centers, as well as businesses that contribute money to fundraisers; however, the school does not have active partnerships with other local schools. The Darrow school affiliates with seven off-campus organizations including Habitat for humanity and an assisted living center; however, because of the school's location it is physically isolated from other educational partnerships. Branson communicates with other private schools and uses blogging, as a member of SEAC, to communicate with other greening

enthusiasts; however, a relationship with LEED has not been developed. Ultimately, while extremely beneficial for the school, communication with outside, national leaders and public school districts is quite limited. This limited communication creates very little national visibility for private K-12 school greening accomplishments.

Another barrier for private schools is applying technologies and having enough time to collect and understand the data. When asked about certain technologies, school personnel were reluctant to answer questions because they were not "well-versed" in the subject. While schools know its general contribution to carbon emissions, most do not know the scientific quantity. Knowing the carbon footprint would help create a comparative study that shows quantifiable result, as well as create a more scientific background to insert in grant writing and other funding proposals.

The last barrier involves the lack of time and authority to oversee greening projects. Craig Westcott explained that greening a private school with high-cost technologies is a long-term process. In order to implement the technology in a timely manner a prioritization system must be in place. Priorities ensure that authorities are chosen and educated on the subject, funding is secure, and implementation is on schedule. However, private schools can also fall into the trap of having too many priorities since, "private schools allow us to explore all these possibilities and to talk about them with the community."[58] Thus, success thrives on a private school that educates authority figures and develops a focused priority plan that ensures project completion. All in all, private schools proactively address the obstacles and continue to work toward a sustainable system; a school that has green buildings, student-run programs, and a curriculum that connects the larger picture to the classroom.

[58] Westcott, Craig. Personal Interview. 26 Jan 2010.

Drawing Conclusions from Private K-12 School Greening

Private K-12 green school building provides the green school building phenomenon greening practices that can transform the phenomenon into a nationwide movement. These private educational facilities provide examples of unique greening strategies, innovative funding methods, successful student-run environmental programs, and environmentally focused curriculum and school policy incorporation. Ultimately, private K-12 school greening methods address climate change and the educational experience. By emphasizing these specific greening techniques, private K-12 schools successfully demonstrate that in an economic recession, campus greening is a creative and business minded approach to educational reconstruction.

Private K-12 schools also demonstrate an entirely new systemic approach to green school building. Private schools focus on constructing entire sustainable systems rather than just green buildings. Sustainable systems create zero environmental impact from the start of the extracting period to the end of the building life-cycle. Green buildings are isolated instances targeting energy and water savings. Private schools are able to work toward sustainable systems due to its quick decision making ability (private schools are not a bureaucratic system). In addition, private schools rely on creative funding methods that can supply any project instead of relying on state funds to dictate project scope.

Lastly, private K-12 schools represent the "heart beat" of future green school building. While not just building to energy and building codes, private K-12 schools understand and believe that something must be done to address climate change and teach students about human responsibility. In the words of Craig Westcott, "since the plant can survive without humans, it is our responsibility to live the healthiest life possible." These

schools recognize this human-Earth relationship and feel constructing sustainable schools is the best way to produce immediate results by decreasing the environmental impact and educating the future leaders of the world.

The following recommendations represent a work plan for private K-12 schools who wish to "go-green" and increase the school's visibility within the green school phenomenon. By following these recommendations a private schools is taking the first step in becoming a leader of the green school movement.

Recommendation 1:

Purchase low-cost technologies before high-cost technologies. The first step when considering purchasing green technologies is to consider campus location and climate. Assess what is necessary and what technology will give you the most desirable benefits for the least cost (do not be tempted by the "flashy" high-cost technologies when beginning campus greening). Focusing on low-cost technologies in the initial greening phase will build environmental enthusiasm with students and teachers. Incorporate both students and teachers into the implementation and maintenance of the low-costs technologies. The environmental enthusiasm can translate into ideological and monetary support by the Board of Trustees and potential individual donors for future high-cost technology purchases.

