Green in a Box®

North Texas Chapter US Green Building Council



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Who Will Help Our District?



Green Schools Advocates:

- Asthma and Allergy Foundation of America
- American Lung Association
- U.S. EPA
- Other School Districts
- Researchers
- Building Consultants
 - Architects
- Builders
- Mayors
- Many others

Learning Objectives

- Identify at least three simple steps used to determine Indoor Environmental Quality issues.
- List at least three upgrades that can be done to existing schools to improve their sustainability within a traditional school budget.
- Name the five key components of the LEED for Schools Rating System and describe at least one issue addressed by each of the key components.
- Identify at least three benefits realized by students attending a green school.





- USGBC goal is that every child is in a green school within this generation.
- Many schools have poor physical plant.
- We can help you spend more on students and less on buildings.



Increase Indoor Environmental Quality (IEQ) = increase test scores

- Average productivity loss due to poor IAQ is between 3 and 7 percent. Occupational Safety and Health Administration

"What if we could raise each child's test scores by 3% to 7%?" - Your school district

Increase IEQ = decrease absenteeism = more \$ in funding - 50% of all illness is caused or aggravated by poor IAQ

American College of Asthma & Immunology

"Asthma affects 1 in 4 of our students and it's getting worse". - North Texas School District

 Green schools are designed to save money on utility bills and water usage. It's how we build in the 21st century.
 "We can't afford not to address IEO but we don't know

- "We can't afford not to address IEQ but we don't know how" - Your school district

Green in a Box ightarrow

School Indoor Environmental Quality (IEQ) – What's in it for me – the Facilities Staff?

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- More durable materials
- Utility & water use reduced
- Use of fewer, less toxic cleaning products
- Savings of time and money
- "We cut buses, we even cut some football (In Texas!) but we did not cut our IEQ Program."
- Frank DiNella, Director of Operations, Keller ISD

School IEQ – What's in it for me – School Administrators?



- Fewer student absentees
 = more kids in seats
- Fewer student absentees
 = higher test scores
- Fewer staff absentees
- Lower utility and water bills
- Lower O&M costs
- More money for my program

School	Lifec	ycle C	osts
50-75	Year	Buildi	ng

1st 2-5 years = 30-40% of lifecycle cost

45 - 48 (70 - 73) years = 60 to 70% of lifecycle cost

Includes design and construction, O&M Includes everything: operations, maintenance, upgrades

Green in a <u>Box</u>

Source: National Institute of Standards and Technology www.nist.gov

NORTHWEST ISD					
ELECTRIC CONSU	MPHON	JANUARY			
2009					
Administration	82,000 KWH	\$7,579.01			
Beck Elementary	44,160 KWH	\$3,370.12			
Chisholm Trail MS	137,952 KWH	\$20,330.48			
Granger Elementary	52,800 KWH	\$5,516.20			
Haslet Elementary	46,395 KWH	\$7,212.62			
Hatfield Elementary	78,243 KWH	\$7,831.38			
Hughes Elementary	92,160 KWH	\$8,688.04			
Justin Elementary	52,526 KWH	\$7,977.77			
Lakeview Elementary	47,295 KWH	\$8,264.25			
Medlin MS	100,800 KWH	\$7,728.27			
Nance Elementary	101,970 KWH	\$17,572.50			
Northwest High School	427,800 KWH	\$41,369.90			
Peterson Elementary	41,280 KWH	\$3,905.32			
Pike MS	172,800 KWH	\$16,111.43			
Prairie View Elem.	65,340 KWH	\$9,540.73			
Roanoke Elementary	51,073 KWH	\$7,734.38			
Sendera Ranch Elementary	47,310 KWH	\$7,359.36			
Seven Hills Elementary	68,968 KWH	\$11,486.53			
Total Electric	1.710.872 KWH	\$199,578.2			

