

Sustainability: The Benefit to Districts and Students



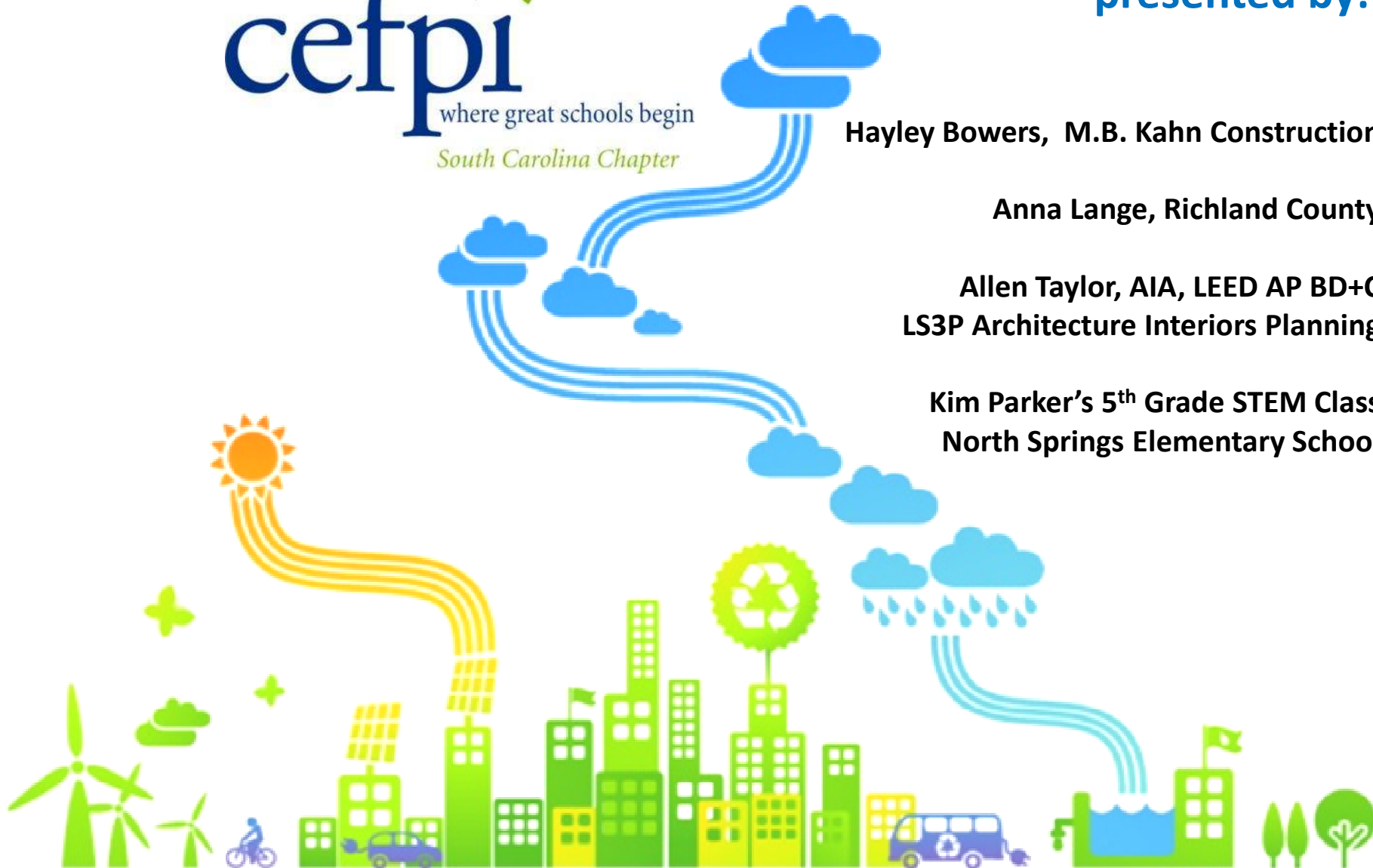
presented by:

Hayley Bowers, M.B. Kahn Construction

Anna Lange, Richland County

**Allen Taylor, AIA, LEED AP BD+C
LS3P Architecture Interiors Planning**

**Kim Parker's 5th Grade STEM Class
North Springs Elementary School**



Solar Power in the South

Hayley Bowers
M.B. Kahn Construction



The Politics of



SOLAR

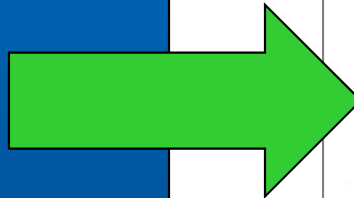
The image features the word "SOLAR" in large, bold, black 3D letters with a white grid pattern. The letters are set against a background of a sunset over a field of yellow wildflowers. A light blue map of South Carolina is overlaid on the letter 'O', featuring a white palmetto tree and a crescent moon.

in South Carolina

Act No. 236
The Distributed Energy Resources
Program Act


June 2, 2014

- ✓ Net metering
- ✓ Purchase Agreements
- ✓ Expires December 2020



C. DURTSCHOFF
EXECUTIVE DIRECTOR
101 Main Street, Suite 900
Columbia, SC 29201

NANCY S. EDWARDS
DEPUTY EXECUTIVE DIRECTOR
Phone: (803) 737-0300
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shudson@regstaff.sc.gov

Shannon Bowyer Hudson
Deputy Chief Counsel for ORS

December 11, 2014

VIA ELECTRONIC FILING

Jocelyn Boyd, Esquire
Chief Clerk/Administrator
Public Service Commission of South Carolina
101 Executive Center Dr., Suite 100
Columbia, SC 29210

Re: Petition of the Office of Regulatory Staff to Establish Generic Proceeding Pursuant to the Distributed Energy Resource Program Act, No. 236 of 2014, Ratification No. 241, Senate Bill No. 1189
Docket No. 2014-246-E

Dear Ms. Boyd:

Please find enclosed a Settlement Agreement in the above-referenced matter. Should you have any questions or concerns, please do not hesitate to contact me.

