Children's Environmental Health Matters: *Healthy Schools - Healthy Kids*

Kara Belle
US EPA Office of Children's Health Protection

What is a School Environmental Health Program

Provides an environment that is supportive and conducive to learning by integrating a preventive holistic strategy and smart practices focused on protecting the health of students, school staff and the environment.

Why is environmental health in schools important

When the school environment is unhealthy, students may be exposed to harmful pollutants and chemicals that may cause their health, attendance, and academic performance to suffer.

In a 2005 survey 43% of Public school principals reported various environmental factors as an interference with the delivery of instruction in permanent building

(U.S. Department of Education, U.S. Department of Education, National Center for Education Statistics. (2007). Fall 2005

http://nces.ed.gov/fastfacts/display.asp?id=94

Why are children more vulnerable?

In proportion to their body weight, kids:

- Breathe more
- Eat more
- Drink more

Difference in Behaviors

- Play closer to the ground
- Hand in Mouth
- Curious nature!

Where are kids most vulnerable?

Children spend 90% of their time indoors

- Home
- School
- Childcare Facility

Children's Health in School: The Culprits

asthma triggers

mold

chemicals

PCBS

mercury

pests

indoor/outdoor air

Significant Disparities

The prevalence of asthma has been reported to be slightly less than 10% in American children as a whole.

In 2009, the prevalence of asthma in African American children living below the poverty line was approximately 18%, or twice the national average.

The CDC reported the number of people diagnosed with asthma grew by 4.3 million from 2001-2009 and increased by almost 50% among black children.

In some communities of Puerto Rican descent, the prevalence of asthma has been reported in excess of 20%.

(CDC, Office of Surveillance, Epidemiology and Laboratory Services (OSELS)

Asthma is the leading cause of school absence

- Significantly have more disturbed sleep
- Have been shown to perform worse on test of concentration and memory
- Tend to have more psychological problems

Cost of Asthma

- According to the Centers for Disease Control and Prevention (CDC), the annual economic cost of asthma, including direct medical costs from hospital stays and indirect costs (e.g. lost school and work days), amount to more than $56 billion annually.

- Loss to schools
  - Loss in student school days
  - Loss in teacher work days
  - Loss productivity
  - Cost of substitute teachers and loss productivity in re-teaching absent students

Studies have shown

- Several studies have found that health, attendance, and academic performance improve with increased maintenance of school facilities.
- One study found that schools in better physical condition show improved academic performance while schools with fewer janitorial personnel and higher maintenance backlogs show poorer academic performance
- Other studies demonstrate that improved IAQ increases productivity

Studies have shown (cont'd)

A 2008 study of 95 New York City public schools found that students attended fewer days on average and had lower grades in English, Language Arts, and Math when enrolled in schools facilities in poor condition.

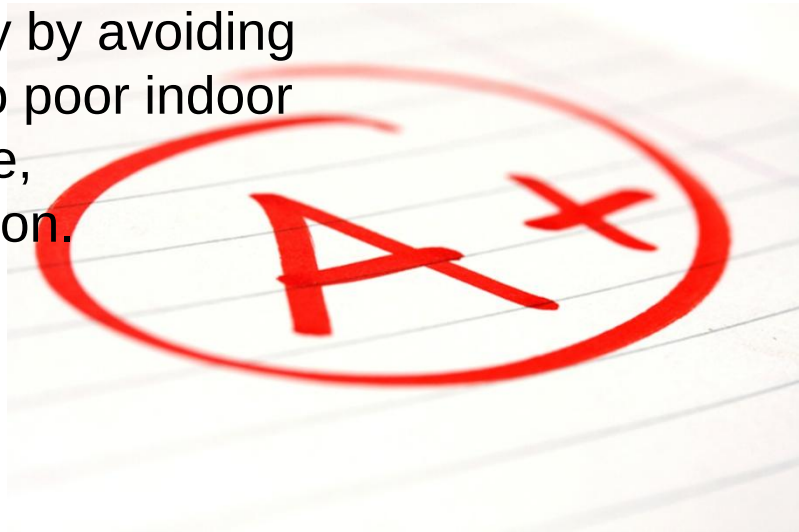
Growing evidence also suggests that improving outdoor air ventilation rates can improve student and teacher performance, increase test scores, and reduce airborne transmission of infection.

In one study, children in classrooms with higher outdoor air ventilation rates scored 14 to 15 percent higher on standardized test scores than children in classrooms with lower outdoor air ventilation rates.

Benefits of a School health Program

- Decreased absenteeism of both students and teachers
- stronger academic performance
- higher scores on standardized tests.

