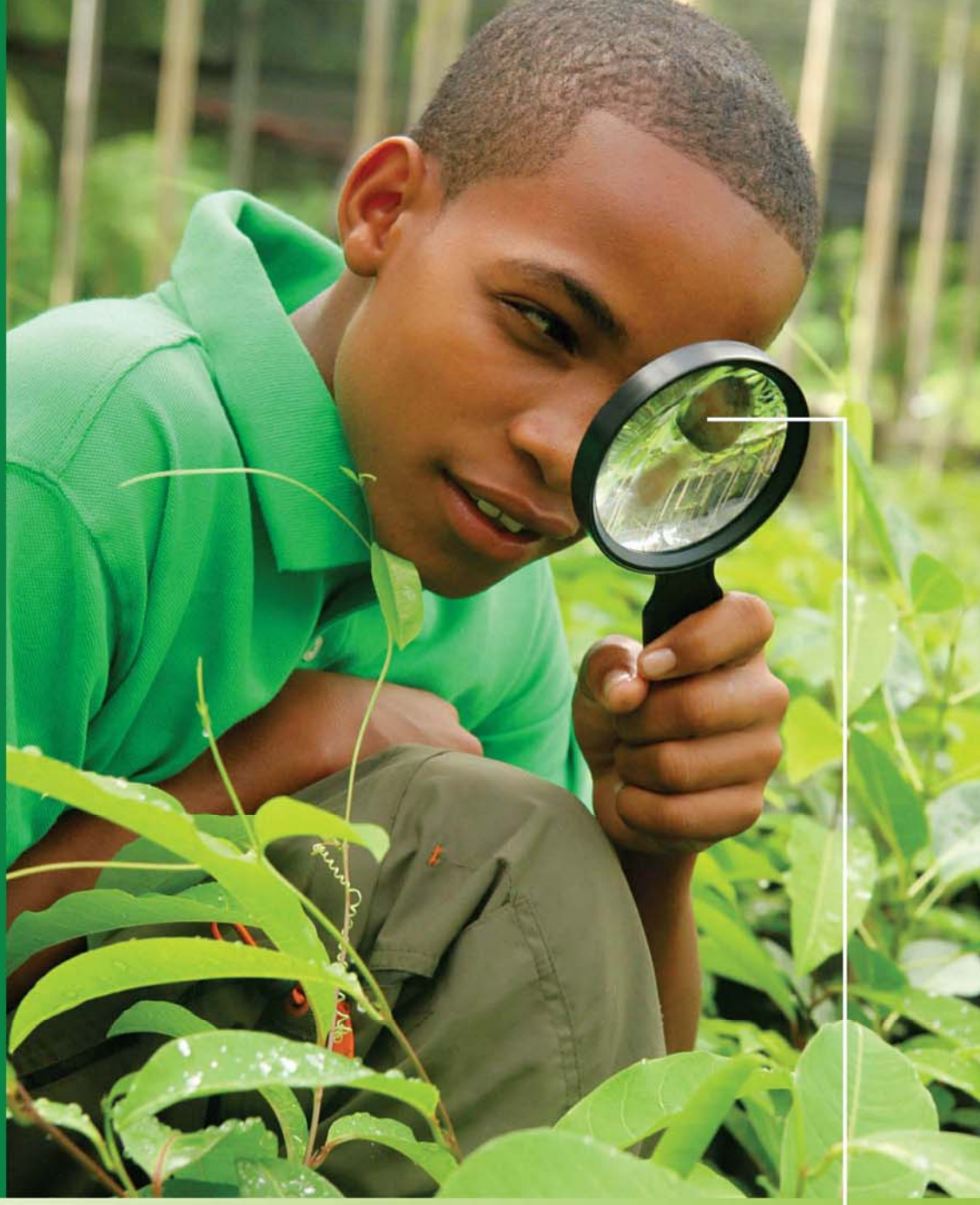
A GUIDE TO BUILDING A SUSTAINABLE, HIGH-PERFORMANCE CHARTER SCHOOL FACILITY



THE SUSTAINABLE ANSWER KEY

ncb capital impact™

IN PARTNERSHIP WITH US GREEN BUILDING COUNCIL

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The Walton Family Foundation is committed to improving K-12 student achievement in the United States in all schools – traditional public, charter public, and private. The Foundation aims to accomplish this result by supporting the infusion of parent choice into America's K-12 education system. When all families have a choice of the schools they will attend, the Foundation believes that all schools are more likely to respond by continuously improving performance and embracing innovations that make them more efficient and productive. As a result, student achievement and attainment will rise dramatically and all schools will improve, enriching student lives and positioning America to thrive in the global economy.

The Annie E. Casey Foundation is a private charitable organization dedicated to helping build better futures for disadvantaged children in the United States. It was established in 1948 by Jim Casey, one of the founders of UPS, and his siblings, who named the Foundation in honor of their mother. The primary mission of the Foundation is to foster public policies, human-service reforms, and community supports that more effectively meet the needs of today's vulnerable children and families. In pursuit of this goal, the Foundation makes grants that help states, cities, and neighborhoods fashion more innovative, cost-effective responses to these needs.

U.S. Green Building Council (USGBC) is a non-profit organization committed to a prosperous and sustainable future for our nation and the world through cost-efficient and energy-saving green buildings. USGBC works toward its mission of market transformation through the LEED green building certification program, educational offerings, a nationwide network of chapters and affiliates, the annual Greenbuild International Conference & Expo, and advocacy in support of public policy to encourage and enable green buildings and communities. Thanks, especially, to Emily Knupp, Pauline Souza and Anisa Baldwin Metzger whose expertise was critical to ensuring the accuracy of this guide.

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Information presented in the green sidebar running throughout the Guide will provide quick references and helpful, topic-specific links.

THE SUSTAINABLE ANSWER KEY

School leaders across the United States are addressing the challenge of creating sustainable schools not only to understand how they can be better stewards of the environment but also to ensure that children are provided healthy physical environments in which to learn. According to the *U.S. Green Building Council (USGBC)*, over a quarter of the nation's students and teachers are learning and teaching in facilities considered substandard or even dangerous to their health. To correct this situation, many school design standards now emphasize building strategies that promote healthy and productive learning environments while minimizing the impact of material and energy resources consumed during construction and operation. The resulting *green schools* have been proven to positively impact health, learning, and also save energy, money and resources over time.

The Sustainable Answer Key will help charter operators design and implement green strategies for their facilities. It provides an extensive overview of **the benefits of green schools,** including **suggestions for integrating sustainable building features** into a charter school facility, **case studies, various educational resources** and a comprehensive **glossary of green terminology.** This Guide will also cover upgrades **specifically tailored to the needs of charter schools.**

Are you interested in learning:

- What does it mean to go green and what are the benefits?
- What *design elements* should I consider in greening my school?
- What are the phases involved in green charter school design projects?
- What are the criteria for identifying a development and design team to guide your charter school through each phase of development?
- What is the difference between *new construction*, *renovation*, and *small scale energy saving solutions*, and how do I choose?
- As a charter school do I qualify for special funding or incentive programs? And, where can I seek funding for sustainable building?

Looking for quick facts on cost and implementation?

The facts about green building costs and savings:

- Don't assume that green school construction costs more. Costs vary by region and by the choices you make. There is evidence that green school construction costs less than or equal to a traditional school building.
- Efficient lighting, heating and cooling systems, use of natural light and better insulated walls and roofs contribute directly to reduced energy consumption and cost.
- Reduced electricity and gas use leads to fewer pollutant emissions.

Why your school should go green:

- Most green schools are built and operated at a lower cost than traditional buildings.
- Green schools have less environmental impact and reduced building operations and maintenance (O&M) costs.
- There are long-term financial and health benefits of green schools which more than offset any initial costs.
- Studies show schools with improved *indoor air quality*, temperature control and lighting provide healthy, productive learning environments. Green schools boast improved teacher retention, which reduces costs, have more opportunities for hands-on learning and promote environmental stewardship.

Before you begin, we encourage you to use the following assessment tool to help capture relevant details of your charter school and facility project.

The following tool will help you consider key elements to success in building or renovating your facility sustainably and will provide you with supporting materials for discussing your project with funders, stakeholders and consultants. You may not have answers to all of these questions immediately, but this tool provides a great starting point for your team. Please note: the main checklist items are discussed in detail throughout this Guide to help you along the way.

Now, let's get started!

PROGRAM ASSESSMENT CHECKLIST

1. What is the mission of our charter school?

2. What do we hope to achieve with this green facility or project? What are the main goals ?

3. What should we consider before embarking on the adventure of greening our school? What are dates we should keep in mind?

a) Will we need to move or will a temporary swing space be necessary (circle one)?

yes no

b) Project timeline: specify any dates to keep in mind (i.e. start of school, summer term etc.)

Who should be on the internal project team? Be sure to include all stakeholders including teachers, administrators, parents, students and professionals (such as architects, owner's representative, grant-writers, etc.)

4. What learning spaces do we have in our current facility?

Total number of existing classrooms, listed by type (fill in other subjects)

____ Science ____ other:_____

____ Math ____ other:_____

____ Social Studies ____ other:_____

____ English ____ other:_____

____ Art ____ other:_____

Existing specialty or gathering spaces (gymnasium, multipurpose, etc.):

_____

_____

_____

_____

5. What types of spaces do we need or lack currently?

Total number of classrooms, listed by type

____ Science ____ other:_____

____ Math ____ other:_____

____ Social Studies ____ other:_____

____ English ____ other:_____

____ Art ____ other:_____

What specialty or gathering spaces do we need and/or currently lack (gymnasium, multipurpose, etc.)?

_____

_____

_____

_____

6. Why do we want to go green?

Below is a list of common benefits of integrating sustainable design strategies into your facility. Please rank benefits in order of importance for your school.

___Better indoor air quality

___Support the mission of the school

___Support curriculum

___Long-term cost savings for school

___Healthier indoor environment

___Use building as a teaching tool

___Other: _____

___Increased marketing potential

___Safer indoor environment

___Proven educational benefits

___Add to appraisal value of school

___Improve attendance

___Reduce environmental impact

___Other: _____

7. Do we need to consider city or county regulations?

Prior to identifying a project team, charter school administrators should research local building regulations or consult with a professional in the building industry. Architects can often help advise but it is also good to understand basic requirements and permitting costs on your own terms. The main questions to consider are:

Will a permit be required? _____

Do architectural drawings require a professional stamp? _____

What are the building and zoning codes we must adhere to? _____

Other policies to be aware of? _____

8. Do we need to find outside consultants for the project?

(check all that apply)

- ☐ Architect
- ☐ Structural engineer
- ☐ Mechanical engineer
- ☐ Contractor
- ☐ Sustainable or “green” consultant
- ☐ Owner’s representative

9. How much is it going to cost?

Costs can vary and depend heavily on the scale of your project. Will you be pursuing alternative power sources or building certifications that might make you eligible for special funding or require fundraising? Wind and solar power, LEED certification and Energy Star certifications are a few possibilities—you can find more information on these topics later in the Guide.

9a. First consider: what is my school currently spending?

In order to calculate cost savings you will need to gather data to help you understand how much money is spent on your current facility. Be prepared to examine current utility bills and other maintenance records as these are a great starting point for creating a cost/benefit or *lifecycle analysis* of possible energy savings.

9b. Then consider: what types of funding are available for my project?

___Grants

___Loans

___Tax credits

___Green loan programs

___Utility incentives

___Other _____

10. Please rank the following features in order of importance to your school:

___Bicycle racks

___Access to public transportation

___Storm water collection and re-use

___Improved indoor air quality

___Develop on brownfield land

___Create vegetable garden

___Adopt green office standards

___Set up a shared-use facility

___Water efficient landscaping

___Increase efficiency of plumbing fixtures

___Building commissioning

___Energy efficient lighting/ lighting controls

___Environmental science curriculum support

___Alternative energy sources (green power)

___Optimize energy performance of building

___Collection and storage of recyclables

___Implement composting and recycling program

___Adopt green cleaning standards

___Increase ventilation

___Increase daylighting

___Material reuse in construction/manage waste

___Use recycled materials for construction

___Use renewable products for construction

___Improve acoustic performance of building

WHAT ARE THE BENEFITS OF GREEN BUILDINGS AND PROGRAMS?

Now that you have made a commitment to learn about greening your charter school you're ready to dive deeper! The benefits of sustainable design will immediately impact everyone that uses your school and make your facility a model for the community. Green schools save money, improve teacher and student attendance and create hands-on learning opportunities in addition to providing a healthy indoor environment.

Students cannot be expected to perform well in sub-standard facilities with poor air quality and bad lighting.

According to a 2004 study of Houston schools, students are less likely to attend schools in need of structural repair, lacking in janitorial services, or housed in temporary facilities. A separate study indicates that over 30% of Washington D.C. teachers and 20% of Chicago public school teachers experienced health issues directly related to the facilities they were working in. This Guide posits that sustainably built schools lead to higher attendance rates, higher teacher retention, and increased health and overall morale.

Twenty percent of Americans are in schools everyday and spend the equivalent of 180 full days inside school facilities each year! Both teachers and students benefit from a well designed facility with clean air, proper temperature and temperature control, noise insulation, proper lighting, overall comfort and good acoustics. According to a report from the Government Accountability Office, 15,000 U.S. schools suffer from indoor air that is unfit to breathe. Green charter

"Green schools are healthy for students, teachers and the environment. **When built correctly, green schools can provide productive learning environments with ample natural light, high-quality acoustics and air that is safe to breathe. Schools everywhere are going green, nurturing children while saving money."**

Benefits of Green Schools

1. Lower operations and maintenance costs
2. Increased indoor air quality
3. Improved student test scores
4. Increased student and teacher morale
5. Increased teacher retention
6. Increased building life

schools provide a safe and healthy learning environment for both students and staff. A 2001 study of over 600 South Carolina schools demonstrated a negative correlation between poor facility condition and student test scores. The study also indicated that the quality of the building affected teacher morale and parent and community involvement. Specifically, the study linked increased parent, teacher and community involvement to greener facilities, and showed a decreased involvement in sub-standard and/or non-green facilities. Another study reported an increase in student test scores from 50%-85% in sustainably designed facilities. A comprehensive list of up to date information regarding the benefits of green school design can be found on the *USGBC* website.