Recommendation 2:

Increase level and complexity of student-run programs. Empower students to become environmental leaders by meeting the students demand and provide an advisor for clubs and/ or organizations started by students. Allow student freedom when

determining program goals as it will help gage what students are most interested about and level of commitment. Help direct student-run programs into organizations that determine and meet goals by providing up-to-date information. Meet goals as it will provide students with a sense of empowerment and responsibility. Link students to national communication organizations or blogs to instigate conversations outside the school community.

Recommendation 3:

Increase innovative funding methods. Perform a power analysis before conducting a capital campaign (See Appendix A). A power analysis will help determine who has a personal or professional connection to the green movement that will be more likely to give a donation. Targeting these individuals will yield better results—more money and faster results. Capital campaigns should use an appealing green technology that alumni, the Board of Trustees and community partnerships can relate to and appreciate. The Darrow School used the Samson Environmental Science Center as its capital campaign icon. Use the student-run programs and low-cost technologies as a platform for justifying high-cost technology purchasing. Also, create stable relationships with community businesses and stakeholders. These relationships can lead to large donations. In terms of small scale fundraising, implement on-campus fundraisers (like the honey sales) to get students to interact with one another, teachers, parents, and community members.

Recommendation 3:

Create environmental school policies with an assessment strategy. Create a school policy that lays out the school's green goals. By creating an environmental

framework for the entire school, the school will begin to attract environmentally oriented students and families. After setting school greening goals it is important that an assessment system is put in place. The Besant Hill 2009 Sustainability Rubric is a great example of a successful assessment system. Environmental assessment allows comparison between school policy and goals versus accomplishments and inconsistencies. Ultimately, goals provide incentive to make changes. Change is guaranteed with effective assessment.

Recommendation 4:

Increase sustainability concepts into school's curriculum. Include official environmental classes and sustainability lessons in school curriculum by a step-by-step process. Step 1 should include using science lesson plans and labs to teach sustainability and environmental issues. Step 2 should include using more academic disciplines that would benefit the students most at your school—Math, English, or perhaps Economics and World History. Step 3 should include adding an official AP Environmental Science course. These are becoming more popular and can be very helpful to senior students wanting to study environmentalism in college. Step 4 should address linking "green" curriculum in all different disciplines throughout the year by hosting green challenges and/ or speakers. The final step is to assess successful classes and less successful classes to determine ways to strengthen sustainability learning. Green Acres School provides a great example of how to incorporate environmental learning across academic disciplines. Ultimately, the goal is to incorporate sustainability concepts into the schools curriculum to mold environmental leaders for the future.

Recommendation 5:

Increase communication with national leaders and community businesses, stakeholders, etc. In order to increase the schools environmental visibility, create national organization relationships and community partnerships to connect your private K-12 school with national environmental leaders. Become a member of LEED and determine a future green building project to be certified (See Appendix I for how-to instructions). Create and maintain a school sustainability website and/ or blog to connect with other schools and students and to showcase your own green achievements. SEAC is a great link to other schools, students and environmental organizations. Determine local businesses, corporations and any other stakeholder that could be part of your greening efforts/ funding efforts. Keep relationships intact by inviting community members and business donors to any informational meetings about future greening projects.

These recommendations are meant to be followed by small private K-12 schools with limited financial resources, as well as any private K-12 school wanting to take the first step toward greening its campus. Ultimately, the goal is to strengthen the role and visibility of private K-12 schools in the green school movement as a means to support the success of the broader green building movement and its fight to reverse climate change and create a sustainable future.

Looking Beyond These Pages

This paper attempts to understand the role of private K-12 schools within the green school movement. Recommendations were made to provide a template on how to "go-green." Following these recommendations will hopefully result in increased private K-12 school greening visibility, pushing the green school phenomenon forward. This paper supports areas of future research that would benefit the green school movement.

While this paper developed a firm understanding of private K-12 school greening, it did not focus on the relationship and communication between private schools and public school districts in regards to greening efforts. Ultimately, this communication link is necessary to create a more cohesive and powerful green school movement.