Sincerely,

Shannon B. Hudson
Shannon B. Hudson

Enclosure

cc: All Parties of Record

Settlement Agreement

The Economics

of Solar



Factors:

- State where you live
- Your Utility Company
- Do you own or lease? Who gets the tax credits?
- Quality of product
- Maintenance costs
- Efficiency of Panels
- Amount of system/\$cost saved per month = # of months to recover

Solar PV on the way to “Grid Parity”

Current cost to produce electricity by Solar PV Panels:

Without subsidies and Tax Credits

25 to 30 cents per kilowatt hour

With subsidies and tax credits

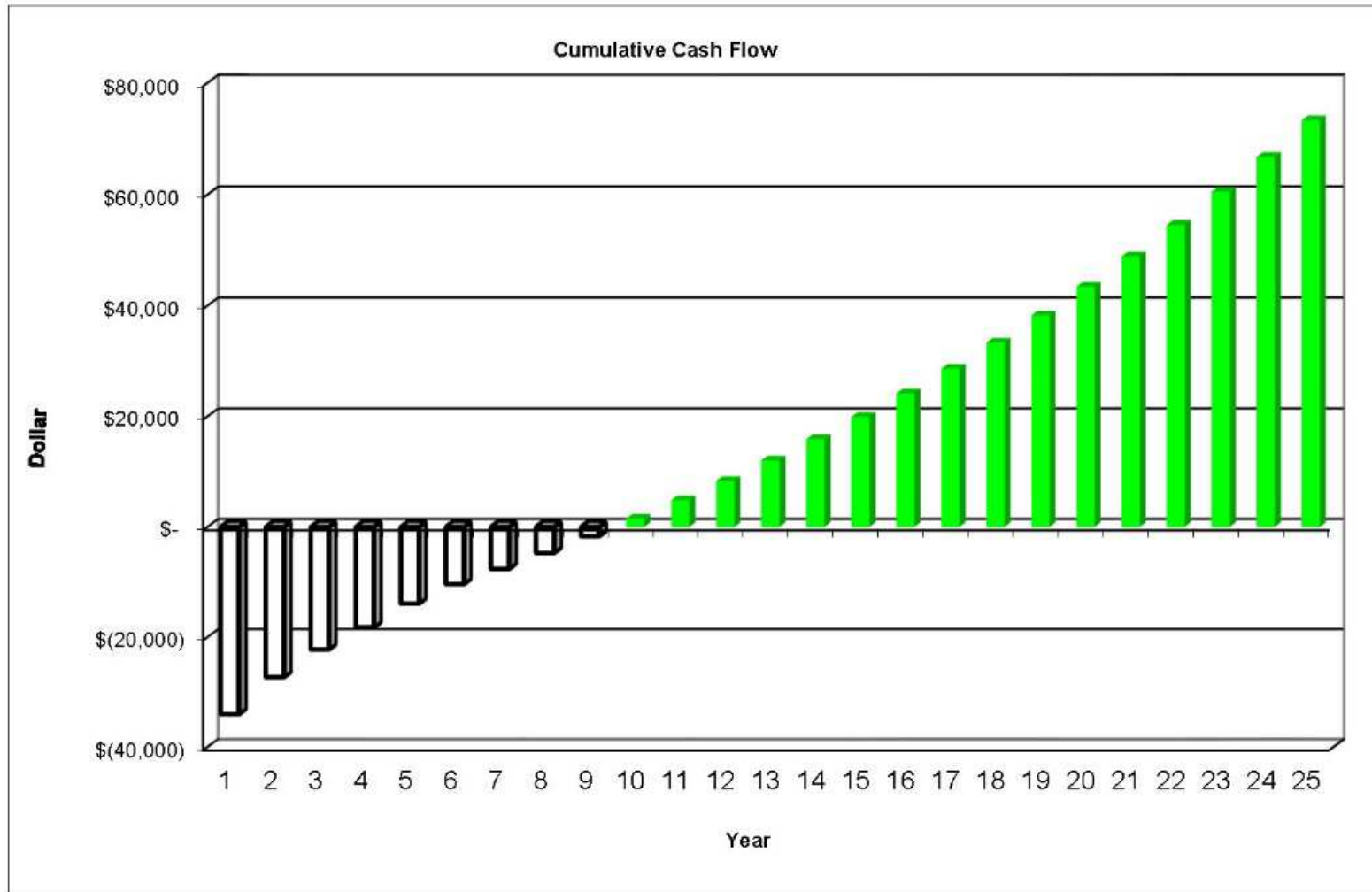
18 to 24 cents per kilowatt hour

Average cost to purchase electricity in SC

11 to 12 cents per kilowatt hour

But we are not quite there!

Return on Investment – How Long?



Sustainable Systems

- ✓ **Solar photovoltaic (PV) power**
- ✓ **Solar hot water heating systems**
- ✓ **LED lighting**
- ✓ **Geothermal HVAC systems**
- ✓ **Tank-less water heaters**
- ✓ **Occupancy sensors**
- ✓ **Recycled materials**
- ✓ **Indoor air quality HVAC systems**
- ✓ **Low VOC and no VOC content materials**
- ✓ **Rain harvesting for landscape**



Average cost for “Net Zero” Building

First 50% of a “Net Zero”

Minimal additional cost to a new building

51 to 80% of “Net Zero”

Additional 2 to 5% of project cost

Last 20% to reach true “Net Zero”

Additional 4 to 5% of project cost

* Above numbers based on new construction projects nationwide.

What about my District?