The many health and educational benefits to greening your charter school are supported by numerous studies. But are there any cost benefits to green charter schools? **Yes! Green charter schools save money!** Implementing sustainable design strategies in new and existing facilities reduces overall operating costs for the life of the building. Sustainable schools use 30%-50% less energy, which directly reduces lifecycle costs for the building. Additionally, green schools tend to boast increased building life due to better *operations and maintenance programs* and more efficient equipment and design elements. The West Brazos LEED Case Study provides a great example of a green school that was built for 18% less than similar schools and resulted in increases in student test scores of 4% to 7% in major subject areas. Long-term cost savings due to better system design and use of natural resources in green schools

Prairie Crossing Charter School constructed a LEED certified building in 2004 with **3% cost premiums**, resulting in **48% energy savings** and **16% water savings.**

Prairie Crossing Charter School

West Brazos is a great example of a green school which was **built for 18% less** than other similar facilities. An increase in student scores of **4% to 7%** in major subject areas occurred.

is greater than those in a traditional school facility.

Finally, some measures increase marketing potential for prospective charter school students and parents. These value adding features include but are not limited to environmentally responsible design, safe indoor environments and proven improvement in student performance.

HOW DOES SUSTAINABILITY FIT INTO THE CHARTER SCHOOL MISSION?

The benefits of green charter schools are supported by hard data. But how do these ideas fit into the current mission of your charter school? How can you begin to integrate sustainable design into the overall school mission?

Typically, charter school missions state the importance of innovative learning and aim to achieve this goal by developing curriculum that involves new teaching methods, emphasizes civic responsibility, promotes student and community involvement, enables effective teaching and demands accountability and discipline. They often focus curriculum on a common subject allowing students to get involved in specific interests or subject matters. Sustainability and general environmental awareness can be a natural fit for charter schools. In fact, many schools have embraced sustainability as an overarching theme for their charter, including: ***Prairie Crossing Charter School***, ***High Tech High School***, ***Pocatello Community Charter School***, ***Gateway High School*** and ***Thurgood Marshall Academy***. All of these schools teach environmental science as one of the core subjects of the curriculum and use their facility as a teaching tool. The Green Charter Schools Network is a resource for emerging green charters to connect and learn from the mission and accomplishments of other schools.

Thurgood Marshall Academy

In 2009 Thurgood Marshall Academy (TMA) built a sustainable gymnasium facility which is shared with a neighbor elementary school. Everyday use of this facility by students allows the building to become a hands-on learning opportunity. TMA students are encouraged to learn about sustainability and to engage in advocacy.

Will a green charter school facilitate learning? Yes!

Turn your facility into another teacher.

Charter schools can provide hands-on learning experiences in environmental science and technology, simply by constructing or renovating their facility using sustainable techniques. At *Prairie Crossing Charter School* students are able to see the rain water collection cisterns which provide constant reminders of the water efficiency system built into the facility. These storage tanks are not hidden, but a part of the overall aesthetic of the building, and allow students to understand the relationship between collected rainwater and the re-use of water in the plumbing systems. The overarching mission of the school is to educate children experientially: through touch, sight and analysis, which complements book study. Environmental sciences provide a lens through which students can explore subjects including but not limited to math, physics, art, meteorology, and horticulture with the green facility adding a practical, real-life dimension to these studies.

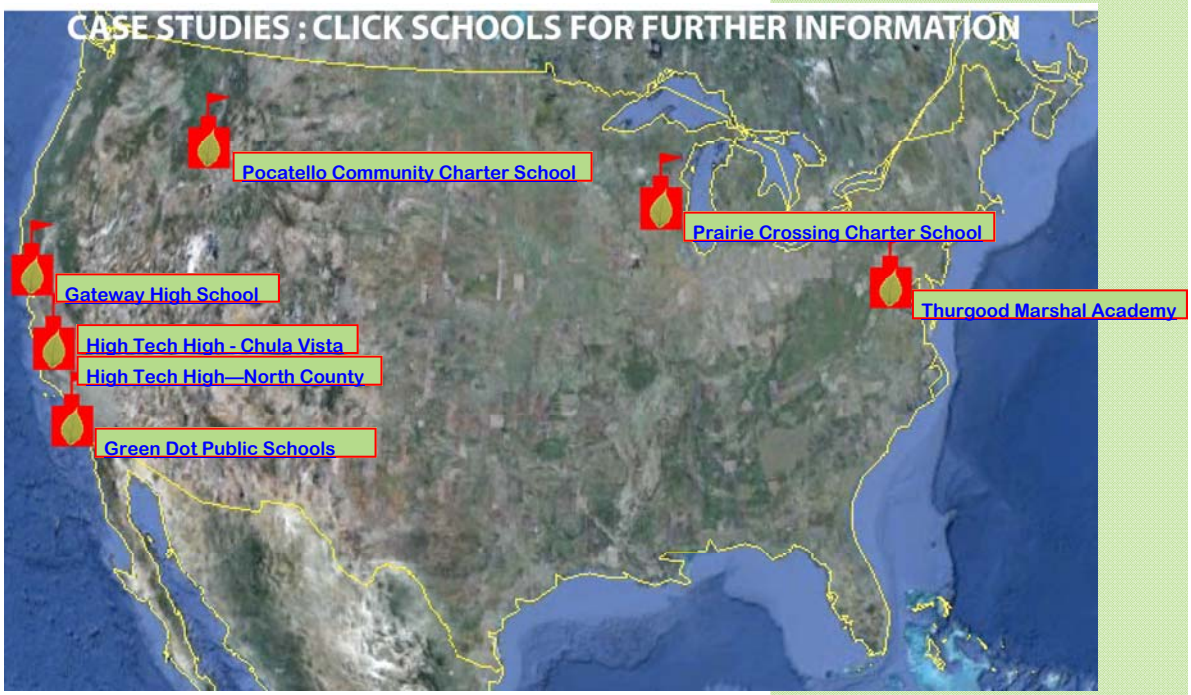
Prairie Crossing Charter School
An exterior storm water collection system is used as a teaching tool for water re-use.

Community involvement and group study are often emphasized in the overall mission of charter schools. Charter schools often extend their hours to include weekend programs and after school programs and clubs, which further increases the need for a healthy and productive indoor environment. Sustainable schools allow students to learn, play and grow in adaptable and safe environments.

Case studies describing existing and emerging green charter schools are included throughout this Guide. These examples can be accessed via the map on the following page.

GET STUDENTS INVOLVED!

To learn more about how one school began implementing sustainable practices into their charter school, read about Green Ambassadors, a project of Environmental Charter High School.



WHAT EXACTLY IS SUSTAINABILITY AND WHAT IS A HIGH PERFORMANCE BUILDING?

These terms are used repeatedly throughout this guide and it is important to understand and discuss them with your team prior to starting the project.

Let's start with *sustainability*. At a basic level, sustainability refers to the most responsible use of natural resources possible. In terms of the built environment, sustainability refers to a structure or material that has the capacity to endure over time.

A *high performance building* is a building with energy, economic, and environmental systems that perform substantially better than their similar counterpart. Strategies to achieve high performing buildings include techniques described in the 'Primary design elements to consider for your charter school' section of this Guide.

Questions to address with your internal team:

- What does sustainability mean to you?
- What other schools provide examples of what you would like to accomplish (*see the case studies throughout this guide in the green sidebar, for a start*)?
- What does becoming a sustainable charter school mean to faculty, staff and parents of your school?
- What portion of the process are you interested in?

OPTIONS UNIQUE TO CHARTER SCHOOLS

An important step in identifying goals for greening your charter school is understanding which strategies are the best fit for your school. A feasibility study can help with this.

Often, charter schools' only options are to utilize existing facilities or shared spaces. Both approaches reduce overall impact on the environment by minimizing construction waste. Setting your charter school within an existing community can also encourage the growth of the surrounding area and provide a stronger sense of community and a collaborative learning environment. As a rule, re-use of existing spaces is the most sustainable option.

Of course sustainable systems can be incorporated in any new construction project and you can also retrofit a building sustainably. The third option includes low-cost, no-construction options that any facility can implement, i.e. waste management programs or the use of low Volatile Organic Compound (VOC) products.

Shared facilities = shared benefits

Charter schools have a unique opportunity to embrace the surrounding community through shared use facilities and programs. Unlike their traditional public school counterparts, charters have some flexibility to create programs and policies to accommodate their goals. Smaller budgets for new facilities or renovations can be augmented by sharing construction costs with other organizations or businesses that will be using the space as well.

Facility questions to consider when determining the scope of work for leasehold projects:

1. Do you lease the whole building or just a portion?

2. What will the lessor allow in terms of renovations?

3. Are there any community organizations that might be interested in partnering and cost sharing?

What is sustainability?

The most responsible use of natural resources possible; a structure or material that has the capacity to endure over time.

CHECK OUT THE FOLLOWING RESOURCES ON CREATIVE USE OF SPACE AND FACILITIES:

Chicago Public Schools Policy Manual: Shared Facility Policy

US Charter Schools—Creative Site Options

Open Architecture Network—Online open source design communication and collaboration tool.

Many sustainable schools have been developed with funding and support from local communities. Engaging with businesses and other schools in the surrounding area is a good way to communicate the sustainable vision of the charter school and open up possibilities for future collaboration and funding sources. Tapping into the knowledge and expertise of parents and friends of the school can open doors to skills from grant-writing to sustainable design.

Underutilized community buildings can be creatively converted by charter schools. Such spaces provide great alternatives to new construction and are an environmentally responsible choice because they take advantage of existing infrastructure. While greening an existing space can be challenging, there are low-cost solutions for leased facilities.

Partnerships can be developed with community organizations that have missions similar to your school or share sustainability goals. Consider partnerships with community organizations, local government, sports and recreation and library programs. School administrators should enter carefully into these agreements and detailed plans for sharing space should consider both building capacity and needs of the student body.

Developing supplementary afterschool programs and student clubs in partnership with external organizations helps students and teachers develop strong social network skills and promotes greater community involvement and civic responsibility.

Pocatello Community Charter School

Pocatello Community Charter School in Idaho is a great example of a school that started out in a building which was not originally intended for a school. Pocatello held a five year lease on a commercial office building space, and was able to accommodate 8 classrooms, administrative offices, a multipurpose space and a library. To read more about the challenges and benefits the charter encountered take a look at this article on the US Charter School's website.

ARTICLE: CONVERSION OF USE

Watch a short AIA video about a charter school which took over an existing laundry facility by clicking here

INTEGRATING SUSTAINABILITY INTO THE BUSINESS PLAN

If it falls within the scope of your project, be sure to include sustainability goals and strategies in your business plan. And, the business plan for a sustainable charter school should incorporate the goal of creating a flexible learning environment. It is important that the sustainability strategies you plan to implement are captured in your initial budget and reflect and support the overall mission of your charter school.

INTEGRATED DESIGN BENEFITS

What is an integrated design approach?

Integrated design calls for collaboration among individual design disciplines in an effort to realize greater efficiency. Sustainable design elements should be integrated into the project from the concept phase. With integrated design, these individual elements can be studied and optimized to work together. For example, by increasing ventilation within a building, the energy required to cool the building may be reduced; increasing daylighting (sunlight) on the south face of a building will reduce heating costs during the winter months.

Applying an integrated design approach will allow for greater overall efficiency of the school facility and provide reduced short-term and long-term cost savings.

Integrating sustainable practices into the charter school business plan

1. Implement sustainable design ideas early.
2. Think long-term goals for long-term savings
3. Strive to create a hands on learning environment
4. Institute a culture of collective responsibility among students and staff.

Examples of Integrated Design Benefits

1. Maximizing daylight results in lower electricity bills.
2. Planting native plants reduces water costs and decreases or eliminates the need for irrigation.
3. Increased natural ventilation can lead to reductions in HVAC costs.
4. Insulated windows usually result in reduction to HVAC system costs and energy savings.

DETERMINING YOUR PROJECT GOALS

Setting quantitative and qualitative goals

Sustainable design and operations goals proposed in the business plan must be set early so your cost estimates are accurate.

Sustainability goals for the facility should be outlined both quantitatively and qualitatively in order to fully describe the program for the charter.

Performance criteria should be clearly outlined with the specific metrics you'd like to achieve. Below are resources and ideas to begin identifying your program criteria:

- Energy design simulation tools: Architects and engineers often have access to these tools, which can be utilized to inform design decisions.
- The Environmental Protection Agency (EPA): Provides a good starting point for building owners.
- Architects and engineers: A good resource for providing thorough data on a specific design or program based on project precedents.
- Graphs demonstrating the consumption of natural resources: A great quantitative data resource which can be created to effectively communicate the benefits of the project on the environment.
- Data indicating positive correlation between the learning/working environment and student and teacher health and productivity: This information can help to generate interest and support for the project.

Gateway High School

Goals can start small

Gateway Charter School in San Francisco started their path to a greener facility with small individual actions. Motivated staff members called for bringing sustainable practices curriculum into the classroom in a hands-on manner. The school began a recycling and composting program. With the help of a local recycling organization the program was introduced to the school at an all school assembly. Educating students about the effects of trash on the environment proved a powerful rallying point. Don't forget: **students are your strongest allies. The student body is the largest population in the school.** You need their buy-in to run any sustainable program. Education is a must. Today, Gateway has managed to reduce their waste from four pick ups of 4-gallon dumpsters to 2 pick ups of 2-gallon dumpsters weekly. They perform weekly waste assessments consistently confirming that the school is diverting 51% of their waste!

DETERMINING YOUR INITIAL CAPITAL BUDGET

An initial capital budget should consist of the sources and uses of funding including sustainable design and construction costs, equipment costs and other related procurement fees. **Making sustainable design choices early in the project can significantly help reduce costs.** Setting performance standards and developing a preliminary budget in the early stages of a project allows charter schools to set an appropriate framework for the overall facility needs. Establishing this baseline cost estimate also allows the charter to communicate effectively with administrators, design professionals and, most importantly, funders of the project.

Putting your program assessment data to work

Now we can begin to utilize the information gathered on your *program assessment* checklist! A program assessment looks at your programmatic needs and ensures that your project is taking the individuals that will be using the space into full consideration. Planning early and engaging the design and construction team in setting initial project goals and developing the scope, intent, quality and level of sustainable design strategies will allow for appropriate budgeting and allocation of funds.

A professional cost estimator hired by the school or architectural team will provide detailed project cost estimates for all phases of your project. Contingencies should be included within the budget to cover unexpected costs whether they are economic (market driven cost increases) or design (project scope) changes. Please note, high contingencies should not necessarily be expected for sustainable design solutions. If you receive an initial budget with exorbitant

Green schools save money in the long-term. How to calculate and determine savings:

1. **Initial / first costs:** Includes all design and construction purchasing costs associated with the new or remodeled facility.

2. **Operation costs:** Operation costs should project all costs associated with running and operating the school building. This includes but is not limited to energy, water, waste, and recycling costs.