Reference Guide A: Terminology

Anthropogenic Climate Change:

Refers to the greenhouse gas emissions from human consumption. Since the post-industrial rise, humans have increased the proportion of greenhouse gases in the atmosphere, especially carbon dioxide levels. The increased atmospheric level of greenhouse gases correlates with the increase in average temperature. The most significant greenhouse gases include carbon dioxide (CO2), methane (CH4), and nitrous oxide (N20). Greenhouse gas levels are the highest in a 650,000 year time period.

Source: http://www.global-greenhouse-warming.com/anthropogenic-climate-change.html

"Green" Building = High Performance Green Building:

A green building is a high-performance property that considers and reduces its impact on the environment and human health. [It's] designed to use less energy and water and to reduce the life-cycle environmental impacts of the materials used. This is achieved through better siting, design, material, selection, construction, operation, maintenance, removal and possible reuse.

Source: Jerry Yudelson, The Green Building Revolution

Sustainable Building:

Encompasses the notion of green building but, in the spirit of sustainable development, addresses the social and economic issues of the habitat, as well as the community context of buildings. "Green" buildings are a subset of sustainable construction, representing simply the structures. The USGBC offers a resourceful

sustainable building manual on the internet: *The Sustainable Building Technical Manual: Green Building Design, Construction, and Operations.*

Source: http://www.usgbc.org/DisplayPage.aspx?CMSPageID=212

Rubric:

An assessment tool that determines when and how goals are met. Besant Hill School of Happy Valley illustrates a working rubric for campus greening. See Tools.

Reference Guide B: Technology Resources

GEN7 Classrooms:

Contact: Jim Wallace, Director of Southern California Sales

Email: jim.w@american.modular.com

Phone: (818) 339-1413

Product: http://www.gen7schools.com/

Alternate Sewage/Water Technologies:

Contact: Jeff Chapman, Director of Audubon Center at Debs Park

Email: jchapman@audubon.org

Phone: (323) 221-2255 ext. 11

Product: AdvanTex –AX Treatment Systems
(http://www.orenco.com/ats/ats_ax_index.cfm)

Other Contact: Brian Muller, Northern Guilford Middle School

Email: mullerb@gcsnc.com

Geothermal Harvesting:

Contact: Adriana Murphy, Green Acres School

Email: adiranam@greenacres.org

Note: In the planning process.

Other Contact: Loren Hardenbergh, Sidwell Friends (Washington D.C.)

Email: hardenberghl@sidwell.edu

Biomass Harvesting:

Contact: Craig Westcott, Darrow School

Email: westcottc@darrowschool.org

Calculating Your School's Carbon Footprint:

http://www.epa.gov/climatechange/kids/calc/index.html

http://www.anr.state.vt.us/site/html/VSCC/cycf.htm

Reference Guide C: Organizations

- **U.S Environmental Protection Agency**: http://www.epa.gov/
- **U.S. Green Building Council**: http://www.usgbc.org/
- **LEED**: http://www.usgbc.org/DisplayPage.aspx?CategoryID=19
- **LEED K-12 Resources**:

  http://www.usgbc.org/DisplayPage.aspx?CMSPageID=1905
- **Becoming a LEED member**:

  http://www.usgbc.org/DisplayPage.aspx?CategoryID=2

  http://www.usgbc.org/DisplayPage.aspx?CategoryID=127

- **U.S. Energy Star**: http://www.energystar.gov/
- **U.S. Department of Energy**: http://www.energy.gov/
- **Council for American Private Education**: http://www.capenet.org/

- **National Association of Independent Schools (Sustainable Schools)**:

  http://www.nais.org/sustainable/index.cfm?ItemNumber=147756&sn.ItemNumber=151711

- **Earth Day Network**: http://www.earthday.net/about
- **Global Green USA**: http://www.globalgreen.org/
- **Southern California Initiative**:

  http://www.globalgreen.org/greenurbanism/schools/

Reference Guide D: Survey Questions and Common Responses

Title: Private Schools and Campus Greening

Resource: Survey Monkey

Questions:

1. **Why is campus greening important to you and/ or your school?**

   Responses: importance of the "green" practice, commitment to shape global citizens, develop future leaders, ethical and moral response to cleaning and protecting the environment