- ✓ **Feasibility Study**
- ✓ **Beware the Pitfalls!**
- ✓ **Board / Community support**
 - ✓ **Other benefits to solar**
- ✓ **Solar Boom on the way!**

- **Investment Tax Credit (“ITC”):**
- 30% federal tax credit for solar systems
- Residential & commercial properties
- In effect through **December 31, 2016**

- ✓ **Solar panel cost is historically low and not likely to get cheaper**
- ✓ **Solar panel efficiency continues to improve**
- ✓ **Solar laws continue to change**
- ✓ **Solar costs and payback can vary greatly**
- ✓ **Solar energy is an option you should investigate**
- ✓ **Start with a Feasibility Study**
- ✓ **Use someone you trust, who understands SC Laws**



Solar Resources

✓ **ases.org**



American Solar Energy Society

✓ **seia.org**



✓ **nrel.gov**



✓ **dsireusa.org - Database of Incentives**

DSIRE®

✓ **Copy of Settlement Agreement (see me)**

✓ **Copy of State Law (see me)**

Hayley Bowers 803-608-7553

hbowers@mbkahn.com



@hayleybowers1

Sustainable Partners in Government

Anna Lange
Sustainability Manager
Richland County





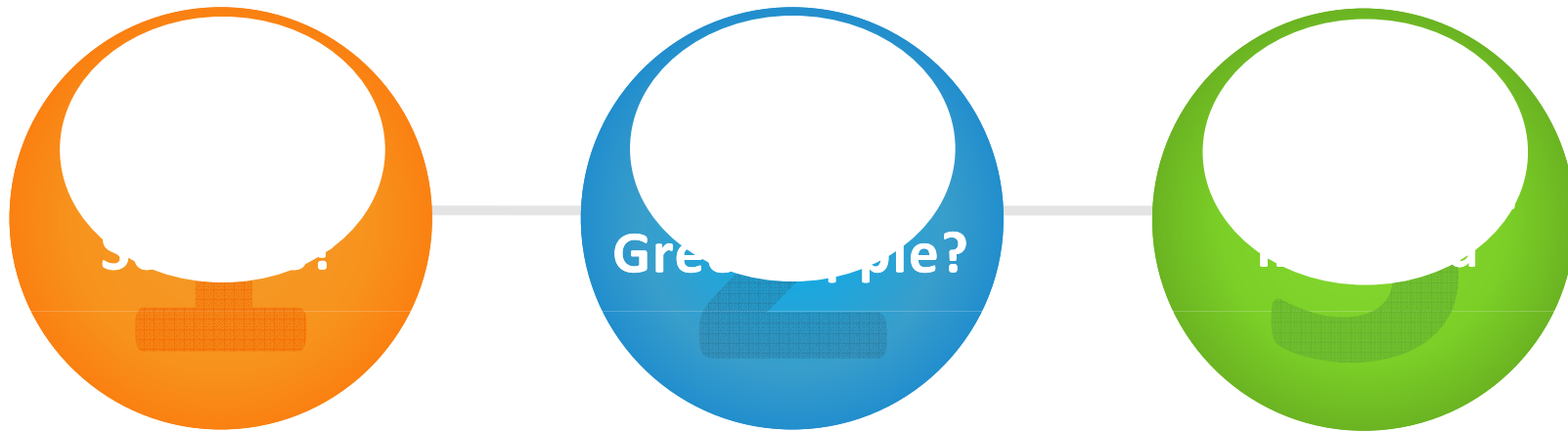
Anna Lange 

introducing

Green Apple Day of Service



Green Apple Day of Service



We have features for every step of the way 





Why Green Schools?

We learn here, and where we learn matters 



→ **AIR QUALITY** ←
 📢 **ACOUSTICS** 📢
LEVELS OF THERMAL COMFORT
 +
DAYLIGHT ☀️
AFFECT THE STRESS LEVELS, HEALTH AND WELL-BEING OF OCCUPANTS IN SCHOOLS 🍎

FACTS



Buildings contribute to nearly 71 percent of electricity use in the United States, 12 percent of water usage and 39 percent of CO₂ production. In the higher education community alone, there are 83,000 existing buildings equating to 3.48 billion square feet, most of which are extreme energy hogs.



71%



12%



39%

We work here, and where we work matters





Who We Are.





Create green schools for everyone within this generation 



mygreenapple.org
#greenapple

Save the date:
September 26, 2015



Parents, teachers, **students**, companies and **local organizations** the opportunity to transform all schools into **healthy**, safe and **productive** learning environments through local **service** projects





How to get Involved

Transform your school 



Mentor:

Plan and support project with school

Provide 3-5 hours of planning support per month

Companies, organizations and individuals can participate

Schools:

Plan low cost or no cost sustainability event

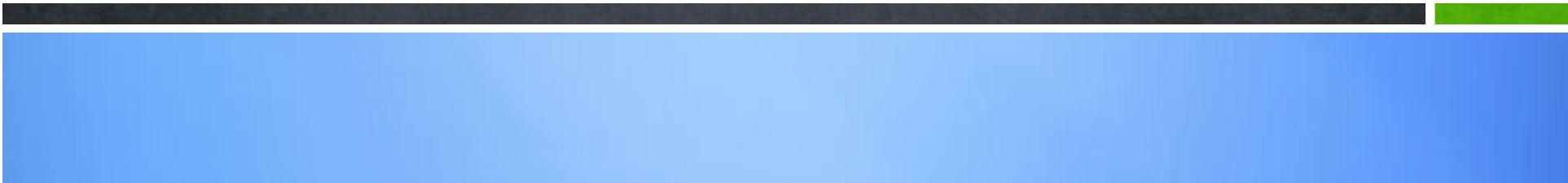
Involve students, volunteers, teachers and get administration approval