3. **Maintenance cost**: The cost of maintaining all equipment and finishes is important to lifecycle costing.

4. **Other benefits**: Additional soft cost savings such as the environmental impact of the building and the impact of the building on individuals should be considered. In order to fully understand the non-monetary benefits, student and teacher attendance as well as student productivity can be considered.

5. **Disposal costs**: In order to come to a total cost of the building systems, the disposal cost or replacement costs from any structures you tear down or drastically alter must be calculated.

contingencies for green building strategies be sure to get more details or a second opinion—estimates that come in on the high end may reflect additional fees from contractors less experienced with sustainable design projects.

In some cases sustainable schools may incur higher design and construction costs up front, but lower operations and maintenance costs long term. The increased initial cost is usually offset or exceeded by long-term cost savings. These factors should also be considered when planning initial budgets and reviewing cost estimates.

For help on allocating project costs, refer to the budget template in the Appendices of this Guide.

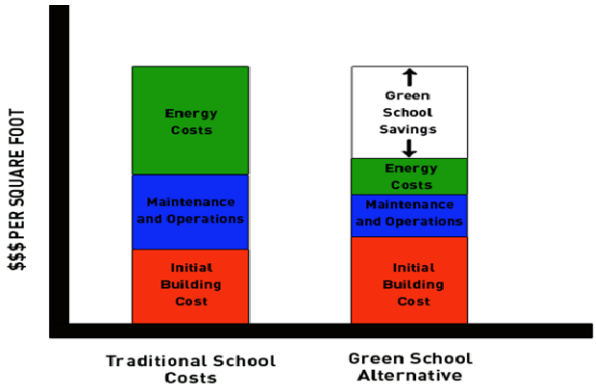
WILL A GREEN CHARTER SCHOOL CONTINUE TO SAVE MONEY? YES!

The long-term cost savings of sustainable charter schools can be measured by assessing the whole building cost over the life of the facility, also called *lifecycle costing*. This *cradle to grave* approach, developed by the *U.S. Environmental Protection Agency* is a method of examining the impact of all building elements throughout the lifecycle of the facility and determining the environmental impacts in order to understand the accumulated costs and benefits. Lifecycle costing can help the design team make educated product selections based on overall environmental and facility cost impact. For example, if a product or system is found to have a very low purchase cost but high maintenance cost and an overall negative impact on the environment upon disposal, other options should be explored. The lifecycle approach also allows schools to analyze the cost and benefit of complex heating and cooling systems vs. alternative power sources, for example.

LOOKING FOR A FEASIBILITY RESOURCE?

The Historic Schools: Renovation vs. Replacement and the Role of a Feasibility Study provides a feasibility study checklist which will help assess the facility or site in question.

Learn more about integrating energy savings into your school. Guide to Financing Energy Smart Schools



GREEN SCHOOLS ENERGY SAVINGS

The above diagram, while not to scale, illustrates the cost savings which could be realized on a green school project.

TIMELINE EXPECTATIONS

Facility design and construction is a process that can take several months to multiple years depending on the project scope, building type and financing needs. A typical project schedule consists of the development of the business plan, identification of goals, assessment and procurement of the site, planning and design, construction and selection of final finishes, furnishings and equipment.

Time and cost can be negatively affected if green building design goals are not addressed early on. The longest phase in building is typically construction. Due to the fast paced nature of the construction phase it is very important that your sustainability goals are clearly integrated in the design of your facility plans prior to construction. These goals should be presented prior to the bidding and negotiation phase in order to accurately estimate costs.

Charter school administrators should educate themselves and their teams about the green design solutions available and, for larger scale projects, consider engaging a professional with sustainable building experience.

Typical project timeline

Remember to keep sustainable design as your overarching theme and incorporate it into every step of the project. Work with professional design teams from the start to ensure you meet your sustainability goals.

- develop business plan
- identify goals
- identify and secure funding
- research possible sites
- perform site assessment
- secure site
- refine goals based on site assessment
- begin planning and design
- obtain permits
- bidding and negotiations to secure contractor
- construction
- final project items (perform a building walk-through)
- select furniture, finishes and equipment (be sure to consider data and phone needs)

EARLY PLANNING

Site selection

Site selection is an important initial phase in the project planning process. Selecting a site based on sustainable criteria as well as a program assessment (see pages 5-8 of this Guide) allows for optimization of the site through evaluation of sun, wind and water needs and availability in relation to the building. It is also important to consider the relationship between your site and the surrounding community. Below are a few items to keep in mind during the site selection process.

- Consider the history of the site. What was there before? Are there negative or positive associations that the community might have with the location you are considering?

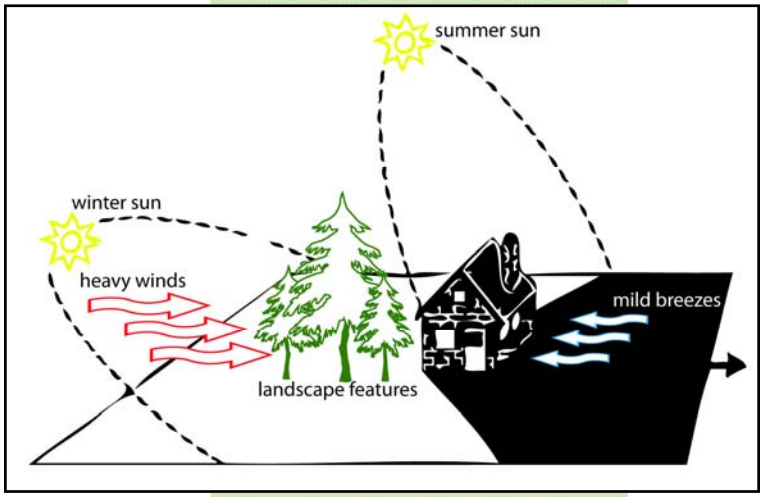
- Your site should have good pedestrian access and access to public transportation. Placement near a residential neighborhood can foster positive community relationships and likely result in improved air quality around the school as residential neighborhoods tend to have less pollutant emitting traffic.

- If the site is contaminated (brownfield, etc.) consider rehabilitating or cleaning the site. There are some incentive and federal assistance programs that might be able to help with this and it is more sustainable to build on a previously developed site than undeveloped land.

- Neighboring structures should be studied to determine any interference they may have with sun and wind harnessing for your site. Adjacent sites should be studied to ensure that tall or large buildings do not block sun or increase noise levels for your site.

Site Planning Strategies

Consider sun angles and wind direction for proper placement of the building and landscaping features.



Questions to get started:

1. **Can materials within the current building be re-used or repurposed?**
2. **Are windows properly insulated?**
3. **Is the building envelope properly sealed from the elements? (Unsealed buildings in cold climates lead to increased utility costs).**
4. **What are the sustainable design features of the current building and what items might be easily re-used or repurposed?**
5. **How does the orientation of the building on the site affect the thermal comfort within the classrooms?**

Rating systems like LEED (Leadership in Energy and Environmental Design (LEED)) for Schools and the CHPS (Collaborative for High Performance Schools) Best Practices Manual outline green site selection criteria in further detail.

Will you need to perform a feasibility study?

A *feasibility study* is generally performed by a member of your architectural team to evaluate the existing site or facility and propose sustainable design solutions specific to your site. Generally, an experienced sustainable design consultant will be able to provide an assessment and recommendations based on past projects and knowledge of current sustainable practices. An expert well versed in greening existing and new facilities is thus an important member to seek out for your project team. **Performing a feasibility study at an early stage to understand your green options will save money.** Outlining appropriate sustainable design procedures is the main goal of a feasibility study and will ensure your building is able to reach maximum efficiency. This approach can also help prevent last minute changes or additions which can greatly inflate your project cost. Rating systems, discussed later in this Guide, can help you determine specific evaluation goals.

A feasibility study of an existing facility should include an assessment of any green design strategies the building already utilizes. Existing landscaping should also be taken into consideration to determine which native plants should be preserved or re-used and the grading of the soil for groundwater management. Evaluation should include a *cost/benefit analysis* of possible sustainable solutions and related long-term cost savings.

For more information on the steps in a typical facility project, reference the Project Process Flow Chart in the appendices.

Tap into the knowledge available to you. Reach out to parents for expertise in fields as varied as design, grant writing, and banking.

DESIGN RESOURCES

AIA—American Institute of Architects Link to registered architects in your area

USGBC—United States Green Building Council Link to LEED Accredited Professionals in your area

Architecture for Humanity Resource for getting design services

Public Architecture 1% solution to connect non-profits with design

NEW CONSTRUCTION vs. RENOVATION

Regardless of the type of facility you occupy or are considering moving into, there are pros and cons to consider.

New construction

Pros:

- Careful site selection can take advantage of optimal solar and wind patterns.
- Building codes can be easily considered for planning future expansion of the facility in another phase.
- Generally, there will be a greater savings of *lifecycle costs* for new construction compared to renovation due to fully integrated systems.
- Re-use of existing building materials on site reduces consumption of raw materials, minimizes the costs and sustainable impact of new construction.

Cons:

- Initial costs of new structures and the embodied energy related to use of raw materials and demolition of existing structures can be greater than renovations or retrofits.

Renovations

Pros:

- If the existing building is structurally sound and if you own the building or have your lessor's approval, renovations to the interior space or *building envelope* provide a more cost effective solution than new construction.
- Limiting use of raw materials in renovations saves money and uses less embodied energy.

Tax incentives for tenant space improvements should be considered as programs and incentives exist in many states and counties. More information on these pro-

Typical Project Team

- **Charter school representative/ owner representative:**
The charter school representative can be a staff member, an architect, or builder who is hired to manage the project on behalf of the owner.

- **Architect:**
The architect should become a part of the project team as soon as possible. He/she should be a registered architect in the state of the construction work, with experience in design and construction of multiple school facilities. The architect should also be familiar with LEED, CHPS, Energy Star and other rating systems, and have a portfolio of sustainable design school projects. You can get recommendations from other charter schools or from the local chapter of the American Institute of Architects.

- **Engineer:**
Engineer should also be registered and have past project experience in energy efficient school building design.

- **General Contractor:**
The contractor will be responsible for coordinating all construction work on site and hiring all subcontractors (plumber, electrician, etc.). He/she should be licensed in the state of the construction work. It is important to hire a contractor with past sustainable design project experience. Contractors without experience in green design may increase bid prices or include contingencies based on lack of experience.

- **Consultants:**
Consultants may be required on more complex projects, and can include a structural engineer, acoustical consultant, sustainable design consultant, commissioning agent, landscape architect, etc.

grams as well as low cost energy and utility saving solutions that do not involve construction are discussed later in this Guide.

Cons:

- Leased charter schools seeking sustainability solutions may face limitations on the extent of renovations they are able to perform as all changes must be approved by the building owner.
- Upgrading mechanical systems to meet energy codes and provide better indoor air quality can be difficult and expensive to integrate into an existing building.

PRIMARY DESIGN ELEMENTS TO CONSIDER FOR YOUR CHARTER SCHOOL

Commonly used sustainability design strategies include: **maximize daylighting, indoor air quality, environmentally safe materials, energy efficiency, alternate energy sources, water efficiency, and waste management**. Most of these strategies can be considered for both large and small scale projects. While consulting with a sustainable design professional is recommended, this portion of the guide will provide a broad overview which will help you understand your options during any future consultation. Review your goals list on the project assessment checklist to see which strategies your charter school might want to explore.

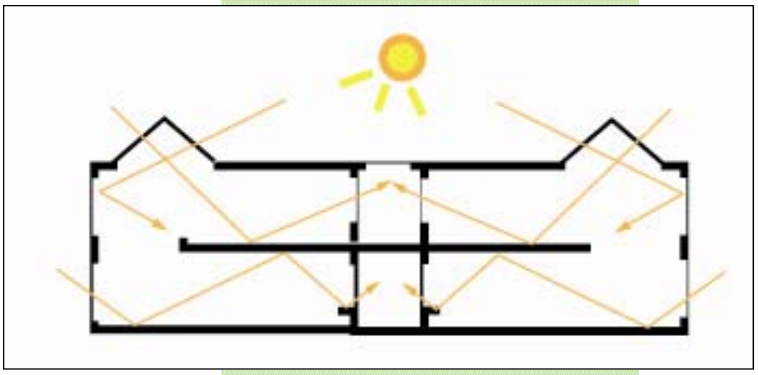
Maximize Daylighting

Incorporate daylighting

Although this may seem basic, it is often overlooked. Daylighting is a method which allows the outside environment

Primary design elements for green schools

- maximize daylighting
- indoor air quality
- environmentally safe materials
- energy efficiency
- alternate energy sources
- water efficiency
- waste management



……students exposed to more daylight show a 21% increase in performance when compared with students exposed to the least amount of natural light.

to interact with the interior environment of your school. Facilities that use daylighting strategies provide natural light-related health benefits as well as reduced energy costs.

What are the benefits of daylighting in schools?

A daylighting and productivity study published by the Heschong-Mahone group in 1999 indicated that **student performance and concentration levels show great improvement when natural light enters the classroom.** Further research has validated the results of the previous study showing that students exposed to more daylight show a 21% increase in performance when compared with students exposed to the least amount of natural light.

How to achieve maximum daylight

Daylighting can be maximized throughout interior spaces of your school by use of *clerestory windows*, skylights, light wells and reflective surfaces. The orientation of your building is important to consider when designing a properly day-lit space to ensure you get the maximum amount of available natural light. Indirect lighting should be utilized when possible to reduce glare on computer screens and teaching surfaces. Orienting large areas of glazing on the north side of a classroom space and adding overhead skylights helps provide indirect light. Skylights allow light to reflect on interior surfaces providing general illumination of the interior space. South facing windows can be designed to provide shading and block direct sunlight. Shading devices are discussed later in this section. In all cases, orientation of the teaching area and student desks should be parallel to the glazing system to ensure the least amount of glare on teaching surfaces. Integration of mechanical systems with the daylighting design plan maximizes energy savings for a

High Tech High School
Chula Vista

Clerestory **windows allowing light into interior corridor spaces and interior windows allowing further sharing of daylight into administrative spaces.**

school building.

Shading devices

Installation of shading devices is an example of a low-cost/ small-scale daylighting technique. Blinds allow for user control of the amount of sunlight and heat entering the building. Exterior shades can be mounted vertically or horizontally. Vertical shades (mounted high on the window wall) provide a way to control the sunlight in summer and winter months. Vertical fins or shades allow you to adjust light entering your space based on the location of the sun. Summer heat can be blocked by blinds in warmer climates allowing for low cost temperature control. Horizontal shades block direct heat from high summer sun while still allowing daylight. Working with a knowledgeable architect can help you optimize daylighting strategies for your facility.