2. **If known, what is your school's carbon footprint?**

   Responses: carbon footprints were not known

3. **What institutional differences between private and public schools affect the greening process of your school?**

   Responses: private schools have less bureaucracy and can act faster, freedom to incorporate curriculum, mission driven

4. **What are your greening priorities? How does being a private school influence your priorities?**

Responses: everything from campus operations to curriculum, encourage knowledge-based learning on key green concepts and technologies, adopt an ethics-based decision-making process, incorporate students into the greening process

5. **What are the biggest struggles in greening a private school?**

Responses: lack of time, money, and authority

6. **What advantages are there for greening a private school?**

Responses: positive image for school and admissions, curriculum flexibility, and endless creative freedom

7. **What implications/ influences can private K-12 schools have on the green schools movement?**

Responses: prepared to think outside-the-box, serve as model schools, creating a social revolution that public schools are afraid to confront and challenge

8. **What will it take for private K-12 schools to become more visible in the green schools movement?**

Responses: already doing it, leadership and cohesiveness, and better understanding of the subject

9. **How can private K-12 schools incorporate themselves into the national green building literature?**

Responses: private schools have to create a way to tell success stories, and incorporate sustainability on the school's website so other schools are aware of the greening context/ position on particular campuses

10. **How can private K-12 schools become leaders in the green building movement?**

Responses: they are already leaders but can increase communication on the national level

Reference Guide E: Contacts

- Peter McCormack, Head of Rolling Hills Preparatory School

  Email: pmccormack@rhps-k12.com

- Barbara Dye, Rolling Hills Preparatory School Director of Institutional Development

  Email: bdye@rhps-k12.com

- Jim Wallace, GEN7 Southern California Director of Sales

  Email: jim.w@americanmodular.com

- Caroline March-Long, PR for Living Machine

  Email: Caroline@fourleafpr.com

- Tom Duffy, C.A.S.H Legislative Director

  Email: tduffy@m-w-h.com

- Ted Bardacke, Green Schools Initiative Representative

  Email: tbardacke@globalgreen.org

- Jeff Chapman, Director and Master Teacher at Debs Park/ Audubon Center (AdvenTex)

  Email: jchapman@audubon.org

- Karen Fuqua, San Jose Unified District Office Public Information Officer

  Email: Karen_Fuqua@sjusd.org

- Melissa Foster, Activities Director at Willow Glen High School

  Email: wghsfoster@mac.com

- Brian Muller, Northern Guilford Middle School (Living Machine)

  Email: mullerb@gcsns.com

- Loren Hardenbergh, Sidwell Friends School

  Email: hardenberghl@sidwell.edu

- Adriana Murphy, Green Acres School

  Email: adriana@greeacres.org

- Craig Westcott, Director of Samson Environmental Center at Darrow School

  Email: westcottc@darrowschool.org

- Tom Toch, Executive Director of the Association of Independent Schools of the Greater Washington Area

  Email: ttoch@aisgw.org

- Besant Hill School of Happy Valley

  http://www.besanthill.org

- Branson School

  http://www.branson.org/Default.asp?bhcp=1

- The College Preparatory School

  http://www.college-prep.org/

Reference Guide F: Useful Tools

1. **SEAC Blog**

   http://www.seac.org/

2. **Besant Hill Rubric and Strategic Plan**

   http://www.besanthill.org/downloads/pdfs/bhs_sust_strategic_rubric.pdf

   http://www.besanthill.org/downloads/pdfs/strat_plan_cover_page.pdf

3. **Funding Method: Symposiums**

   http://www.darrowschool.org/uploaded/Sustainability/SessionDescriptionsListDSSS2Formatted.pdf

4. **Emerging Trend: Wind Power**

   http://www.greenbuildingnews.com/articles/2010/01/28/wind-power-emerging-choice-schools