Clean Up

Breathe Better Signage

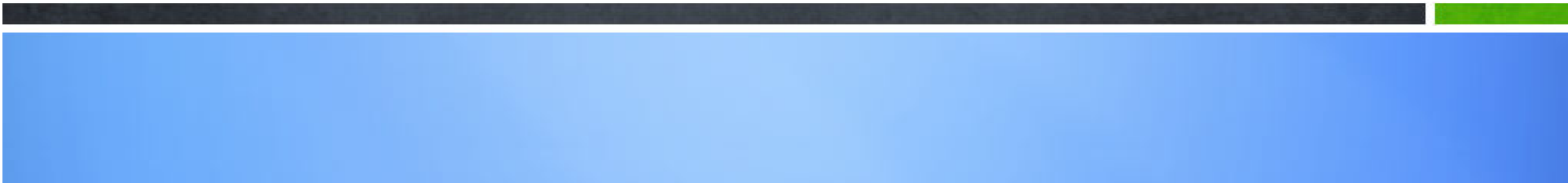


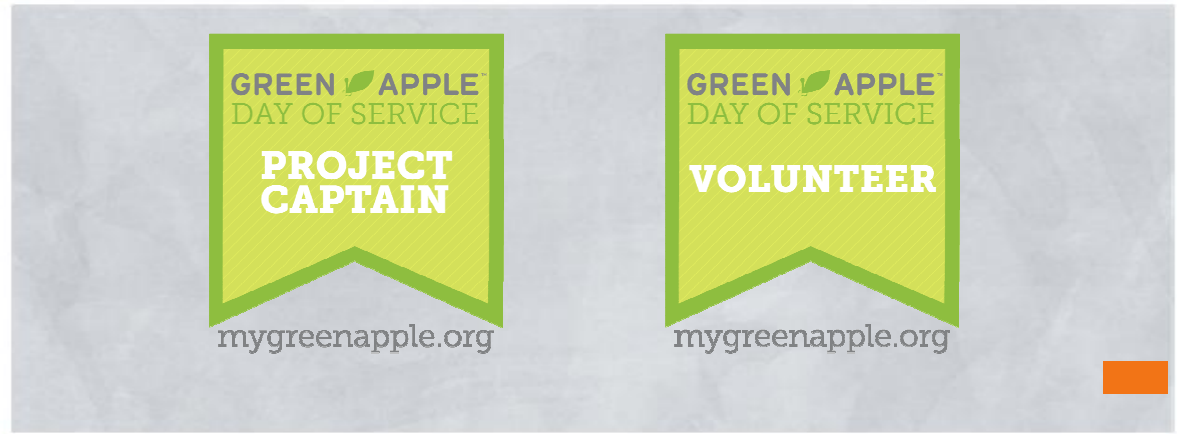
Litter Getters!



Plant a Garden

Recycle Programs





Think global, act local



Anna Lange
langea@rcgov.us

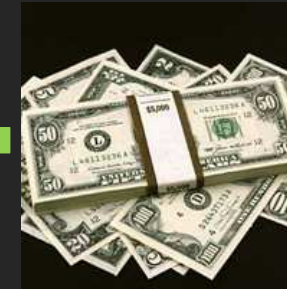
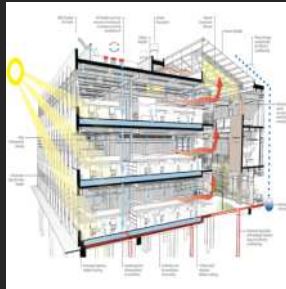
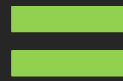
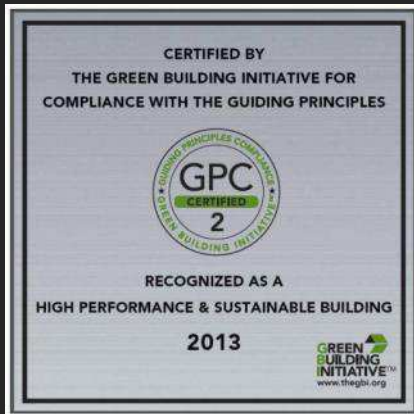
Allen Taylor, AIA, LEED AP^{BD+C}

LS3P Architecture Interiors Planning

**USGBC SC Chapter Green Schools
Committee Co-Chair**

SUSTAINABLE SCHOOLS
INNOVATIVE ARCHITECTURE IN SOUTH CAROLINA

BUILDING CERTIFICATION & DESIGN



CERTIFICATION

WHAT ARE THE OPTIONS?

WHICH ONE IS RIGHT FOR MY PROJECT?

WHAT WILL IT COST?

DESIGN

WHAT ARE THE DESIGN CONSIDERATIONS?

NEED A SPECIALIZED TEAM?

CAN PERFORMANCE BE OPTIMIZED BY DESIGN?

TOOLS

WHAT IS THE RIGHT DESIGN TOOL?

MONEY

DESIGN COST?

CERTIFICATION COST?

CONSTRUCTION COST?

LONGTERM SAVINGS?

BUILDING RATING SYSTEMS

There are a lot of choices:



LEED



Green Globes



Energy Star

Whole Building Approach



Multiple Building Types



Considers Quality of Life



Lifecycle Cost



Environmental Impact



Energy Impact



Natural Resource Impact



On Site Review



Digital Submittals Only



Design and Documentation Cost

\$\$\$

\$\$

\$

Certification Cost

\$\$\$

\$\$\$

\$

BUILDING RATING SYSTEMS

Which One is Right for You?



LEED



Green Globes



Energy Star

LEED

- Good Brand Recognition
- Comprehensive Rating System
- World Wide Acceptance
- Multiple Levels of Certification
- Commissioning is Required

- Higher Cost
- Rigorous Requirements
- Submittal and Review Process is intensive
- Intensive Documentation Required and includes design team, construction team & Owner
- Prerequisites are Required for Certification

BUILDING RATING SYSTEMS

Which One is Right for You?