Schools with sick building syndrome (very poor indoor air quality) have **greater rates of absence** for both teachers and students resulting in loss of productivity. **Better performance has been linked to good indoor air quality.**

High Tech High School, Chula Vista
Exterior overhangs control sunlight and heat entering the building and allow daylight to enter.

Lighting control devices

Lighting control devices allow for automatic energy savings using available daylight. According to the *Energy Information Administration (EIA),* 72% of all energy costs in educational facilities are electrical, of which more than 50% go towards lighting. Automatic lighting controls can reduce costs over time by reading the lighting levels in the room and controlling the output of electrical light based on level of daylight. Automatic lighting controls can be considered for larger scale projects. Smaller scale projects can investigate the use of light sensor switches which sense movement within a room to turn lights on and off as needed. Light sensors are a lower cost option for energy savings.

Other types of controls allow the user to switch off all lights within a space or only one set of lights closer to the day-lit

Prairie Crossing Charter School
Ample daylighting in classrooms improves the quality of the indoor environment.

areas of the room. Controllability, from a user standpoint, can be useful for teaching and presentation purposes, as well as saving money.

Light shelves

Light shelves are essentially horizontal shades on the interior surface of a window wall. They allow low winter sun to enter the building, providing indirect light.

Green interior finishes

Providing light colored walls and surfaces and considering light reflection properties of individual paint colors can maximize benefits of natural daylight and minimize the need for electric lighting. Using low Volatile Organic Compound (VOC) paint can help maintain good indoor air quality.

Improve indoor air quality

Asthma is the primary cause for poor attendance in grades K- 12 and is said to be the fastest growing chronic disease in America. Schools with *sick building syndrome* (very poor indoor air quality) have greater rates of absence for both teachers and students resulting in loss of productivity. Good performance has been linked to good indoor air quality and directly correlates with a better learning environment for students and a better working environment for teachers and staff.

Good *indoor air quality (IAQ)* design minimizes the potential of problems with atmospheric issues that outdoor pollutants, indoor pollutants, building materials, molds and bacteria present. Methods of cross ventilation and stack ventilation help insure good air quality. Proper moisture control measures should be factored into the building design to preventatively address bacteria and mold growth.

Ventilation

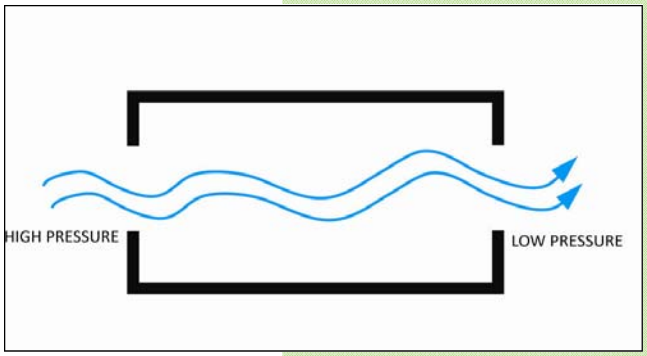
Natural ventilation is a passive design technique that can greatly reduce loads for heating and cooling systems,

Green schools save money in the long term. **Green strategies should be integrated throughout the project and involve all material and systems selections.** **The costs attributed to green design should not be one piece of the pie, but rather part of an integrated design goal.**

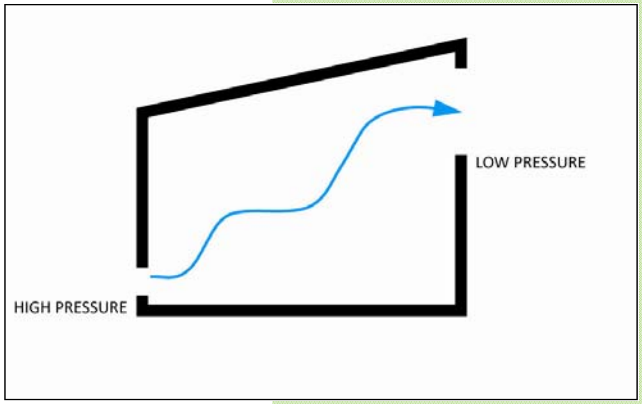
LTC (long term costs) and the compact fluorescent light bulb (CFL)

Spend more initially upfront to install CFL light bulbs and reduce the cost of replacing bulbs over time. CFL's use 65% less electricity and last 10 times longer with a savings of $88 over the life of the bulb . Thus, the higher initial cost is 'paid' for over the lifecycle of the product.

reducing operation costs for the building. Cross ventilation and stack ventilation are the main methods of ensuring proper airflow. Cross ventilation utilizes the outdoor wind pressure to draw fresh air into the building on one end and push it out the opposite end, continuously cycling fresh air through the building. Stack ventilation uses a similar method, however, ventilation is achieved by means of convection. Openings at the base of the building draw fresh air in, while stagnant hot air indoor rises, causing the air to cycle out of the building at a higher point. The continuous motion of air entering low and exiting high due to pressure changes in the building allow air to exchange at a constant rate in stack ventilation.



Cross ventilation



Stack ventilation

Low VOC emitting materials

Building materials including carpet, paint, surfaces and linoleum, and the cleaning products used to maintain them, can greatly affect the quality of indoor air in your school. The use of low VOC products can help ensure good indoor air quality.

VOC's are gases emitted from materials including paint, finishes, adhesives, and furniture. Some everyday cleaning products also contain VOC's. Use of these substances can irritate health conditions and develop into chronic health issues over time. A proper *operations and management program* or green cleaning program should recommend the use of low VOC products.

Introduction to environmentally safe materials

Whether your charter is considering building a new school or renovating a leased space there are many design decisions

for the finishes and furniture within the space which can help ensure you provide an environmentally safe learning environment. Using rapidly renewable materials (explained below), low VOC non-toxic products, and locally sourced materials are methods to achieve this. Consult with your architect about locally sourced materials that meet these requirements.

Rapidly Renewable Materials

Rapidly renewable materials are materials that can be grown and harvested within a short amount of time. Materials like **bamboo, cork, plywood, linoleum, hemp,** and **wool** are examples of rapidly renewable materials. In addition to being environmentally friendly, products like cork provide acoustic benefits and are considered a durable and resilient surface.

Locally sourced materials

You may want to consider where your materials are coming from. Locally sourced materials are products made and shipped from a local area (usually within a 500 mile radius of the project site). Using locally available materials lessens the overall environmental impact of your project.

Recycled and recyclable materials

Talk to your designers about using products that contain recycled materials or can be easily re-used or recycled after use. Items such as resilient flooring, carpet and concrete to name a few can contain recycled content or even be recycled. This is another method of reducing waste and building green.

LEARN MORE ABOUT LOW VOC MATERIALS AVAILABLE ON THE MARKET TODAY

http://www.healthybuilding.net/healthcare/Low-VOC-Paint-Listing.pdf

Prairie Crossing Charter School
Bamboo floors: bamboo is a renewable material that can be an elegant and cost effective design solution.

Energy efficiency: a cost / benefit approach to lowering your utility bill.

Energy conservation is one of the easiest ways to lower your everyday operating costs. Ten to 20% of the total energy consumed in the average school is directly related to the

inefficiency of the building envelope. Integrating sustainable design elements into the exterior shell of your building should be a priority.

Materials re-use / recycle diagram: bricks from an existing structure can be repurposed for other uses

Proper insulation of the building envelope, including exterior and interior partition insulation, double paned glass and inspection of existing building leaks, is very important for both existing buildings and new construction. Frequently, seals between windows and walls need repair and are major sources of energy loss in existing structures. Improved comfort, reduced heat loss and reduction in size and cost of *HVAC* systems can be achieved by efficient building envelopes.

The design of new buildings should always include a well-insulated building envelope, insulated exterior walls and fully sealed enclosures. These are considered *no cost methods* of providing your school with greater efficiency as they are integrated into the design and won't require maintenance. A no cost method of reducing electrical costs is to use light colored wall and surface finishes and natural daylighting to reduce the amount of artificial light necessary. Light colored exterior surfaces will also help lower heat gain. As soon as basic principles of energy efficiency are integrated into the operation of the school, further systems and controls can be considered.

HVAC (heating, ventilation and air conditioning) system

An efficiently designed *HVAC* system will also help with energy conservation and cost savings. *Passive design* techniques will reduce loads on the overall building system.

Alternative energy sources

Alternative energy sources are free, clean and renewable

Speak to your local utility companies, waste contracting management companies and businesses about your green goals!

Get help to properly educate your staff on recycling and compost programs as well as use of solar and wind systems. Involve teachers and students in the process.

sources of energy (think sun, wind, and earth) which do not negatively impact the environment. Use of alternative energy sources decreases carbon emissions and makes you less dependent on finite and polluting resources like coal, gas and oil. While implementation costs may be high, lifecycle costs are low and worth investigating. Alternative sources of energy also provide great hands-on learning opportunities for students.

Solar power

Schools operate mainly during the day, which makes solar power a natural fit as an alternative source of energy. Individual solar cells capture sunlight and convert it to electricity for direct use within the school building. A central computer system can track total energy harnessed, and can be shared with students to complement curriculum or extracurricular studies of environmental technologies and sciences.

Wind power

Wind power can be harnessed by wind turbines which collect energy from the wind through rotating blades. Wind power can also be monitored, tracked by a central system and shared with students and teachers. Using solar and wind power reduces the overall load of the facility on the community energy grid and reduces energy costs for the school. Some utilities companies provide financial incentives for contributing power to the grid.

Power purchase agreements

Administrators should contact local energy and utility companies and ask about available lease programs for alterna-

10%-20% of the total energy consumed in the average school is directly related to the inefficiency of the building envelope.

Amino Pat Brown Charter School
Interior corridor with exposed heating, cooling and ventilation ductwork.

tive energy systems. Many schools have been able to secure equipment from a local utility company or manufacturer. For example, Pocatello Community Charter School in Idaho installed a wind turbine while Gateway Charter School installed a solar panels, with help from local companies. Power purchase agreements allow schools to work with local utility companies in acquiring energy source equipment at affordable costs.

Greywater systems and water re-use

Greywater refers to all untreated water produced by your building not been used for waste management (toilets, kitchen sinks, or related functions). Water from non–kitchen sinks and rainwater can be collected daily and used without treatment for flushing toilets, or filtered and used for subsurface irrigation. All unused water can be diverted to your sewage system on a daily basis. Though greywater collection systems can have high initial costs, life-cycle savings often balance initial costs over time. Re-use of water from rainfall, commonly known as stormwater re-use, is a great method of saving water and water usage costs. Water can be collected for uses such as irrigation, landscaping and flushing of plumbing fixtures.

North Oakland Community Charter School (NOCCS)

NOCCS has partnered with a private company (NetJets) to rent solar panels on the roof of their facility for $1.00 per year. The school is currently realizing significant cost savings from the power generated by the solar panels which helps offset electrical costs. NOCCS is then able to use these statistics as a marketing tool by stating that the panels provide enough energy to offset costs of running the facility on a typical school day. These funds can then be allocated to other areas of the facility. To learn more about the green initiatives of NOCCS, please visit their project profile on the Green Schools Initiative website by clicking here.

Pocatello Community Charter School

Students learning about the wind turbine installation at their school through the Wind For Schools Program sponsored by Wind Powering America.

Waste management

Proper collection of building waste throughout the school is a method by which all charter schools can inexpensively reduce costs and protect the environment. Teaching students and staff to recycle, compost and separate waste appropriately can save on waste management and hauling costs throughout the year.

Gateway High School

Gateway High School in San Francisco worked with their local energy company, Pacific Gas & Electric (PG&E), to secure a grant for a solar panel installation. PG&E will be monitoring the energy savings for the school over the period of two years. In the meantime, the students learn about solar energy power by the physical presence of the panel and by the data readings from the central computer.

In addition, the school used some of the solar panels to build a 'solar snack shack' where students can sell smoothies and snacks. The power from the solar panels are diverted to a battery which then powers all of the electrical equipment needed for the snack shack.

BUILDING COMMISSIONING

What is building commissioning?

Building commissioning is a method of confirming the initial goals of the project and ensuring that individual building systems perform at optimal efficiency. If desired, building commissioning should be implemented throughout the design process and verified post construction. Commissioning agents are usually third party consultants and are generally hired directly by the owner to coordinate with all project design and construction phases. Though a higher fee might result from the additional time it takes architects and engineers to coordinate with your building commissioner on an ongoing basis, commissioning can provide cost savings in the long run. Building commissioning is not a general code requirement, however various green building rating systems may either require commissioning, or provide additional points towards a project which utilizes building commissioning.

How can charter schools benefit from building commissioning?

Optimal building performance not only ensures that all systems are running together properly and performing per the original design, but also takes system failure and equipment replacement into consideration. *Operations and maintenance* programs should be developed regardless of whether you hire a building commissioner to ensure consistent and appropriate maintenance of all systems. Taking preventive action to ensure that your facility is running as efficiently as possible will help you avoid costly mistakes. While the building commissioning process can help achieve that goal, it is not your only option.

Thurgood Marshall Academy in Washington, DC **has beautifully integrated environmental design and green living into its mission. The school's mission is to provide all students with access to a first-class education. Law-related curriculum combined with youth development programs (like a student run green club) teach sustainable living and civic responsibility.**

Can you employ commissioning services on an existing building? What are the benefits?

Yes. Building commissioning for an existing facility is a process of evaluation of the existing facility and explores the integration of non-intensive or low-cost solutions, while continually monitoring performance. The terms re-commissioning or retro-commissioning are often used when describing existing facility commissioning. The benefits are similar to those of new building commissioning. Operations and maintenance needs are assessed and appropriate training is provided, ensuring a longer lifecycle of the facility's products and systems.

RATING SYSTEMS

What are rating systems and what are some benefits of rating systems?

There are several green design rating systems that can be helpful when approaching sustainable design and construction projects. Rating systems provide qualitative and quantitative benchmarks for energy savings. These standards often also provide recognition for your project and the project team after completion, sharing knowledge and strategies with the surrounding community. The *EPA*, *USGBC*, and the *Collaborative for High Performance Schools (CHPS)*, are three organizations which provide rating systems that are a good starting point for standardizing and formalizing sustainable design approaches. Schools should evaluate all rating programs, based on financial and programmatic criteria, to decide which tools will augment and advance the proposed scope of work.

The definition of a green school can differ from one charter to another. Every charter school must set its own sustainability goals based on budget, facility and mission. It is most important to develop goals which support your initial business plan and that can be expanded over time.