NORTHWEST ISD NATURAL GAS CONSUMPTION JANUARY 2009					
Beck Elementary	68 MCF	\$578.54			
Chisholm Trail MS	144 MCF	\$953.00			
Granger Elementary	175 MCF	\$1,295.32			
Haslet Elementary	200 MCF	\$1,336.31			
Hatfield Elementary	91 MCF	\$564.88			
Justin Elementary	159 MCF	\$1,223.64			
Medlin MS	130 MCF	\$1,098.74			
Northwest High School	1,330 MCF	\$7,898.91			
Peterson Elementary	233 MCF	\$1,704.78			
Pike MS	320 MCF	\$1,915.88			
Prairie View Elem.	110 MCF	\$730.74			
Roanoke Elementary	136 MCF	\$1,146.57			
Sendera Ranch Elem.	276 MCF	\$2,309.16			
Total Natural Gas	3,479 MCF	\$23,421.07			

• 16,500 Students

- 1 month= \$200k elec, \$20k H20, \$23k gas = \$243k /month
- Approx \$3M spent annually
- What if you could save 10%?
 50%?
- = savings of +\$300K
- Roadmap



Keller ISD Results after implementing IEQ Measures using EPA Tools for Schools

Test Scores Increased 2007 2008 2009 2010 % INC 82 85 87 79 10.1% Scholarships Increased (in millions) 2007 2008 2009 2010 % INC \$24.3 \$30.7 \$37.2 \$40.2 65.4% **Reduced Cost per Sq Ft (Operations)** ■ <u>2006</u> <u>2007</u> <u>2008</u> <u>2</u>009</u> % DEC ■ \$.234 \$.243 \$.227 \$.232 **.008% A Decrease in Operations Costs**

Green in a <u>Box</u>

Middle

Characters

Asthma Control



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"When we followed a protocol for asthma, we cleaned up 90% of our breathing problems." North East ISD, San Antonio

- Institute District-wide IEQ program from the top.
- Collect and review school nurse data on inhaler use, absenteeism.
- Each IEQ step taken will reduce need for inhalers continue to track school nurse data.
- Institute strict hand-washing protocol with foam soaps.
- Institute green cleaning and green O&M
- Build green new, additions, renovations, upgrades.
- Purchase green Furniture, Fixtures and Equipment (FFE).
- You will reduce absences.

Green in a Box (GIB)

- North Texas US Green Building Council Chapter LEED for Schools Committee
- Lending library includes information and instructions, handheld testing equipment, software and instructions including DVD's
- Volunteers can provide LEED charette
- School you build in-house IEQ Team to use GIB and "7 steps to 21st Century School Performance"

7 steps to 21st Century School Performance Using Green in a Box

- Form a team and obtain buy-in from top administration – best is District-wide IEQ Program
- 2. Educate the team.
- 3. Determine Green in a Box goals.
- 4. Divide your school into team sectors with a floor plan, walk the school and take notes.
- 5. Use the Green in a Box tools to test for Temperature, CO2, % relative humidity, and particulate size. Option: electricity usage, HVAC air flow, other.
- 6. Log IEQ Equipment data.
- 7. Make improvements.

Tools

Method

- Walkthrough:
- Teams work in pairs
- Clipboard or ipad
- Floor Plan

IAQ Testing Equipment:

- Temperature, CO2, %
 Relative Humidity
- Particulate size
- HVAC pressure drop /air flow
- Kill-a-Watt for plug load

- GIB Questionnaire/ interview teachers, nurses before walkthrough to find out if there are problem areas of the building or other issues.
- 2. Do walkthrough with floor plan and clipboard or tablet.
- 3. Then use IAQ testing equipment in each room of building. This needs to be done while building is fully occupied, no earlier than mid-morning. Use class schedules to determine where to test. If classroom is unoccupied then wait until 2 or more classes have been through.