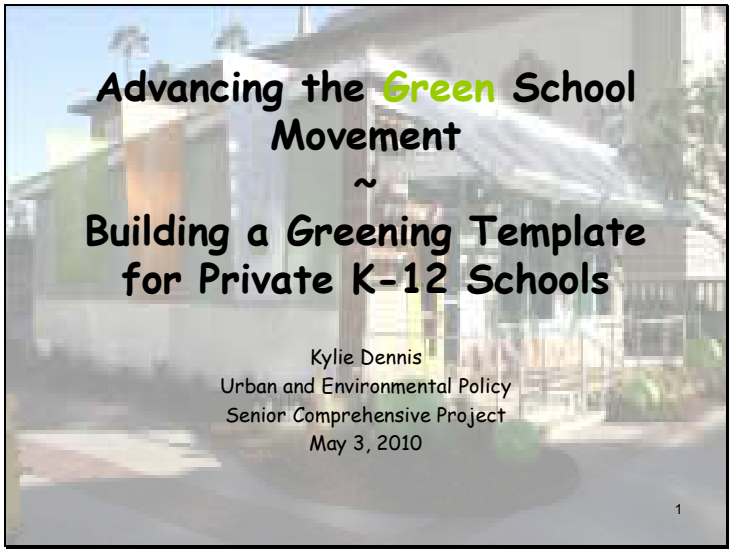
5. **Green School Event**

   http://www.greenschools.net/section.php?id=64

6. Power Analysis

Power Point Presentation

Slide 1



Slide 2

Slide 3

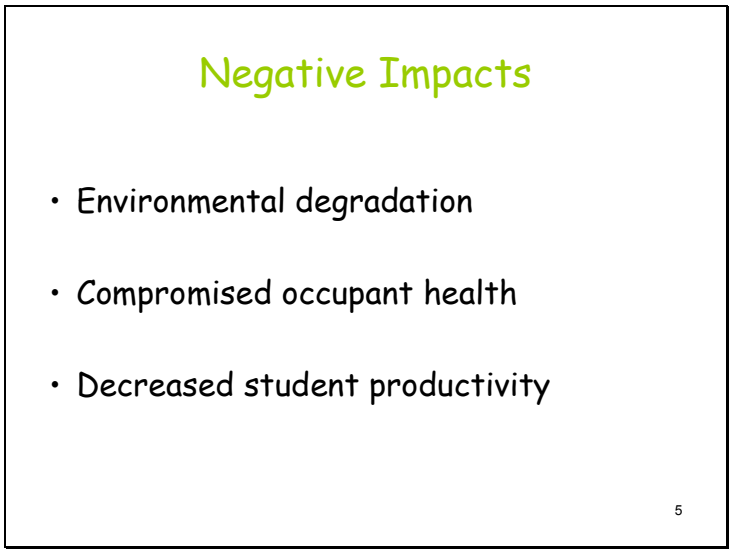
Talking Points

- Overview
  - Negative impacts from school infrastructure
  - -Green school concept
  - -Green school phenomenon
- My Research
- What Is Out There?
- Recommendations

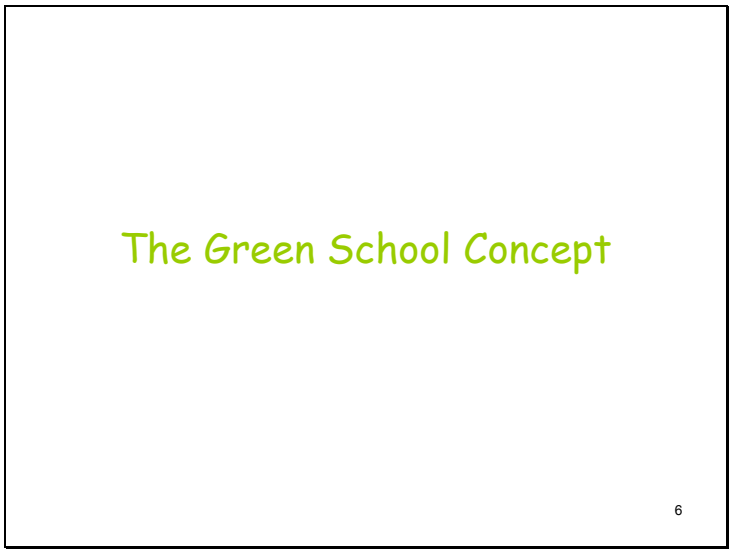
3

Slide 4

Slide 5


Negative Impacts
• Environmental degradation
• Compromised occupant health
• Decreased student productivity
5