Administrators should seek professional guidance from their project architects or engineers regarding certifications available and cost and time implications for each program. Several cities are now mandating that public building structures meet certain sustainable criteria or achieve specific certification, such as LEED certification.

Make sure you are familiar with local codes and incentives—many states offer incentive programs for certified projects or projects that incorporate measurable sustainable design strategies. Incentives can be in the form of tax credits, tax breaks, lower fees, and expedited permitting processes. School administrators should check with local building departments about such programs before beginning project planning.

LEED certification

The LEED (*Leadership in Energy and Environmental Design (LEED)*) rating system is an internationally recognized green building certification system, providing third-party verification that a building or community was designed, built or is operating using strategies aimed at improving performance across all the metrics that matter most: energy savings, water efficiency, CO_2 emissions reduction, improved indoor environmental quality, and stewardship of resources and sensitivity to their impacts.

Developed by the U.S. Green Building Council (USGBC), a 501c(3) non-profit organization, LEED provides building owners and operators a concise framework for identifying and implementing practical and measurable green building design, construction, operations and maintenance solutions.

Schools can be certified under the LEED for Schools or the LEED for Existing Buildings: Operations & Maintenance rating systems. Non-academic school buildings, such as free-standing gymnasiums or performance spaces, should

Prairie Crossing Charter School

Prairie Crossing Charter School in Grayslake, Illinois is an example of a **LEED Gold** certified school. This school has implemented many sustainable building strategies including daylighting, storm water re-use, site appropriate landscaping and energy saving lighting. The LEED Gold status becomes a symbol to teach the surrounding community, teachers, parents, and students, about the energy and cost saving technologies implemented into the traditional school building model.

Prairie Crossing Charter School LEED Gold Plaque

use LEED for New Construction or LEED for Existing Buildings: O&M.

The LEED for Schools rating system recognizes the unique nature of the design and construction of K-12 schools. LEED for Schools addresses issues such as classroom acoustics, master planning, mold prevention and environmental site assessment.

LEED for Existing Buildings: O&M addresses the sustainable ongoing operations of existing facilities that are not undergoing major renovations. The rating system provides an outline for buildings to use less energy, water, and natural resources, as well as improve indoor environments and uncover operating inefficiencies.

By addressing the unique characteristics of school spaces and children's health issues, LEED for Schools provides a comprehensive tool for schools that wish to build green, with measurable results. LEED for Schools is the recognized third-party benchmark for high-performance schools that are healthy for students, comfortable for teachers, and cost-effective.

The cost to register and certify a LEED project is based on the project's square footage. This process provides a comprehensive third-party review of the energy and environmental performance of the school and ensures that goals are met. For a 100,000 square foot school, LEED for Existing Buildings: O&M registration and certification fees are less than $4,000. Prices are established by the Green Building Certification Institute. For complete pricing information, visit www.gbci.org.

LEED CERTIFIED CHARTER SCHOOLS

1. **Green Dot Charter School, Los Angeles, California**

2. **Savoy Elementary** *(a shared gym facility with Thurgood Marshall Academy)*, **Washington D.C.**

3. **Prairie Crossing Charter School in Grayslake, Illinois**

4. **High Tech High School, Chula Vista, California**

High Tech High, North County
Sustainable charter school building under construction

CHPS Certification

CHPS takes a geographic approach to its high performance school rating system, the CHPS Criteria. The CHPS Criteria sets a national high performance common denominator while preserving local flexibility. The priorities under the CHPS Criteria are 1) protecting student and staff health and enhancing the learning environment, 2) conserving energy, water and other resources thereby reducing operating costs, and 3) minimizing waste, pollution, and environmental degradation. Regional CHPS Criteria cover eleven states including California, Colorado, Massachusetts, New York, Texas, Washington, and the Northeast states of Connecticut, Maine, New Hampshire, Rhode Island, and Vermont. The CHPS Criteria encourages integrated design and addresses operations early in the process. The CHPS Criteria is specifically tailored for new schools, new buildings on existing campuses, additions, major modernizations and renovations, and minor renovations.

Modernization and renovation projects are particularly well-suited to using the CHPS Criteria as it employs a systems approach to the major building systems – HVAC, lighting, envelope, and interior finishes.

CHPS offers two recognition options – CHPS Verified or CHPS Designed for new construction or renovation projects. CHPS Verified is an independent review of the project involving CHPS and an assigned third-party consultant, the charter school, and their design team. Recognition for this program entails registration, setting up an individual project web page, completion of a score card to document progress with CHPS Criteria, conducting a design review, conducting a construction review, and recognition for projects that exceed the minimum thresholds. CHPS Verified is currently offered in California, Colorado, Massachusetts, and Texas. CHPS Designed is the original green, high performance schools rating system and is self-certified by the charter school and

CHPS REGISTERED CHARTER SCHOOLS

1. High Tech High
2. Escondido Charter School

LEARN MORE ABOUT THE COLLABORATIVE FOR HIGH PERFORMANCE SCHOOLS

CHPS Operations Report Card—a program which will provide a benchmark for existing school facilities and provide suggestions for improvement

Best Practices Manuals
Manuals on high performance school design, construction and operations

According to the US. EPA, top performing Energy Star labeled schools cost forty cents per square foot less to operate than the average performers .

their design team. A comprehensive list of all schools with CHPS recognition or in process of recognition can be found online.

Energy Star

The U.S. Energy Protection Agency (EPA) offers recognition to facilities which focus on **energy savings and efficiency of energy systems**. This rating system, called Energy Star, is a label awarded to buildings that consume roughly 35% less energy than a similar building in the same general area. The Energy Star program offers free resources, an online database for tracking energy savings and technical assistance. A list of all school facilities with the Energy Star Label can be found on the EPA's website.

OPERATIONS AND MAINTENANCE (O&M) OF A SUSTAINABLE SCHOOL

Many schools fall short of performance standards when it comes to the operations and maintenance of the building. Maintenance systems directly affect the longevity of building systems and structure and overall indoor air quality *(IAQ)*. For example, utilizing products with high off gassing (off gassing refers to emission of potentially harmful fumes) takes away from a well designed ventilation systems.

Similarly, heating and cooling systems, including ductwork, when not well maintained per manufacturers instructions will not only lead to poor indoor air quality but also shorten the lifespan of the equipment. Weekly and monthly cleaning schedules should be reviewed for carpet and other surface finishes to ensure that they can be kept free of dust and other pollutants.

Providing floor mats at all entry points to the building can greatly reduce outdoor pollutants inside the building. **Problems with indoor air quality can**

Operations and maintenance goals:

1. Routine inspection and maintenance of building equipment and systems including heating, air conditioning and ventilation will increase efficiency over time.
2. Be sure your cleaning standards include guidelines for environmentally safe products and handling, and disposal of chemicals.
3. Consider implementing a waste management program for food waste. Reduction of trash can be achieved through recycling and compost programs.
4. Make sure you have strategies in place for safe handling and disposal of lab chemicals.
5. Replace out of date, inefficient lighting or heating systems with newer, more efficient models.
6. Act immediately in the event of any liquid or food spills to prevent growth of mold and insect infestations.
7. Develop guidelines for maintenance and repairs to the facility, setting standards for construction materials, equipment, furniture, carpet, etc.
8. Maintain proper ventilation during construction period; construction work should be organized to keep learning areas as free of dust and debris as possible.
9. Replace ventilation ducts regularly (per manufacturer instruction) to reduce energy costs and increase air quality.

be prevented by planning and executing a proper maintenance plan. Schools looking to complete a *retrofit* project in an existing space should conduct a full systems and efficiency report prior to the start of the project to ensure that there is proper focus on building elements that might negatively impact building efficiency.

Green cleaning procedures are prerequisites for some of the rating/certification systems discussed previously. Guidelines for green cleaning products and suggested standards and operations for effective cleaning of equipment and finishes provide a starting point for setting sustainable maintenance and operations procedures.

The Best Practices Manual, Volume IV, on maintenance and operations published by the Collaborative for High Performance Schools (CHPS) takes an in-depth look at school facility management highlighting **building infrastructure, energy use, electrical, plumbing, waste management, green cleaning and landscape**.

USGBC has developed a Green Existing Schools Toolkit for schools with green goals that aren't building new facilities. Included in the toolkit are the *Green Existing Schools Project Management Guide* and a *Green Existing Schools Implementation Workbook*. The *Project Management Guide* is designed to help schools launch and implement an initiative to green their existing facilities, with the goal of achieving LEED for Existing Buildings: Operations & Maintenance certification. It outlines the entire process, from ways to make the case for going green to how to promote success. The *Guide* will give school leaders the necessary tools and resources to operate and maintain schools that are healthy for students, comfortable for teachers, and cost-effective. The *Guide* is available for free download on USGBC's website.

Operations and maintenance should be areas of focus throughout your green charter school facility plan.

RESOURCES: O & M

LEED for Existing Buildings: Operations and Maintenance Rating System

EPA: cleaning and maintenance

Now that the goals are set for your green charter school project, **where do you go to get funding?** In most ways, the process for funding a sustainable school is no different than the process for funding any other charter facility. The original *Answer Key* is a comprehensive resource designed to help you understand and manage the financing process. Now is a good time to review that document as a place to start developing your funding plan.

Fortunately, additional sources of public and private funds are available for green projects, and incentive programs like rebates and credits are there if you know where to look. Debt financing should be considered with special emphasis on lenders who understand how to evaluate green buildings, including lifecycle costing and appraisal of green facilities.

GRANTS AND OTHER DIRECT FUNDING

Grants and other direct funding from federal, state, utility, and non-profit resources can help lower the overall cost of a charter school facility project. To write a successful grant, specific goals must be outlined, so it is important that your project plan is clearly defined. A well described business plan, mission statement and list of project goals is a good start to a successful grant application. The following are federal sources of support for green facilities:

Amino Pat Brown Charter School

- The U.S. Treasury department has established a grant program that allows schools to receive up to 30% of their property value for use towards implementing renewable energy technologies.
- Federal Emergency Management Agency (FEMA) - http://www.fema.gov/government/grant/index.shtm

"By using a roadmap derived from a lenders' perspective on your green buildings, you can structure a positive, fact-based dialogue that elevates you and your project above the many other loan applications the lender may be receiving."

-Galley Eco Capital "present your green project to your lender" December 2008 article

- USDA Rural Development Community Facilities Program (http://www.rurdev.usda.gov/recd_map.html)

- US Department of Energy maintains a database of financing resources by region and state (http://www.eere.energy.gov/buildings/energysmartschools/finance_resources.html)

Many states offer incentive programs for certified projects or projects that incorporate measurable sustainable design strategies. Incentives can be in the form of tax credits, tax breaks, lower fees, and expedited permitting processes. States may also offer both grants and post-implementation rebates for energy efficient investments. Here are a few state-specific examples:

- California – Proposition 1D – High Performance Incentive Grant (http://www.opsc.dgs.ca.gov/Programs/SFProgams/High+Performance+Incentive+Grant.htm)

- Massachusetts – MTC Renewable Energy Trust offers grants (http://masstech.org/renewableenergy/index.html) ; MA School Building Authority (http://massschoolbuildings.org/) provides up to a 2% reimbursement on total project costs for schools certified as MA High Performance Green Schools.

- Vermont – Efficiency Vermont (http://www.efficiencyvermont.com/pages/) and its subcontractor, the School Energy Management Program, offers incentives to schools for improvements related to lighting, HVAC, and cooling systems.

- New Hampshire – New Hampshire Partnership for High Performance Schools (http://nhphps.org/) incentive program allows school districts that design according to specific standards to receive up to 3% reimbursement on total project costs.

What to present to your lender:

- Outline how your project benefits the lender.
- Indicate how the sustainable building strategies and the projected performance impact the costs and risks of your property.
- Create a roadmap that shows metrics that address observable aspects of assets.
- Include an operations and maintenance manual that analyzes cash flow and gives necessary data to calculate the financial risk for the lender.
- Provide full bios of team members, including all applicable certifications. Experienced partners will reduce risk and cost over run for your lender.

Further information on state and federal incentives for renewable energy technologies can be found in the Database of State Incentives for Renewables and Efficiency (DSIRE).

Charter schools should also check with their local utility companies to determine whether certain rebates or credits are offered for the installation of energy efficient equipment or appliances.

TAX CREDITS

The American Tax Recovery and Reinvestment Act of 2009 provide credits which incentivize groups to implement renewable energy systems. Production Tax Credits (PTC) and Investment Tax Credits (ITC) are two such programs. PTC gives back 2.1 cents / kilowatt hour for the first ten years of a project which generates, wind, solar or geothermal energy.

New Markets Tax Credits (NMTC)

New Markets Tax Credits (NMTC) is a federal program administered by the U.S. Department of the Treasury. The program is designed to stimulate investment and development in low-income communities across the U.S. A Community Development Entity (CDE) is a domestic corporation with a track record in development for low-income communities, and is certified to receive allocations of NMTCs. Many Community Development Financial Institutions (CDFIs) -- including those referenced in this Guide -- are certified CDEs. Through CDEs, charter schools can access community facilities loans with very favorable terms. More information on NMTCs -- including a list of those CDEs with a NMTC allocation -- can be found here: http://www.cdfifund.gov/what_we_do/programs_id.asp?programID=5

High Tech High, Chula Vista, California

High Tech High in Chula Vista constructed a 46,700 square foot, two-story facility for 530 high school students. It has been built to LEED for Schools standards, including elements such as solar panels, low-water and low-energy use fixtures, and materials with high recycled content. The school is also used as a tool in the school's curriculum.

DEBT FINANCING

Internal financing, or using the charter school's own cash reserves, is the simplest and most direct method to pay for a new facility or facility improvements. However, most charter schools operate on narrow margins and will not have sufficient excess funds to cover the costs of a facility project. And, typically, grants and other sources of direct funding will be insufficient without additional debt financing to make your sustainable building construction or renovation project possible.

There are several community development organizations that administer lending programs for charter schools in low-income communities and some that even focus specifically on green charter schools. For general information, the National Resource Center on Charter Schools is a good place to start for a general funding program database. Below are a few organizations and programs which provide support for charter schools pursuing sustainable building. Also, remember your local bank may be a good resource for financing your green charter school facility project.

Community Development Financial Institutions (CDFI's)

CDFI's are financial institutions that provide credit and services to foster growth and development in communities not typically served by traditional financial institutions. Here are a few CDFIs that are friendly toward financing green charter schools. Please see the CDFI website for more information www.cdfifund.gov.