Walk the site (exterior) Check building envelope Water infiltration, roof leaks Mold, Smells **Plumbing problems** HVAC problems Pests – rodents, insects Chemicals Motor vehicle exhaust Cleaning issues/cleaning products Fabric furniture Formaldehyde-containing products (furniture, building) Carpet Plug point load / electrical Lab hoods, exhaust vents **Teacher reports**

GIB walkthrough

Six Areas: HVAC Mold/Moisture Integrated Pest Management (IPM) Cleaning & Maintenance Materials Selection Aggressive Source Control



On the GIB walkthrough - outdoors

Diesel is a listed carcinogen. Implement a no-idling policy. Build sidewalks so children can walk and ride bikes to school rather than have parents drive.

Check for idling near air intake, HVAC, buildings, doors. Move air vents/ intakes away from driveways and parking.





What are these? Supply? Exhaust? Crawl space ventilation? There may be a problem if air circulation is too close to each other. Track and record, trace out location and put on a set of as-built plans, paper or electronic, for Facilities staff.

Slope of lawn and leaking downspout have led to water running into the building when it rains. Fix this. Investigate what looks like crumbling pieces of the building and fix. The air intakes turn into water intakes when it rains hard. Examine sprinkler patterns, water should never be hitting any building.

Outdoor Air Pollution



On the GIB walkthrough - Indoors

Study: Allergens in School Settings: Results of Environmental Assessments in 3 City School Systems Stuart L. Abramson, MD, PhD, et al What's microscopically found in common dust in the classroom:

 Dust mites
 Cat Allergens
 Cockroach droppings

Green in a Box How do custodial staff vacuum or dust this classroom? (Need to make schools cleanable by removing junk and clutter).



Filters – do you know where they all are located?
Filters – do you have a replacement schedule?
Duct cleaning – needs to be done on a schedule.
Measure: does HVAC have sufficient air flow?

Aargh!





Physical barriers to HVAC operation: dusty stored materials, air dampers can't operate and this space is not cleanable. You should be able to eat off the floor. Check for asbestos in the pipe insulation.

• Green in a Box tools measure CO2, temperature, % relative humidity and particulate size. Anything 10 microns or above is indicative of mold. • Use your nose: what does the building smell like? • Take "smells bad" complaints seriously.





Stained ceiling tiles – evidence of something that can send a child to the hospital. Explore leaks and fix them "for real". Explore HVAC, plumbing, roof, overflowing condensate drains/pans. Flush condensate lines on a quarterly basis. If it smells bad it is bad.

Fix the leaks. Remove the jar of mystery substance. Black adhesive – is it asbestos? Is there mold underneat the base cabinet or behind the base cabinet?

Green in a Box



Green in a Box Pets or Pests? It depends, do you feed them or not? If you want to reduce asthma you'll need to get rid of pets.

Implement an Integrated Pest Management (IPM) Program. Remove infestations, droppings, and avenues of entry. Get rid of in-classroom refrigerators, microwaves, coffeemakers, etc.

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Abate environmental hazards: asbestos, mold, radon, soil contamination of hydrocarbons. Have water pipes tested for lead.

Chemical Storage









- What does your building smell like?
- It shouldn't smell like cleaning products or chemicals.







Restrooms



- What does your building smell like?
- It shouldn't smell like "heavily used restroom", mold, or floor drains whose trap primers are not working.
- Fix trap primers, get higher CFM exhaust fans in restrooms, and if it smells like mold, that's because there IS mold.
- Liability issues: if it smells like human waste, that means there are molecules of human waste floating in the air spreading disease. If it smells like mold that's because there is mold being breathed in.

After the Walkthrough



Step 7: Make Improvements

- Triage
- Make long-range plans/budgets
- Work on district-wide IEQ
- •Educate teachers, students, parents, administration
- Include IEQ measures when hiring architects, contractors, subcontractors

Resources

- US Green Building Council North Texas Chapter,
 LEED for Schools: we are your resource for
 Green in a Box www.northtexasgreencouncil.org
- US Green Building Council <u>www.usgbc.org</u>
- Center for Green Schools www.centerforgreenschools.org
- EPA Tools for Schools www.epa.gov/iaq/schools/toolsforschools Also http://www.epa.gov/schools/healthyseat/index. html
 - •Education Facilities Clearinghouse
 - www.efc.gwu.org