LEED



Green Globes



Energy Star

Green Globes

- Comprehensive
- Requires EPA Energy Star Modeling
- Lower Design Cost than LEED
- No Prerequisites for Certification
- Simpler when compared to LEED
- Multiple Levels of Certification

- Not as Rigorous as LEED
- Certification is by Online Questionnaire and On-Site Review
- Can be Subjective and Does Not Include Construction Team
- Not as Transparent as LEED
- Commissioning is Optional

BUILDING RATING SYSTEMS

Which One is Right for You?



LEED



Green Globes



Energy Star

Energy Star

- Two Levels of Achievement:
 - Designed to Earn Energy Star (For New Construction - Requires Energy Model)
 - Energy Star Certified (For Existing Buildings - Requires Proof From Energy Bills)
- Low Cost
- Possible Tax Incentives
- Simple Application
- Good Brand Recognition

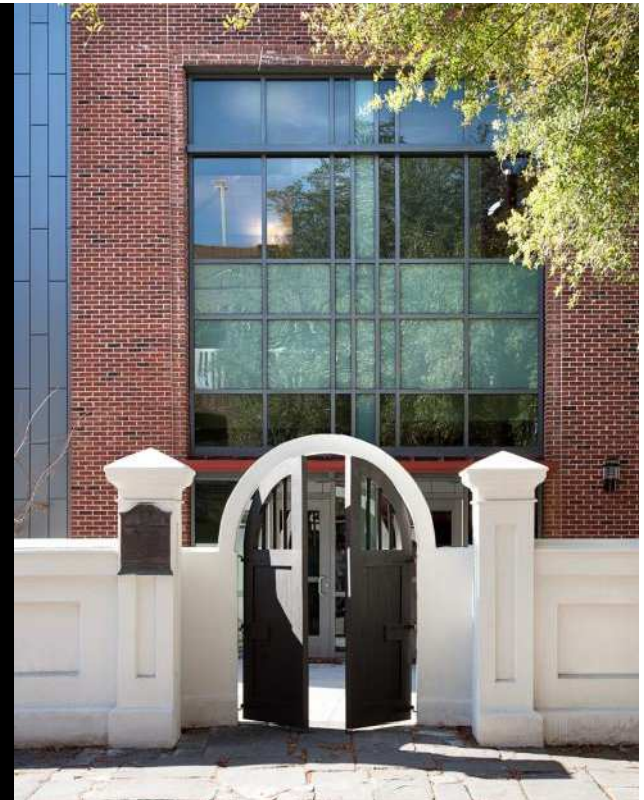
- Published Performance Requirements Valid for Current Year Only
 - Minimum Score is revised each year (based on EPA data for Similar Buildings)
- Not all Building Types Qualify
- Certification is Annual



WANDO CENTER FOR ADVANCED STUDIES
Charleston County School District – Mount Pleasant, SC
Completed: June 2014

**Sustainable Features: Rainwater Harvesting; Green Roof Used as a Teaching Tool;
Use of Exterior Sun Screens for Daylight Control**





MEMMINGER ELEMENTARY SCHOOL
Charleston County School District – Charleston, SC
Completed: August 2013

Sustainable Features: Steel Framing and Studs Made From Recycled Steel
Reuse of Existing Brick Pavers and Existing Garden Wall
Daylight and Views to Exterior From Occupied Spaces
Use of Light Shelves and Sun Screens for Daylighting





MEMMINGER ELEMENTARY SCHOOL
Charleston County School District – Charleston, SC
Completed: August 2013

Sustainable Features: Construction Waste Management Plan Resulted in over 90% of Demolished Building Being Diverted From Landfill; Reuse of Existing Site, Community Connectivity and Public Transportation Access





DESIGNED
TO EARN THE
ENERGY STAR

The estimated energy performance for this design meets US EPA criteria. The building will be eligible for ENERGY STAR after maintaining superior performance for one year.



Statement of Energy Design Intent

Project: Aiken High School Science Classroom Building
Energy Use Intensity (EUI) = 84 kBtu/sf/yr
Percent CO2 reduction = 42%
ENERGY STAR design rating = 92

Annual Savings Statistics
(Compared to an average building EPA rating of 50)
Energy savings = 2,506,176 kBtu
CO2 savings = 113 Metric Tons CO2



AIKEN HIGH SCHOOL SCIENCE CLASSROOM / LAB BUILDING – DESIGNED TO EARN THE ENERGY STAR

Aiken County Schools – Aiken, SC

Completed: 2013

Sustainable Features: High-Performance Building Envelope; Solar Orientation; High-Efficient HVAC Systems; Low-Flow Plumbing Fixtures





BOLDEN ELEMENTARY/MIDDLE SCHOOL
DoDEA (Department of Defense Education Activity) Parris Island Laurel Bay, SC
Anticipated Completion: August 2016

Sustainable Features:
Seeking LEED for Schools Silver Certification & Net Zero Ready

Predicted EUI = 27kBTU/SF/YR
This is the amount of energy used per square foot per year and is within the EUI range of Net Zero Ready.

Hybrid geothermal system

High efficiency building envelope:

- Walls – Insulating concrete forms (ICF)
- Roof – R29
- High performance Glazing
- Continuous air barrier



LS3P



479,000 gallons of potable water conserved per year

539,115 kWh/yr energy savings

225 metric tons carbon emissions avoided

1,798,000 pounds of waste diverted from landfills

\$41,872 yearly energy cost savings

Sustainability Facts	
Langford Elementary School	Elementary School
Building Use	Richland School District Two
Location	Blythewood, SC
Size	140,775 SF
Cost	\$104,480,000
LEED for Schools Rating out of 70	
Total Score	37
Sustainable Sites	6
Water Efficiency	3
Energy & Atmosphere	6
Materials & Resources	6
Indoor Environmental Quality	7
Innovation & Design Process	3
Certification Level	Silver Certification
Energy Savings (kWh/yr. \$/yr)	539,115 kWh/yr* \$41,872/yr
Carbon Emissions Avoided (tons)	225 metric tons
Water Savings (gallons/yr. \$/yr)	479,000 gallons/yr
Operations & Maintenance Savings (\$/yr)	NA
Productivity Enhancements (\$/yr)	NA
Natural Habitat Restored (acres)	NA
Project Team Profile	
Client	Richland School District Two
Architect	LS3P ASSOCIATES LTD
Engineers	ADC Engineering (civil/landplanning), Bulford Goff & Assoc. (MEP/FPF), Daniel Design (food service)
Contractor	Contract Construction Inc.
Construction Manager	M. B. Kahn
Commissioning Agent	System Works