Local Initiatives Support Corporation (LISC)

LISC helps promote community development in low income neighborhoods by providing loans, grants and community equity investments. With the support of the Walton foun-

For a free executive summary of the USGBC Paid from Savings guide on external financing and self-financing, visit www.greenschoolbuildings.org

In 2008, LISC partnered with Global Green USA on a pilot program to "green" five charter schools in the Los Angeles area. For more information on the first project in this pilot program. click here

dation, they founded the Educational Facilities Financing Center (EFFC). The EFFC has initiated a national fund for non-profit charter schools through its educational and facilities loan and guarantee fund. For more information on LISC programs for charter schools, visit their online resources page.

Low Income Investment Fund (LIIF)

LIIF provides capital and technical assistance to help low income communities finance and build facilities for education, affordable and supportive housing, child care and other community revitalization programs. Since 1999 LIIF has provided nearly $160 million in capital for charter schools, supporting 43,000 classrooms. LIIF's education program aims to help schools create stable, sustainable learning environments by providing educational organizations with flexible and affordable financing. Recently, LIIF committed $50 million to green buildings in low income communities over the next three years. Read more about LIIF's Green Opportunity (GO) Fund: here.

NCB Capital Impact

For more than 30 years, NCB Capital Impact has been providing innovative financial services and expert technical assistance programs that are sustainable and scalable. Since 1992, the organization has loaned over $430 million to more than 100 charter schools serving nearly 140,000 students. NCB Capital Impact's current Sustainable Charter School Initiative includes a focus on policy, facilities, and financing for sustainable charter schools in addition to the production of The Sustainable Answer Key. For more information about NCB Capital Impact's charter school lending programs, click here.

Nonprofit Finance Fund (NFF)

The vision of Nonprofit Finance Fund (NFF) is of a strong, well-capitalized and durable nonprofit sector that uses capi-

Green Dot Public Schools

To keep up with rapidly growing demand for quality education, Green Dot Public Schools requested $11.8 million to purchase a newly remodeled school facility for its Ánimo Pat Brown Charter School (Pat Brown). The facility includes many environmentally sustainable elements such as water efficiency, energy efficiency, increased ventilation and the use of recycled and certified materials. The facility realizes energy savings of 23% and cost savings of 21% through energy efficient components, including lighting controls and natural lighting in 95%+ of the classrooms. To make the acquisition affordable enough to be a reality, **NCB Capital Impact** stepped in to provide a $4.4 million leverage loan as part of a New Markets Tax Credits (NMTC) transaction. The loan was combined with two $2 million leverage loans each from **LISC** and **NFF** and a $3.6 million equity investment from **US Bancorp** CDC. The tax credits were provided by **ExED**. Pat Brown opened in the fall of 2006.

tal effectively to support the highest aspirations and most generous impulses of people and communities. Since 1980, NFF has made over $175 million in loans to nonprofits in support of over $1 billion in projects. Click here to find out more about NFF's loan offerings: http://www.nonprofitfinancefund.org/details.php?autoID=160

Self-Help

Self-Help is a community development lender and real estate developer that works with individuals, organizations and communities traditionally underserved by conventional markets. Since 1997, Self-Help has loaned over $100 million to 44 charter schools in 11 states. Check out Self-Help's website to learn more about their financing available for charter schools.

The Raza Development Fund, Inc. (RDF)

RDF is a support corporation of the National Council of La Raza, (NCLR) and was established in 1998 as the community development lending arm for NCLR. RDF is committed to providing a full range of financing products to help charter school operators and charter schools and charter school facility developers secure and improve adequate facilities for schools.

For more information, please visit: www.razafund.org

The Reinvestment Fund (TRF)

TRF focuses primarily on the mid-atlantic region of the U.S. TRF also provides financing for energy efficiency improvements which could be a helpful tool for charter schools looking to re-use an existing building. As of September 2009, TRF's charter school lending program has funded 62 charter schools that together educate more than 29,000 students. TRF charter school lending guidelines for such programs can be found on their website, which specifies terms of agreement, uses of funding and further lending and project guidelines.

TRF has financed two green charter schools. For more information on the LAMB school in Washington D.C. and City Neighbors in Baltimore, MD. Click here

Finally, charter schools may want to consider **special leasing arrangements** or energy savings performance contracts (e.g. power purchasing agreements). These arrangements are made with a third party that may own the equipment and/or designs, installs, and guarantees a certain level of performance. These arrangements can be complex and charter schools should consider working with a knowledgeable attorney to negotiate on their behalf.

GET INVOLVED

Do you want to help advocate for charter school policies and practices for healthy schools?

Check out the Healthy Schools Campaign

Do you want to foster the growth of the green economy and learn more about organizations which support people from diverse backgrounds to provide information on healthy living and communities?

Click below to find out more about Green For All and Green Power

Conclusion

This document is intended to be a living resource for sustainable school design and implementation. We would love to hear your feedback—lessons learned, case studies, questions or comments so that we can continue to update sections throughout the Guide. Please send us your thoughts regarding sustainable charter schools:

www.ncbcapitalimpact.org/SustainableCharterSchools

We hope this guide has provided insight on how to green your charter school. The following pages contain additional resources including detailed case studies, resources and a glossary of terms relating to sustainable school design.

Gateway High School, San Francisco, CA

GENERAL INFORMATION

Project location: San Francisco, CA

Mission statement: Gateway High School is a model college preparatory charter school committed to academic excellence through personalized, student-centered learning. Gateway combines a rigorous academic program with an approach where the individual talents and strengths of its students are identified and supported. Gateway seeks and supports students who have ambition, who are committed to working hard, and who are eager to share responsibility for their own learning. Working with teachers committed to its mission, Gateway students will acquire the skills, habits, and knowledge necessary for academic and personal success in college and in adult life.

SCHOOL STATISTICS

Student population: For 2009-2010

Total: 451

Grades taught: 9-12

Student / Teacher ratio: 12 to 1

Student performance: In 2007 Gateway was again named a California Distinguished School. Gateway has held this designation consistently since it first became eligible for consideration in 2003. Each year only 2% of California public schools receive the Distinguished School designation. Gateway is the first charter high school in the state to receive this distinction two times.

SCHOOL INVOLVEMENT WITH GREEN DESIGN

School recycling program: There is a program implemented school wide. The school partnered with the local waste management company to introduce a composting and recycling program to the students and staff

Sustainable design education program: The school has a Green Team that allows students to partake in daily activities which help to reduce the negative impact on the environment

Environmental Sciences curriculum fully embraces the green school mission. Students have many related projects throughout the year and also care for plants and other eco-environments.

Community partnerships PG&E recently awarded the school with a free standing solar panel installation as a pilot study for the school. The project will be monitored by PG&E for one year. If the program is successful, they will pursue additional panels for installation on the roof of the building.

Plants donated from San Francisco Park and Recreation for the front and side of building; student Green Team takes care of these plants.

University of San Francisco Pediatrics Resident Program works with the students for the upkeep and development of the vegetable garden. Residents teach students about nutrition. Some funding was given by USF PRP for this project.

FINANCIALS

Grants received:

Gateway High School has been awarded 4 grants totaling approximately $50,000 in the past 8 years for various 'green' upgrades, including solar panels, outdoor gardens and a recycling program. A teacher on staff has experience in grant writing

OTHER INFORMATION

Facility information:

The current facility is shared with a KIPP charter school and has been in leasehold since 2005.

School-wide programs and projects:

Trash/compost/recycle bins throughout facility with clear labeling in all areas.

Shredded paper goes directly in paper bags as requested by the city recycling plant. This reduces shredded paper litter throughout the city during pick up and drop off of paper.

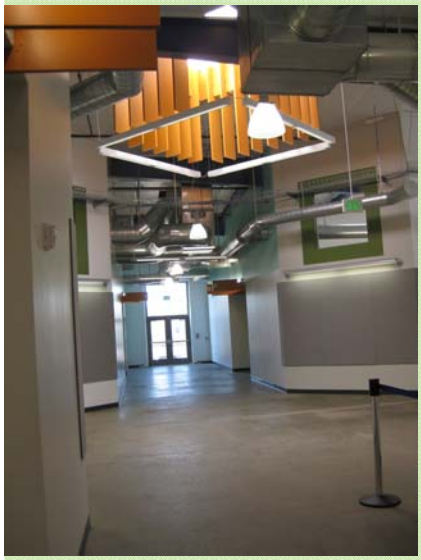
All power strips and equipment is unplugged during vacation times and school holidays.

The school attempts to use all post consumer products for office use (files, folders etc).

Drip irrigation has been installed at the front of the building to feed the planting beds. Plants were specifically chosen to fit the native climate. Drip irrigation allows for control of the water and reduction of water use.

The little solar house is a project built by parents and students using a grant.

Green Dot Public Charter Schools, Los Angeles, CA



GENERAL INFORMATION

Project location: Los Angeles, California

Green Dot Public Schools (GDPS) is a Los Angeles, nonprofit charter school organization (CMO) working in a community where, as recently as ten years ago, high schools were failing to graduate more than 50% of their students, let alone prepare those who made it through for college. The vast majority of students failing out of the system were children from low income families.

Today, GDPS successfully manages 19 high schools and serves more than 7,500 students throughout high-needs communities in Los Angeles, making it the largest operating CMO in the area.

To keep up with rapidly growing demand for quality education, GDPS requested $11.8 million to purchase a newly remodeled school facility for its Ánimo Pat Brown Charter School (Pat Brown). The facility includes many environmentally sustainable elements such as water efficiency, energy efficiency, increased ventilation and the use of recycled and certified materials. For example, the facility realizes energy savings of 23% and cost savings of 21% through energy efficient components, including lighting controls and natural lighting in 95%+ of the classrooms. To top it off, the facility is built to LEED Silver building standard!

To make the acquisition affordable enough to be a reality, NCB Capital Impact stepped in to provide a $4.4 million leverage loan as part of a New Markets Tax Credits (NMTC) transaction. This loan was combined with two $2 million leverage loans each from LISC and NFF and a $3.6 million equity investment from US Bancorp CDC. The tax credits were provided by ExEd.

Pat Brown opened in the fall of 2006 as part of the Jefferson High School Transformation Project. The school launched with a single class of 145 ninth grade students with plans to add a grade (or roughly 140 students) per year until it offers the full high school spectrum of grades 9 through 12.

Pat Brown ranked 10 - the top decile - for its 2008 Similar School ranking, showing that it is a top performer among its peers. Approximately 97% of the school's student body is eligible for the Free and Reduced Lunch Program. Recently, the school received a Charter School Excellence award, sponsored by the Siart Foundation. The award, presented at an annual luncheon by ExED, honored Ánimo Pat Brown and other recipients for their excellence in academic achievement and strong fiscal management. Bill Siart, founder and chairman of ExED, presented the award to Pat Brown's principal Chad Soleo along with $10,000, which will be used to increase academic achievement and improve the school's instructional program.

High Tech High School, Chula Vista, CA

GENERAL INFORMATION

Project location: Chula Vista, California

Mission statement: High Tech High schools foster student engagement by tapping into student experience and interests, and by building a strong sense of community.

High Tech High purpose-builds each school to support its methods of instruction. The schools follow the High Tech High Board Resolution which requires all new construction, modernizations, maintenance, and operations programs to use sustainability green building strategies.

Reason for project conception: High Tech High's growth strategy included the development of a new campus in southern San Diego County.

SCHOOL STATISTICS

Student population: For 2009-2010

Girls: 215 Boys: 235

Grades taught: 9-11; (next year will serve 9-12)

Student / teacher ratio: 19 to 1

Student improvement/performance: Not statistically measurable because this is construction for a new school

SCHOOL INVOLVEMENT WITH GREEN DESIGN

School recycling program: The school follows a waste and recycling management program, which is an integral part of the school's high performance operations program and requires participation from staff, teachers and students.

With a strong emphasis on project-based learning, school projects account for large volume of the waste stream so there is a focus on methods of waste prevention and salvaging materials for reuse.

Community involvement: Numerous design workshops were held in the community to offer stakeholders an opportunity to be involved in shaping the site and building design.

PROJECT TIMELINE

Project conception: January 2006

Construction period: March 2008-July 2009

Projected project end date: The building was occupied in January, 2009. Minor site and building elements were under construction until July 2009.

PROJECT DETAILS

Type of construction: New construction

Total building square footage: 44,370 square feet

Ratio of building footprint to total land: 44,370sf/350,111sf = 13%

General Building Structure / Construction: Steel frame with metal stud infill over a concrete conditioned crawl space.

LEED, CHPS, Energy Star or Other Criteria: USGBC LEED for schools, Collaborative for High Performance Schools (CHPS) Verified, and EPA Energy Star.

PROJECT TEAM

Architect: Studio E Architects, Eric Naslund, FAIA

Engineer: BTA Engineers, Bong Manlulu, PE

Sustainable Design Consultant: Drew George & Partners

Drew George, PE

Contractor: Bycor General Contractors

Commissioning Agent: MBO Consultants, Jorge Torres Coto

School Staff Involved with Project: High Tech High

Christopher Gerber, Architect / LEED-AP

Off Site Fabrication Contractor: Williams Scotsman

Jack DiBenedetto, Project Manager

FINANCIALS

Total Project Cost: $16,000,000

Green Certification Costs: LEED Administration: $40,000

CHPS Administration: $10,000

Current Utility Bills: Recent gas bills at end of 2009 (monthly)

Gas: $98.17

Electric: $4423.65

Water: $4510.97

High Tech High - North County, San Diego, CA

GENERAL INFORMATION

Project location: San Diego, California

High Tech High (HTH) is a successful California charter school management organization, created in 2000, and today operates nine charter schools serving 2,800 students (2009-10) in greater San Diego, California.

HTH's schools present excellent academic performance, and the demand for the schools largely exceeds the number of openings each year. HTH opened two new high schools in September 2007: HTH North County in San Marcos and HTH Environmental in Chula Vista. Operating out of temporary modular facilities since it opened in September 2007, HTH North County badly needed a suitable and permanent facility.

To make their new facility a reality, NCB Capital Impact and several partners put together an innovative financing package of $21 million in New Markets Tax Credits.

The new building is a 46,700 square foot, two-story facility for 530 high school students, and has been built to LEED for Schools standards, including elements such as solar panels, low-water and low-energy use fixtures, and materials with high recycled content. The school is also used as a tool in the classroom curriculum.

HTH schools: have college acceptance rates at nearly 100%, with more than half of graduates being first-generation college students; are all in the top tier of schools and outperform district scores; and report attendance rates above 96%. HTH North County met national AYP academic criteria in its first two years of operation and increased its API from 764 to 778 in its second year of operation, which approaches the California state target of 800.