Slide 6



Slide 7

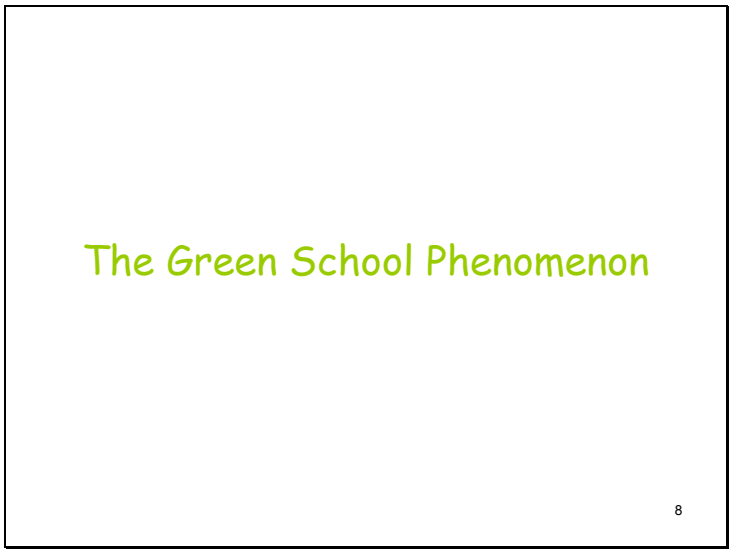
Green Schools Target:

- Carbon Emissions
- Waste production
- Student performance
- Image
- Teaching tool
- Money savings

http://www.edweek.org/media/2006/11/09/03green.jpg

7

Slide 8



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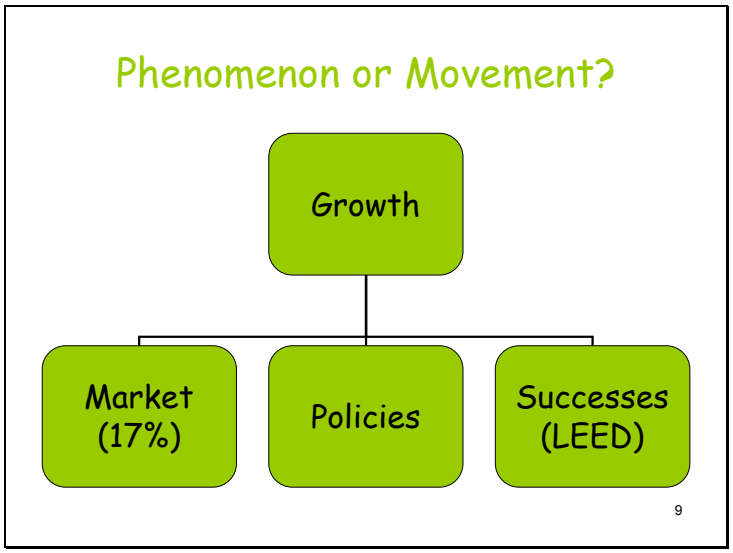
Phenomenon or Movement?
Growth
Market (17%)
Policies
Successes (LEED)
9

Slide 10


My Focus: Private K-12 Schools
• Private K-12 schools → invisible
• Missing opportunities and strategies
• Reconstructing the educational experience
10

Slide 11

What Does Private K-12 School Greening Look Like?