LANGFORD ELEMENTARY SCHOOL – LEED for Schools SILVER
Richland School District Two – Blythewood, SC
Completed: 2011

Sustainable Feature: Optimized orientation for maximum daylighting & efficiency, low flow fixtures, sunshades, lighting controls, high efficiency boilers and VFD fan control, efficient food service equipment, high reflectivity roof surfaces, construction waste diversion, material recycle content, green cleaning





CATAWBA TRAIL ELEMENTARY SCHOOLS (Site Adaptation of Langford ES) – LEED for Schools CERTIFIED
Richland School District Two - Elgin, SC
Completed: 2012

Sustainable Feature: Optimized orientation for maximum daylighting & efficiency, low flow fixtures, sunshades, lighting controls, high efficiency boilers and VFD fan control, efficient food service equipment, high reflectivity roof surfaces, construction waste diversion, material recycle content, green cleaning





RICHLAND INSTITUTE OF INNOVATION – GOAL OF TWO GREEN GLOBES

Richland School District Two – Columbia, SC

Estimated Completed: Spring 2016

Sustainable Features: Optimized orientation for maximum daylighting & efficiency, low flow fixtures, sunshades, lighting controls, high efficiency boilers and VFD fan control, bio-polar ionization fresh air system, high reflectivity roof surfaces, material recycle content





Jackson School

Kershaw County School District

80,828 SF | 650 students

Opened in July 2010

First LEED Gold K-12 School in SC

Exemplary Project

USGBC South Carolina Chapter (2011)



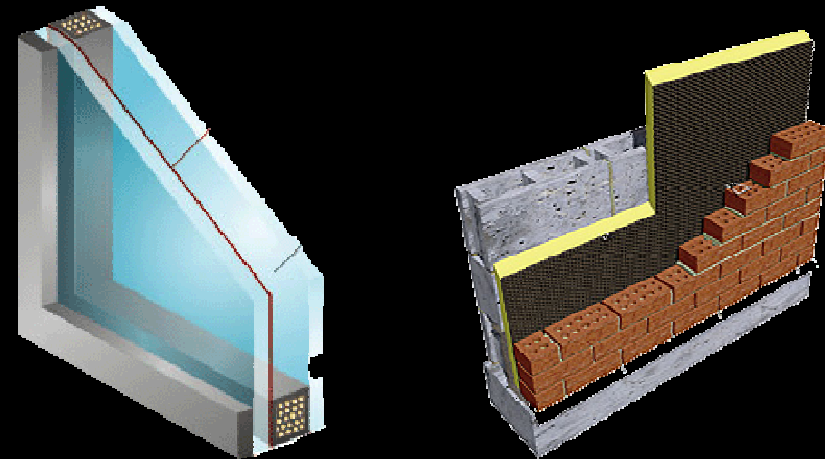
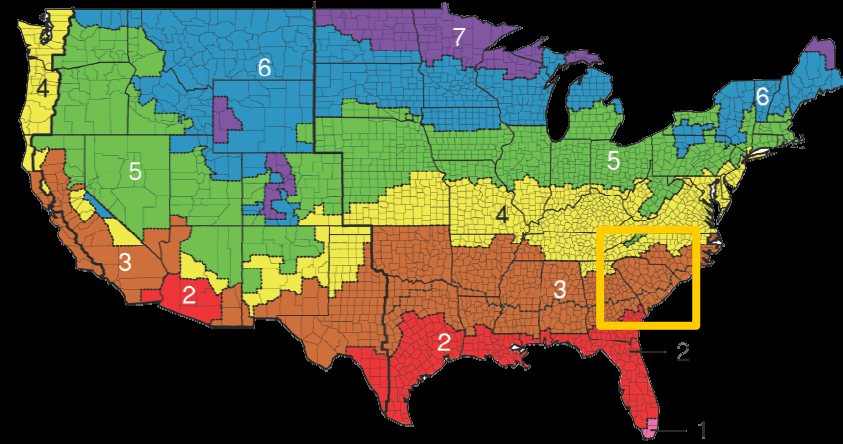
MOSELEYARCHITECTS



Jackson School

Energy Saving Features: Building Envelope

- ▣ Highly reflective roofing materials
- ▣ Windows with ultra-low solar heat gain glass
- ▣ Increased roof and wall insulation

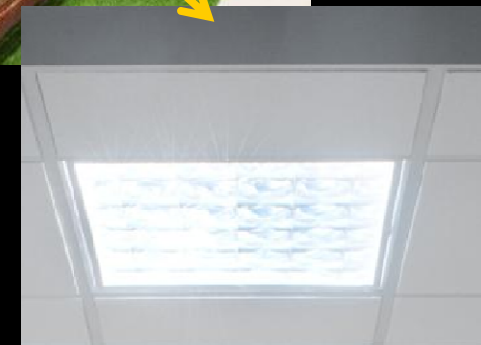




Jackson School

Energy Saving Features: Lighting + Daylight

- ▣ Solatube skylights
- ▣ Exterior sunscreens
- ▣ Interior light shelves
- ▣ T5 fluorescent lighting with daylight sensors and automatic dimming