The grand opening of this facility was celebrated in November 2009. The high school now operates grades 9 through11 in the new facility. HTH opened a middle school this year that will operate from the modulars still located on the campus.

Pocatello Community Charter School, Pocatello, ID

GENERAL INFORMATION

Project location: Pocatello, Idaho

Mission statement: PCCS is an innovative public education option for grades K-8. They are dedicated to the implementation of the Expeditionary Learning model, small multi-age classrooms, and academic excellence. Supported by skilled professionals and parental involvement, the school emphasizes personal responsibility, collaboration, and critical thinking.

SCHOOL STATISTICS

Student population: For 2009

Total: 324

Grades taught: K-8

SCHOOL INVOLVEMENT WITH GREEN DESIGN

Sustainable design education program: The school is a leader in teaching about alternative energy by means of the installation of a wind turbine and the city's first solar '4 R Schools' solar panel. Both programs are monitored online by students and staff to understand and calculate how this generated power can save money.

Resources: Visit the Pocatello wind for school web site:

http://wind-for-schools.caesenergy.org/windforschoolsweb/Pocatello.html

Visit the Pocatello solar panel monitoring page:

http://www.idahopower.com/NewsCommunity/OurEnvironment/GreenPower/solar4Rschools/pocatello.cfm#

Prairie Crossing Charter School, Grayslake, IL

GENERAL INFORMATION

Project location: Grayslake, Illinois

Mission statement: Prairie Crossing Charter School (PCCS) is an innovative public charter school offering students an academic curriculum centered on the environment. PCCS takes advantage of its location nestled in the prairie to move teaching beyond the four walls of the classroom. The charter school provide a warm, caring atmosphere that fosters life-long learning and environmental stewardship for students, parents and teachers.

Reason for project conception: PCCS had outgrown its facility and required four mobile classrooms in 2003 to accommodate students and staff.

SCHOOL STATISTICS

Student population: For 2004

Total: 260 students, 360 at full capacity (2006)

Grades taught: K-8 (K –6 previously)

Student improvement/performance: 2002 Spring, 100% of 3rd graders met or exceeded Illinois state standards in math and reading; 100% of 4th graders met or exceeded state standards in science.

SCHOOL INVOLVEMENT WITH GREEN DESIGN

School recycling program: The school follows a waste and recycling program, which is an integral part of the school's environmental learning program.

Community involvement: The school regularly engages the surrounding community in the programs and activities. Prairie Crossing Charter School (PCCS) is located in Grayslake, Illinois within the nationally recognized conservation community of Prairie Crossing. The school follows the goals of the surrounding community, utilizing the existing preserved landscape, prairie fields, organic farms, and natural wetlands as curriculum tools.

PROJECT TIMELINE

Project conception: 2005

PROJECT DETAILS

Type of construction: New construction of classroom buildings and gymnasium

Total building square footage: 14,060 square feet

LEED, CHPS, Energy Star or other criteria: USGBC LEED Gold Rating

PROJECT TEAM

Design architect: Serena Strum Architects

Project manager / Landscape architect: WRD Environmental

OTHER PROJECT INFORMATION

The following is a selection of the many sustainable features of the building.
• Non-toxic, recycled or recyclable building materials
• Daylighting in classrooms and interior corridors with indirect light sources (clerestory windows placed between the classroom and corridor allow ample natural daylight into the internal corridors.) Classrooms boast large expanses of glass, allowing natural light and negating the need for electrical lighting during daytime hours.
• Geothermal heat pumps
• Natural ventilation
• Photovoltaic electricity
• Stormwater Re-use: Stormwater is collected in large cisterns and pumped into the building for uses such as water for toilet flushing. The cisterns are a daily reminder and teaching tool for all members of the school community.

PCCS students ranked in the top twenty-five schools statewide in reading, writing, and mathematics within the first two years of the school's conception. It is regarded as one of the top public elementary schools in the state of Illinois, with educational programs emphasizing environmental science and civic responsibility. Outdoor learning is integrated into math, science, social studies, and language arts. Hands-on learning methods allow students to retain and understand information through personal experience. In addition, the students learn to be more innovative and begin to understand how to realize their own projects and visions in the surrounding environment. Individual projects or research is encouraged. All students complete a compiled research study project, similar to a thesis, by the end of their 8th grade year. Students are encouraged to choose a topic or subject which interests them and investigate it further. Presentations to the staff and parents are given at the end of the year by each student. Once a year, Waste Management provides an award to the student with the best project.

FINANCIALS

Total project cost: $7 Million

Funding: Most of the financing was through bonds secured by existing buildings.

In addition PCCS launched a capital campaign to raise approximately $1.2 million in order to obtain bank financing and begin construction.

Thurgood Marshall Academy, Washington D.C.

GENERAL INFORMATION

Project location: Washington, D.C.

Mission statement: Encourage the students to be engaged in advocacy and an innovative society.

24/7 access is part of the school's philosophy, that is now balanced with the environmental constraints.

Build a building that is beautiful and pleasant and isn't institutional, and people will respect it.

Reason for project conception: Uninhabitable at time of 'purchase'. Issues were mostly deferred maintenance.

SCHOOL STATISTICS

Student population: For 2009

Total: 390

Grades taught: 9-12

Student / teacher ratio: 12 to 1

Student improvement/performance: Over the past 4 years, test scores have increased 40 points in English and 29 points in math

SCHOOL INVOLVEMENT WITH GREEN DESIGN

School recycling program: There is a recycling program implemented school wide. They also have a student run Green Club that monitors the levels of trash, recycling, and compost.

Sustainable design education program: Green Club—run by students to monitor compost and garden program. The mission of the green club is to teach about healthy choices and the seed to waste stream.

Community involvement: TMA wants to build an organic garden with the adjoining Savoy Elementary. A recent health fair featured healthy eating and involved the surrounding community.

PROJECT TIMELINE

Project conception: 2003

Construction period: 12-14 months for school

Projected project end date: Project was for the most part on schedule, the gymnasium was one month behind schedule.

PROJECT DETAILS

Type of construction: New construction

PROJECT TEAM

Architect: Bowie Gridley

Alise Robinson, Savoy Gym Building

Steven Stoller

School staff involved with project: Stakeholders, teacher committees, administrators.

Executive Director was the main point person on the design and construction.

FINANCIALS

Current utility bills: Gas: $1000 highest months

Electric: $11000 / month (cut considerably through weather-stripping, power savings implemented in 2006, sealing in the skylight.

Water: $150 / month

OTHER PROJECT INFORMATION

More then 50 organizations in the surrounding community have partnered with the school to integrate a youth development program for the students. This program involves after-school events, tutoring, mentoring, college guidance, enrichment activities, and summer programs. In addition to financial help from these organizations, support is also found through more than 250 volunteers.

Law related topics of learning are not the only emphasis at this emerging school. The students of Thurgood Marshall Academy are thinking 'green'. The school's 'Green Club', led by the students, has drastically changed building operations in all aspects. The club has worked to reduce waste by use of compost bins and monitoring of recycling. In addition, the students regularly perform trash 'audits' by weight of bags to enforce the club's initiative. The school also has constructed four raised vegetable beds and will be installing solar roof panels in the fall. These simple operational changes have helped to reduce waste and related costs, and reduce energy costs for the life of the charter school.

In 2009, Thurgood Marshall Academy opened a new sustainable gymnasium facility intended to be a shared resource with the neighboring A. Kiger Savoy Elementary.

GLOSSARY OF TERMS

American Institute of Architects AIA

Based in Washington, D.C., the AIA has been the leading professional membership association for licensed architects, emerging professionals, and allied partners since 1857. With nearly 300 state and local chapters, the AIA serves as the voice of the architecture profession through advocacy, information, and community.

American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE)

ASHRAE, founded in 1894, is an international organization of 51,000 persons. ASHRAE fulfills its mission of advancing heating, ventilation, air conditioning and refrigeration to serve humanity and promote a sustainable world through research, standards writing, publishing and continuing education.

Building commissioning

Building commissioning is a documented process by which an outside consultant ensures that all of the building systems are properly operating, performing efficiently, and maintained per original design.

Building envelope

The building envelope refers to the exterior 'skin' of the building, encompassing all materials of the exterior shell which separate the interior space from the exterior environment.

Building operations and maintenance (O&M) programs

O&M refers to long term plans for regular maintenance of building systems and cleaning and maintenance of interior finishes, as well as an overall plan for repairs and upkeep of the facility.

Charter school

Charter schools are elementary or secondary schools in the United States that receive public money (and, like other schools, may also receive private donations) but have been freed from some of the rules, regulations, and statutes that apply to other public schools in exchange for some type of accountability for producing certain results, which are set forth in each school's charter.

Clerestory

A row of windows above eye level designed to emit indirect sunlight. Historically, an upper level in a Roman Basilica or nave of a church, the walls of which are punctuated by windows that let in light.

Cradle to grave

An approach which takes into consideration the environmental impact of a building material's full lifecycle. The full lifecycle of a product accounts for its production, use and eventual destruction or demolition.

Collaborative for High Performance Schools (CHPS)

The Collaborative for High Performance Schools (CHPS) is a national non-profit dedicated to making schools a better place to learn and which supports the design of high efficiency schools and innovative and improved educational

spaces. CHPS has published several Best Practices Manuals which are available online as a free resource to designers and administrators. Charter schools can join CHPS for free to gain full access to high performance school resources and tools in return for a commitment to track progress and accomplishments in relation to sustainable implementation.

Cost benefit analysis

A cost benefit analysis summarizes all project related costs, including positive and negative impacts to the environment, in an effort to financially evaluate the risk of a sustainable building project.

Department of Energy (DOE)

The DOE is a U.S. governmental agency whose mission is to advance energy technology and promote related innovation in the United States.

Department of Education

The Department of Education is a U.S. government agency that promotes student achievement and preparation for global competitiveness by fostering educational excellence and ensuring equal access.

Design elements

Design elements and principles are fundamental ideas about the practice of good visual design. Elements form the 'vocabulary' of the design, while principles constitute the broader structural aspects of its composition.

Economic sustainability

Economic sustainability looks at the cost of initial build or start up, lifetime running costs including energy consumption and maintenance, impact on local economy and the longevity and flexibility of the space as well as ability to be used for different purposes throughout life span. Economic sustainability is an important contributor to the success of environmentally sustainable development.

Environmentally friendly

Something is environmentally friendly if it has minimal or no negative impact on the environment.

Environmental Protection Agency (EPA)

The U.S. Environmental Protection Agency (EPA or sometimes USEPA) is an agency of the federal government of the United States charged to protect human health and the environment, by writing and enforcing regulations based on laws passed by Congress.

Environmental sustainability

This term refers to environmental preservation or improvement in relation to changes in the environment. Issues such as renewable energy, waste reduction, non-toxic materials, and re-use or recycling fall under the heading of environmental sustainability.

ExED

Excellent Education (ExED) is a non-profit organization providing business management services to southern California charter schools.

Feasibility Study

A feasibility study is an evaluation of a proposal designed to determine the difficulty in carrying out a designated task. Generally, a feasibility study precedes technical development and project implementation. In other words, a feasibility study is an evaluation or analysis of the potential impact of a proposed project.

Glazing

Modern double-pane and triple-pane windows often include one or more coatings to reduce the window's rate of heat loss. Typically, soft-coat low-e coatings tend to result in a lower solar heat gain coefficient (SHGC) than hard-coat low-coatings.

Greywater

Greywater is wastewater generated from domestic activities such as laundry, dishwashing, and bathing which can be recycled on-site for uses such as landscape irrigation.

Green building movement

A green building, or the green building movement, refers to building practices focused on reducing material waste and energy consumption. The use of local and environmentally friendly materials, and renewable energy sources (such as solar, wind, or geothermal) are examples of green building strategies.

Green Charter School Network

The Green Charter Schools Network is a resource for connecting with school administrators who are interested in sustainable building.

Green school

A school facility which focuses on reducing material waste and energy consumption and maintains the overall goal of a sustainably designed facility.

Healthy Schools Campaign

The Healthy Schools Campaign is an independent not-for-profit organization that advocates for policies and practices that allow students, teachers and staff to learn and work in a healthy school environment

High Performance Building

A high performance building is a building which performs higher than its standard counterpart, in relation to its consumption of energy, environmental impact and cost benefit.

HVAC

HVAC is an acronym that stands for the closely related functions of heating, ventilating and air conditioning. HVAC is an umbrella term that covers the technology of indoor or environmental comfort including heating, cooling, and ventilation.

Indoor air quality (IAQ)

IAQ refers to the quality of the air in terms of the contents of mold, bacteria, or outdoor pollutants, which can negatively affect human health.

Integrated design

Integrated design is a collaborative method of designing buildings to allow for a more efficient building design. Integrated design requires multidisciplinary collaboration from key stakeholders and design professionals.

LEED

Leadership in Energy and Environmental Design http://www.usgbc.org/

Lifecycle costing or analysis

Lifecycle costing is a method by which a specific material can be analyzed based on production cost, usage and maintenance cost to eventual impact on the environment upon demolition.

National Institute of Building Sciences (NIBS)

The National Institute of Building Sciences is a non-profit, non-governmental organization that brings together representatives of government, industry, labor and consumer interests and regulatory agencies to focus on the identification and resolution of problems of the built environment in the US.

New construction

A building which is designed and constructed from ground up.

No cost methods

No cost methods are design strategies that do not incur extra cost or maintenance and save money over time.

Passive design

Passive design refers to the use of solar energy to maintain interior thermal comfort throughout the sun's daily and annual cycles while reducing the requirement for active heating and cooling systems.

Program assessment

A method for analyzing the programmatic needs of the school, based on population, use of space and projected needs.

Re-commissioning

A method of evaluating the efficiency of existing systems within an existing building, such as energy efficiency of mechanical systems.

Retro-Commissioning

Also known as Existing Building Commissioning. A documented process by which an outside consultant ensures that all of the building systems are properly operating or restored to the original intended performance for the building.

Retrofit

Improvements to building infrastructure by means of new technology to increase efficiency and reduce utility and maintenance costs for an existing building.

Renovation

Design and construction to improve upon an existing building structure or space.

Sick Building Syndrome

A term used to describe instances where users of the building experience symptoms which cannot otherwise be linked to a particular illness, and are the result of being within a particular indoor space (poor indoor air quality).

Small Scale Energy Solutions

Systems which can generate a small amount of energy in order to displace energy pulled from the main grid, such as an individual wind turbine.

Social Sustainability

Refers to empowering and strengthening individuals, communities and groups. Issues such as reducing poverty, improving education, providing health care, and augmenting social connections all fall under the heading of social sustainability.