- Case studies:
  - Darrow School (NY)
  - Green Acres School (MD)
  - Sidwell Friends School (Washington D.C)

  - The Branson School (CA)
  - Besant Hill School (CA)
  - The College Preparatory School (CA)

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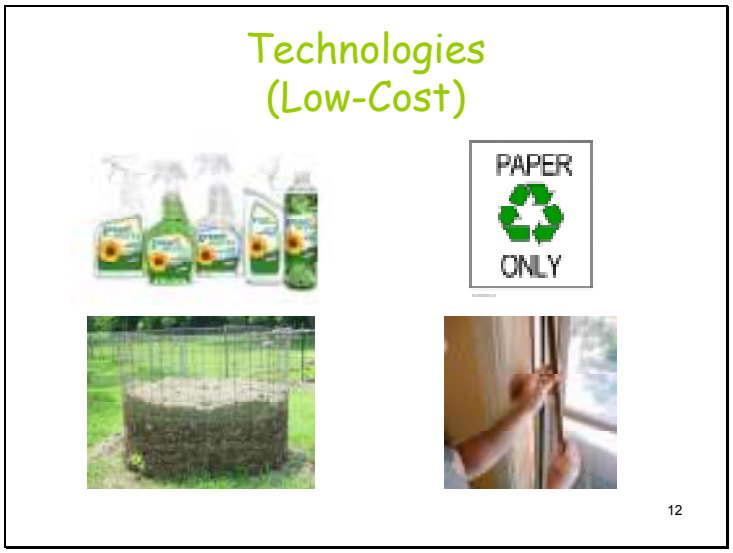
Slide 12



Slide 13

Technologies (Low Cost)

- Reusable water bottles
- Energy and water audits
- Light sensors
- Carpooling

13

Slide 14

Technologies (Mid-Cost)

- Computer Software
- LANDSCAPING

14

Slide 15

Technologies (High-Cost)

- Geo-thermal heating
- Wind power

(2 year purchasing contracts)

- Bio mass harvesting

15

Slide 16

Technologies (High-Cost)

- Solar Trash Compactor

- Green Building: local materials, orientation, roofing, ventilation, operation, solar

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Slide 17

Green Building: LEED Certified

http://video.yahoo.com/watch/90485/905783

http://www.sidwell.edu/about_sfs/green-buildings/index.aspx

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Slide 18

Samson Environmental Center

http://www.darrowschool.org/page.cfm?p=34

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Slide 19

AdvanTex

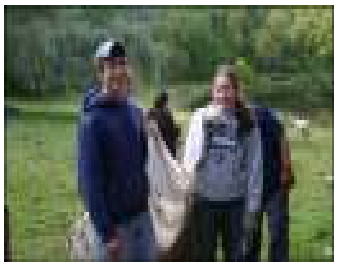
http://www.osieagle.ca/services/design/ATcomm/drawing.jpg

19

Slide 20

Slide 21

Student-Run Programs



http://www.boardingschoolreview.com/photos/large_13_364.JPG

- Hands-to-Work
- Tree Huggers/Energy Patrol
- ECO (Environmentally Conscious Organization)

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Slide 22


Creative Funding Methods
• Grants
• Focused capital campaigns (power analysis)
• Sustainability symposiums
• Endowment investments
• Operational fund
• On-campus fundraisers
• Community Relationships
22