Jackson School

Energy Saving Features: Renewable Energy

- ▣ Solar thermal panels
 - ▣ Sized to accommodate kitchen needs

- ▣ Photovoltaic array
 - ▣ Sized to offset the energy used by site lighting





Jackson School

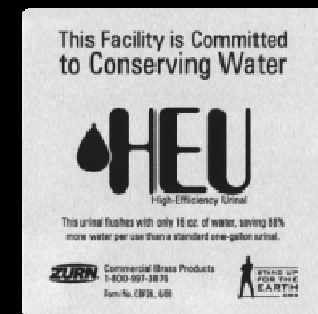
Water Saving Features: Bathrooms and Kitchen

- ▣ Pint-flush urinals and dual-flush toilets

*Estimated savings:
269,000 gallons / yr*

- ▣ Water efficient kitchen equipment (ENERGY STAR)

*Estimated savings:
139,700 gallons / yr*





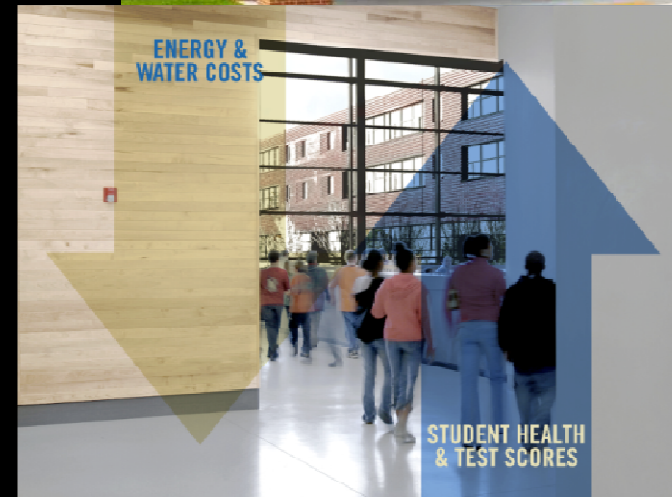
Jackson School

Actual Savings (2012):

- ▣ Energy: \$36,365 (37%)
- ▣ Water \$1,692 (43%)

Cost of LEED Features:

- ▣ Total: \$179,325
- ▣ % of Budget: 1.63%
- ▣ Payback Period: 4.7 yrs



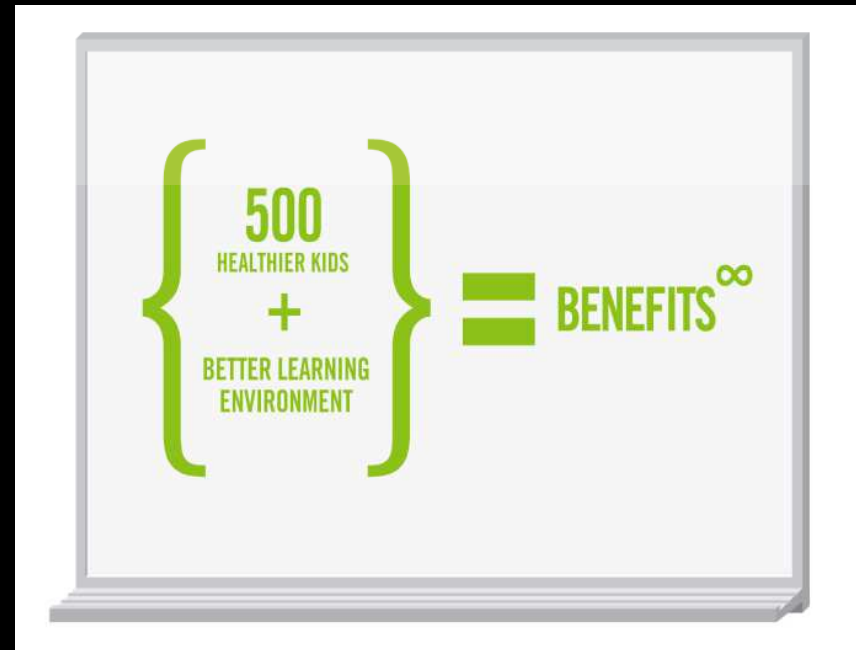


Jackson School

“Intangible” Benefits:

- ▣ Indoor Air Quality
- ▣ Natural Daylight
- ▣ Acoustics
- ▣ Curriculum Integration

- ▣ Teacher Retention
- ▣ Reduced Absences
- ▣ Student Performance





Jackson School



“Our scores are going up with our testing and I know that comes from us being a green school. When students are in a healthier environment, they’re going to perform better and feel better about their school.”

- Matia Goodwin, Principal

“Environmentally friendly buildings provide healthy learning spaces and also save money on energy bills over the long run. It’s a win-win situation for everyone.”

- Dr. Frank Morgan, Superintendent





A.J. WHITTENBERG ELEMENTARY SCHOOL OF ENGINEERING

LEED FOR SCHOOLS SILVER
2014 USGBC-SC GREEN SCHOOL OF THE YEAR

ENERGY SAVINGS (kWh/yr, \$/yr) 330,011 kWh/yr*; \$23,823/yr
CARBON EMISSIONS AVOIDED 184 metric tons
WATER SAVINGS (sensors, waterless urinals) 80,932 gallons/yr

SITE DEVELOPMENT COSTS WERE SHARED WITH THE SALVATION ARMY. THE ENTIRE SITE WAS DEVELOPED AT ONE TIME.

URBAN LOCATION IN DOWNTOWN GREENVILLE ALLOWS MULTIPLE MEANS OF TRANSPORTATION, INCLUDING THE SWAMP RABBIT BIKE TRAIL.

LEED FOR SCHOOLS 2.0 CONSIDERED CLASSROOM ACOUSTICS. SOUND TRANSMISSION BETWEEN CLASSROOMS WAS IMPORTANT. CARPET SQUARES IN EACH CLASSROOM REDUCES BACKGROUND NOISE AND FACILITATES LEARNING.