Sustainability

Sustainability is the longevity, suitability and positivity of a development or project. The term is often used when referring to environmental sustainability, and issues such as energy preservation, waste reduction or the use of environmentally friendly materials.

Sustainability Movement

A social and political movement which addresses environmental awareness in respect to building design.

U.S. Green Building Council (USGBC)

The U.S. Green Building Council is a 501(c)(3) non-profit community of leaders working to make green buildings available to everyone.

Volatile Organic Compound (VOC)

Chemical compounds generally found in cleaning products, paints, and other building related materials, which negatively affect the environment and human health.

WORKS CITED

Websites:

Advanced Design Guide for K-12 School Buildings, ASHRAE
http://www.ashrae.org/publications/page/1604

Alternative Energy Institute web site
http://www.altenergy.org/

AFT Report of Government Accountability Office
http://www.aft.org/topics/building-conditions/downloads/BMMB_GREENGUIDE.pdf

Building Green on a Budget, Feature from Environmental Building News, May 1, 1999
http://www.buildinggreen.com/auth/article.cfm/1999/5/1/Building-Green-on-a-Budget/

California Division of State Architect's Sustainable Schools Resource
http://www.sustainableschools.dgs.ca.gov/SustainableSchools/sustainabledesign/water/onsitewaterreuse.html

California Integrated Waste Management Board
http://www.ciwmb.ca.gov/

CDFA - Council of Development Finance Agencies
http://www.cdfa.net/cdfa/cdfaweb.nsf/pages/greenbuildingfactsheet.html

Charter School Facilities
http://www.uscharterschools.org

CHPS Web Site
http://www.chps.net/dev/Drupal/node/133

Cleaning and Maintenance, EPA - Environmental Protection Agency
http://www.epa.gov/iaq/schools/clean_maintenance.html

Daylighting and Productivity Study, Heschong-Mahone Group, 1999
http://www.h-m-g.com/projects/daylighting/projects-PIER.htm

Efficient Plumbing Fixtures — Saving Water at a Profit, Opitz, Mike
http://www.fmlink.com/ProfResources/Sustainability/Articles/article.cgi?USGBC:200606-26.html

Energy Design Guidelines for High Performance Schools: Cold and Humid Climates
http://www.nrel.gov/docs/fy02osti/29107.pdf

Energy-Efficient Plumbing Fixtures: Healthy for Environment and Wallet, Baldwin, Jeff
http://www.tsbrass.com/news/energy-efficient-plumbing-fixtures.cfm

Energy Smart School, U.S. Department of Energy – Building Technologies Program
http://www1.eere.energy.gov/buildings/energysmartschools/design_team.html

USGBC's Green Schools Website
http://www.greenschoolbuildings.org

Healthy Schools Campaign
www.healthyschoolscampaign.org

WORKS CITED

How Parents and Teachers Are Helping To Create Better Environments for Learning. Energy-Smart Building Choices.
http://www.nrel.gov/docs/fy01osti/30557.pdf

Integrated Building Design, U.S. Department of Energy, May 2001
www.eere.energy.gov/femp/pdfs/29267-4.1.pdf

LEED for Existing Buildings: Operations and Maintenance Rating System (p.62),
http://www.usgbc.org/DisplayPage.aspx?CMSPageID=221#v2008

National Institute of Building Sciences
http://www.nibs.org/

Planning for Sustainable School, LPA Blog, by Rochelle Veturis, 2009
http://blog.lpainc.com/lpa-blog/bid/24877/Planning-for-Sustainable-Schools

Playbook for Green Buildings + Neighborhoods: Stormwater
http://www.greenplaybook.org/infrastructure/act/types/stormwater.htm

SMRC - The Stormwater Manager's Resource Center
http://www.stormwatercenter.net/

Solar Energy in Schools
http://www.nrdc.org/GreenSquad/library/energy_solar.html

Sustainable Building: Project Design, Cost Issues, California Government
http://www.ciwmb.ca.gov/greenbuilding/Design/costissues.htm#Lifecycle

Switch to CFL's and Save, article by Erin Huffstetler, About.com Guide to Frugal Living
http://frugalliving.about.com/b/2007/06/21/switch-to-cfls-and-save.htm

US Charter Schools Start-Up Brief: Facilities
http://www.uscharterschools.org/cs/r/view/uscs_rs/1705

US DOE - Federal Management Program Life Cycle Costing - (PDF on server)
http://www.bfrl.nist.gov/oae/publications/handbooks/135.pdf

US EPA - Guidebook of Financial Tools: Paying for Sustainable Environmental Systems
http://www.epa.gov/efinpage/guidebook.htm

USGBC Web Site
http://www.usgbc.org

What is the Difference between LEED and Energy Star, Energy Star web site
http://energystar.custhelp.com/cgi-bin/energystar.cfg/php/enduser/std_adp.php?p_faqid=4908

Whole Building Design Guide
http://www.wbdg.org/resources/cwmgmt.php

WORKS CITED

Publications:

9.2 Building Commissioning, US Department of Energy, May 2001

American Federation of Teachers (AFT)'s "Building Minds, Minding Buildings" report (2008)

Building Minds, Minding Buildings; Our Union's Road Map to Green and Sustainable Schools, American Federation of Teachers, 2008

CHPS Best Practices Manual, Collaborative for High Performance Schools

Cost of Green Revisited, Davis Langdon, July 2007

Daylighting in Schools: Reanalysis Report, California Energy Commission, October 2003

Environmental Assessment and Specification of Green Building Materials, The Construction Specifier, Froeschle, Lynn M. October 1999

Galley Eco Capital: Present Your Green Project to Your Lender, December 2008 article

Greening America's Schools / Costs and Benefits, by Gregory Kats

Guide to Financing Energy Smart Schools, U.S. Department of Energy

LEED for Schools, United States Green Building Council

Lighting Control Best Practices Guide for Schools, prepared by The Watt Stonne

Managing the Cost of Green Buildings, KEMA, October 2003

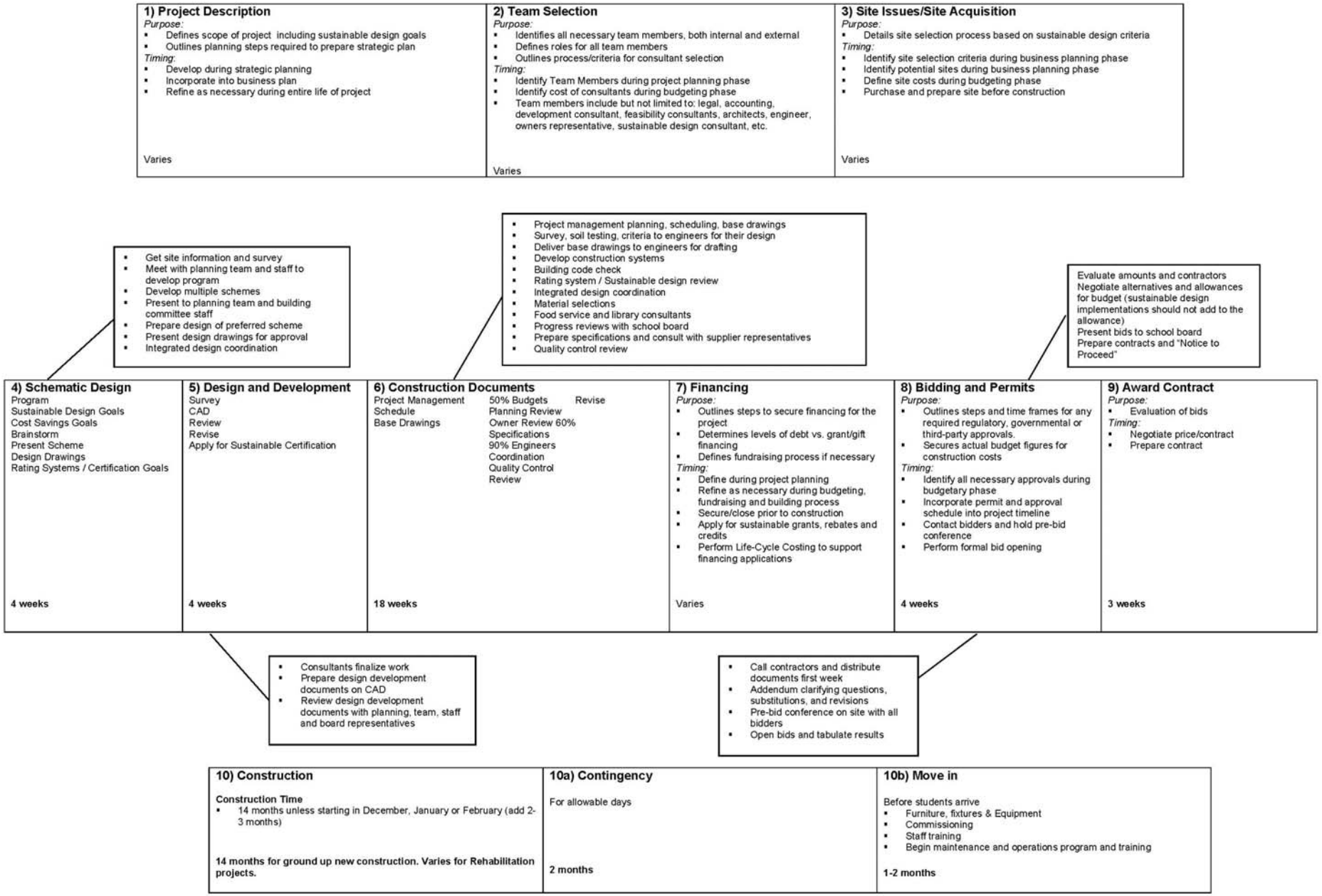
Massachusetts High Performance Green School Buildings, Massachusetts Technology Collaborative

Research on the Impact of School Facilities on Students and Teachers: A Summary of Studies Published Since 2000, 21st Century School Fund

Resource Guide for Sustainable Development in an Urban Environment, prepared by UEI, October 22, 2002

Top Ten No Cost Ways to Lower Your School's Utility Bills, USGBC Webinar Series: Energy Efficiency for Schools

	CAPITAL BUDGET TEMPLATE		
USES OF FUNDS			
Acquisition of building			
Feasibility Study			
Construction/renovation Costs			
Demolition of old walls			
Electrical			
Plumbing			
Heating/ventilation			
Renewable Energy Source			**SOURCE OF FUNDS**
Roof			
Drywall and painting			Cash
Carpet			
Windows			Grants
Fixtures and Fit-out			
Site work			Donations
Total Construction:			
			Tax Credits
Hard Cost Contingency (15%)			
			Loan 1
Total Hard Costs			
			Loan 2
Soft Costs			
Legal Fees			**GRAND TOTAL**
Appraisal			
Architect			
Project Manager			
Engineering			
Sustainable Design Consultant			
Insurance during construction			
Closing Costs			
Financing fees (loan origination fee, etc.)			
Interest during construction			
Inspection fees			
Environmental studies			
Commissioning			
Accountant			
Security			
Bonding			
Certification Fees (LEED, CHPS, etc)			
Total	**0**		
Soft Cost Contingency (5%)	0		
Total Soft Costs	**0**		
GRAND TOTAL	**0**		


1) Project Description
Purpose:
Defines scope of project including sustainable design goals
Outlines planning steps required to prepare strategic plan
Timing:
Develop during strategic planning
Incorporate into business plan
Refine as necessary during entire life of project
Varies
2) Team Selection
Purpose:
Identifies all necessary team members, both internal and external
Defines roles for all team members
Outlines process/criteria for consultant selection
Timing:
Identify Team Members during project planning phase
Identify cost of consultants during budgeting phase
Team members include but not limited to: legal, accounting, development consultant, feasibility consultants, architects, engineer, owners representative, sustainable design consultant, etc.
Varies
3) Site Issues/Site Acquisition
Purpose:
Details site selection process based on sustainable design criteria
Timing:
Identify site selection criteria during business planning phase
Identify potential sites during business planning phase
Define site costs during budgeting phase
Purchase and prepare site before construction
Varies
Get site information and survey
Meet with planning team and staff to develop program
Develop multiple schemes
Present to planning team and building committee staff
Prepare design of preferred scheme
Present design drawings for approval
Integrated design coordination
Project management planning, scheduling, base drawings
Survey, soil testing, criteria to engineers for their design
Deliver base drawings to engineers for drafting
Develop construction systems
Building code check
Rating system / Sustainable design review
Integrated design coordination
Material selections
Food service and library consultants
Progress reviews with school board
Prepare specifications and consult with supplier representatives
Quality control review
Evaluate amounts and contractors
Negotiate alternatives and allowances for budget (sustainable design implementations should not add to the allowance)
Present bids to school board
Prepare contracts and "Notice to Proceed"
4) Schematic Design
Program
Sustainable Design Goals
Cost Savings Goals
Brainstorm
Present Scheme
Design Drawings
Rating Systems / Certification Goals
4 weeks
5) Design and Development
Survey
CAD
Review
Revise
Apply for Sustainable Certification
4 weeks
6) Construction Documents
Project Management
Schedule
Base Drawings
50% Budgets
Planning Review
Owner Review 60%
Specifications
90% Engineers
Coordination
Quality Control
Review
Revise
18 weeks
7) Financing
Purpose:
Outlines steps to secure financing for the project
Determines levels of debt vs. grant/gift financing
Defines fundraising process if necessary
Timing:
Define during project planning
Refine as necessary during budgeting, fundraising and building process
Secure/close prior to construction
Apply for sustainable grants, rebates and credits
Perform Life-Cycle Costing to support financing applications
Varies
8) Bidding and Permits
Purpose:
Outlines steps and time frames for any required regulatory, governmental or third-party approvals.
Secures actual budget figures for construction costs
Timing:
Identify all necessary approvals during budgetary phase
Incorporate permit and approval schedule into project timeline
Contact bidders and hold pre-bid conference
Perform formal bid opening
4 weeks
9) Award Contract
Purpose:
Evaluation of bids
Timing:
Negotiate price/contract
Prepare contract
3 weeks
Consultants finalize work
Prepare design development documents on CAD
Review design development documents with planning, team, staff and board representatives
Call contractors and distribute documents first week
Addendum clarifying questions, substitutions, and revisions
Pre-bid conference on site with all bidders
Open bids and tabulate results
10) Construction
Construction Time
14 months unless starting in December, January or February (add 2-3 months)
14 months for ground up new construction. Varies for Rehabilitation projects.
10a) Contingency
For allowable days
2 months
10b) Move in
Before students arrive
Furniture, fixtures & Equipment
Commissioning
Staff training
Begin maintenance and operations program and training
1-2 months


ncb
capital impact