Slide 23

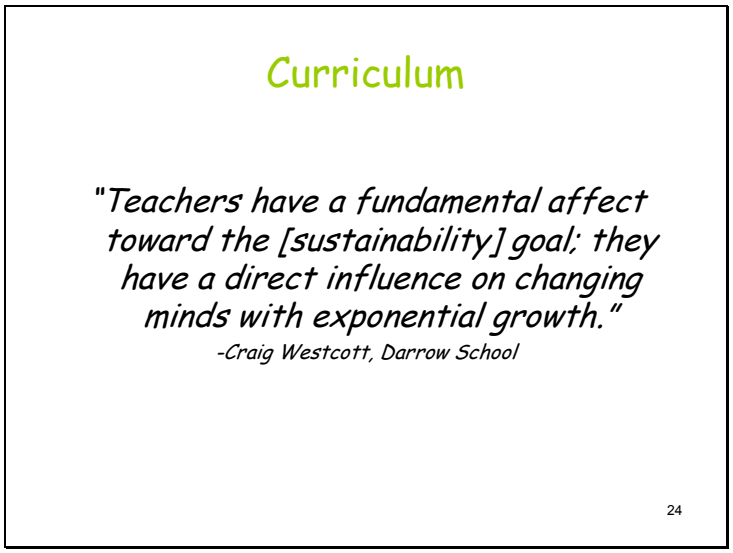
"Policy"
Assessment & Strategy Plans

- Mission statements
- Rubrics/ Assessment tools

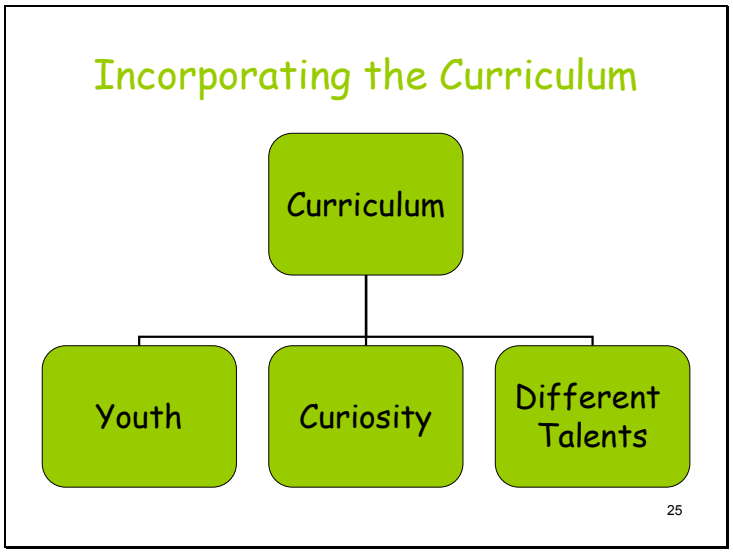
- http://www.besanthill.org/downloads/pdfs/strat_plan_cover_page.pdf

23

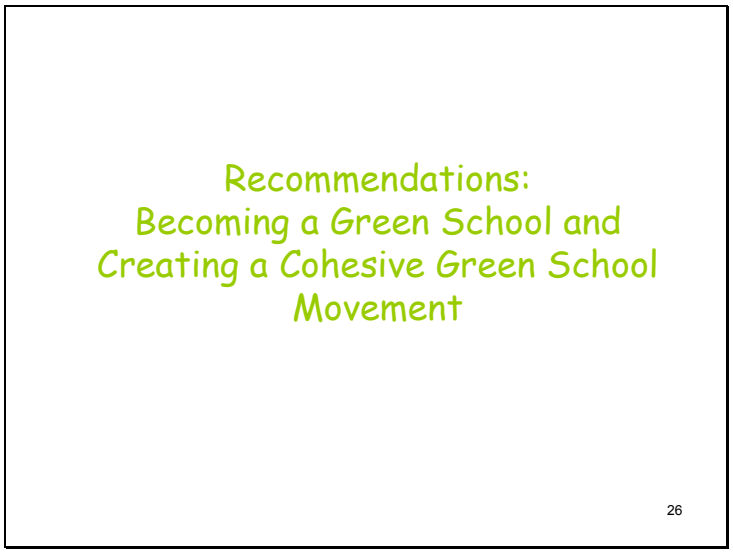
Slide 24


Curriculum
"Teachers have a fundamental affect toward the [sustainability] goal; they have a direct influence on changing minds with exponential growth."
-Craig Westcott, Darrow School
24

Slide 25


Incorporating the Curriculum
Curriculum
Youth
Curiosity
Different Talents
25

Slide 26


Recommendations:
Becoming a Green School and
Creating a Cohesive Green School
Movement
26

Slide 27

5 Recommendations

1. Purchase low-cost technologies before high-cost technologies
2. Increase level and complexity of student-run programs
3. Increase innovative funding methods

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Slide 28

Recommendations (cont.)

4. Incorporate environmental school policy
   - -connect with "outside" policy
   - -curriculum

5. Increase communication with national green leaders, community stakeholders, and other schools

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Slide 29


Private K-12 Schools:
No longer just building green. . . but building sustainable systems!
29

Slide 30

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