OWNER:
GREENVILLE COUNTY SCHOOLS

CONTRACTOR:
HARPER CORPORATION

CRAIG GAULDEN DAVIS

● ARCHITECTURE PLANNING INTERIOR DESIGN



A.J. WHITTENBERG ELEMENTARY SCHOOL OF ENGINEERING

PUNCHED WINDOWS WERE PLACED ON THE EAST AND WEST ELEVATIONS. RIBBON WINDOWS WERE PLACED ON THE NORTH AND SOUTH ELEVATIONS TO ALLOW MAXIMUM DAYLIGHTING. SUN SHADES REDUCE THE HEAT LOAD ON THE SOUTH ELEVATION.

THE PRECAST CONCRETE CREATES AN OUTSTANDING THERMAL ENVELOPE. THE PLANT IS WITHIN A FEW MILES OF THE SITE WHICH CONTRIBUTED TO REGIONAL MATERIALS CREDIT.

OWNER:
GREENVILLE COUNTY SCHOOLS

CONTRACTOR:
HARPER CORPORATION

CRAIG GAULDEN DAVIS

● ARCHITECTURE PLANNING INTERIOR DESIGN



A.J. WHITTENBERG ELEMENTARY SCHOOL OF ENGINEERING

BUILDING AS A LEARNING TOOL:
PHOTOVOLTAIC PANELS ALLOW CHILDREN TO MEASURE
HOW MUCH ENERGY CAN BE GAINED FROM THE SUN.

TRAY-TYPE GREEN ROOF ALLOWS STUDENTS TO STUDY BEST
STORMWATER MANAGEMENT PRACTICES AS WELL AS THE
THERMAL VALUE OF THE GREEN ROOF.



MT. PLEASANT ACADEMY

REUSE OF EXISTING SITE PREVENTS SPAWL

MAXIMIZING VIEWS

CRAIG GAULDEN DAVIS

● ARCHITECTURE PLANNING INTERIOR DESIGN

**CONTRACTOR:
BRANTLEY CONSTRUCTION**

**OWNER:
CHARLESTON COUNTY SCHOOL DISTRICT**



SPEARMAN ELEMENTARY SCHOOL

LIGHT MONITORS ALLOW NATURAL LIGHTING. GLAZING IS PLACED ON A VERTICAL SURFACE TO PREVENT LEAKS COMMON WITH SKYLIGHTS. ARTIFICIAL LIGHTING IS OFTEN NOT NEEDED RESULTING IN ENERGY SAVINGS.

CRAIG GAULDEN DAVIS

● ARCHITECTURE PLANNING INTERIOR DESIGN

CONSTRUCTION MANAGER:
M.B. KAHN

CONTRACTOR:
MELLOUL-BLAMEY CONSTRUCTION

OWNER:
ANDERSON SCHOOL DISTRICT ONE



BUIST ACADEMY

REUSE OF EXISTING SITE AND PRESERVATION OF ORIGINAL STRUCTURE (1921).

CUMMINGS CONSTRUCTION MGT. INC.
BUIST ACADEMY
NOV. 2012

CRAIG GAULDEN DAVIS CONSTRUCTION MANAGER:
● ARCHITECTURE PLANNING INTERIOR DESIGN **CUMMINGS**

CONTRACTOR:
MB KAHN

OWNER:
CHARLESTON COUNTY SCHOOL DISTRICT

BUIST ACADEMY

REUSE OF EXISTING SITE AND PRESERVATION OF ORIGINAL
STRUCTURE (1921).



CRAIG GAULDEN DAVIS CONSTRUCTION MANAGER:
● ARCHITECTURE PLANNING INTERIOR DESIGN **CUMMINGS**

CONTRACTOR:
MB KAHN

OWNER:
CHARLESTON COUNTY SCHOOL DISTRICT



QUACKENBUSH ARCHITECTS + PLANNERS

Richland School District Two – Muller Road Middle School

LEED for Schools Certified

Columbia, South Carolina



Sustainable Feature: The building includes over 20% recycled materials and a number of regional materials including local brick. 85.68% of construction waste was diverted from the landfill when the project was built.



QUACKENBUSH ARCHITECTS + PLANNERS

Richland School District Two – Muller Road Middle School LEED for Schools Certified Columbia, South Carolina



“The daylighting at Muller Road Middle School definitely makes a big impact in our classrooms.”

*– Mr. Ed Watson, New Design and Construction Manager
Richland School District Two*



Sustainable Feature: Generous daylighting is provided in core learning and common areas. Shading devices are provided on the building exterior to control the quality of lighting.



QUACKENBUSH ARCHITECTS + PLANNERS

Richland School District Two – Muller Road Middle School

LEED for Schools Certified

Columbia, South Carolina



Sustainable Feature: 698,858 square feet of open space is preserved on campus, with existing trees preserved at the perimeter of the site. Students utilize the on-site detention pond and open areas in science classes.



QUACKENBUSH ARCHITECTS + PLANNERS

Richland School District Two – Muller Road Middle School

LEED for Schools Certified
Columbia, South Carolina



Sustainable Feature: RSD2 embraced environmentally friendly operations and maintenance practices by adopting a green cleaning policy and contracting with a green pest management company.



QUACKENBUSH ARCHITECTS + PLANNERS

Richland School District Two – Muller Road Middle School

LEED for Schools Certified
Columbia, South Carolina



Welcome!



NORTH SPRINGS
ELEMENTARY



The National Association for Magnet and Theme-Based Schools

NATIONAL MAGNET SCHOOL
OF MERIT

Thank You!

cefpi
where great schools begin
South Carolina Chapter

contact us:

Kim Parker's 5th Grade STEM Class
kparker@richland2.org

Hayley Bowers
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Anna Lange
langea@rcgov.us

Allen Taylor
allentaylor@ls3p.com