Small investments to address critical environmental issues in schools can save schools money by avoiding costly cleanups and remediation related to poor indoor air quality (IAQ), mold and mildew damage, mismanaged chemicals, and pest infestation.



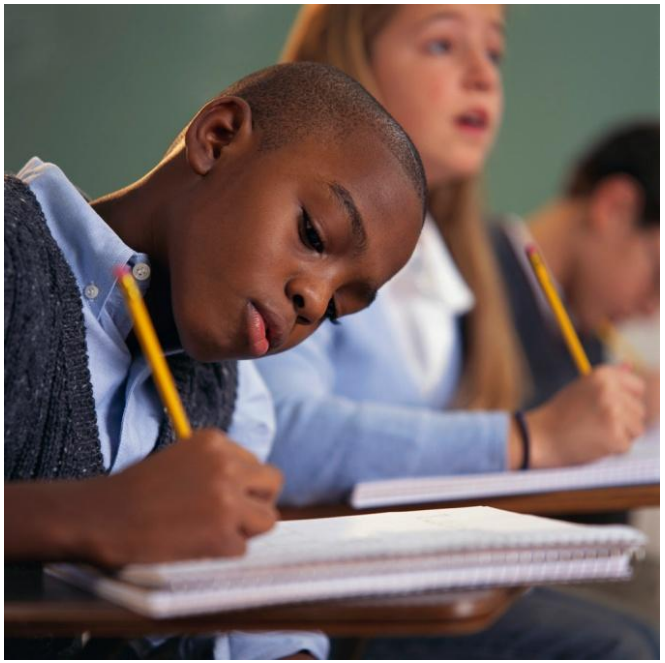
Costs & Benefits of a School health program (cont'd)

Classrooms with the most daylighting had a 20% faster learning rate in math and a 26% faster learning rate in reading during one school year when compared to classrooms with the least amount of daylighting.

Energy improvement translate to healthy environments; higher student and staff performance; more comfortable classrooms for students; lower operating and maintenance cost; as well as reduced energy bills

Good IAQ is an A+ for Schools

- Studies demonstrate that improved IAQ increases productivity and improves the performance of mental tasks, such as:
  - Improved concentration and recall in both adults and children.



Location, Location, Location

- School Environmental Health and School Siting go hand-in-hand
- More than 1,900 new schools serving approximately 1.2 million children and costing more than $13 billion opened in the 2008-2009 school year
- Proper school siting can
  - help communities better protect the health of students and staff from environmental threats when selecting new locations for schools
  - help communities ensure that new locations for schools are accessible to the students they are intended to serve

School Buildings and Community Building

U.S. EPA's Office of Sustainable Communities

About EPA's Office of Sustainable Communities

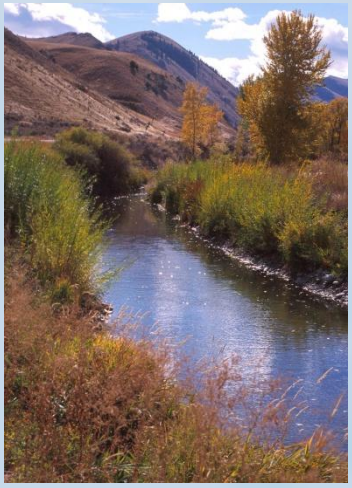
- EPA's mission is to protect human health and the environment.
- OSC focuses on the environmental and public health impacts of the built environment because where and how we build affects our land, air, and water.
- We work on:
  - *Changing the conversation:* Education and outreach
  - *Helping the willing:* Tools and technical assistance
  - *Changing the rules:* Research and policy analysis

What's a Sustainable Community?

An urban, suburban or rural community that has more housing and transportation choices, is closer to jobs, shops or schools, is more energy independent and helps protect clean air and water.

A Response to Development Challenges

Skaneateles, New York



Waitsfield, Vermont

- Development that provides:
  - Choices for where to live and how to get around
  - A stronger, more resilient economy
  - A safer, healthier place to live
  - Opportunities to protect the things that you love about the place you live (farmland and open space, natural beauty, sense of community, etc.)

Photo Credits (top to bottom, left to right): EPA, NRCS, EPA

What's the Connection?
Schools & Community

- Schools both affect and respond to community growth.
- Schools are a major financial investment that the entire community bears.
- Schools can either work with or against a wide variety of community goals.

Let's Establish a Baseline for this Discussion

- Something we can and should all agree on: Schools should provide students with a safe healthy place to get a good education.
- This is their primary goal.
- But…having established that, there is room for discussion.

School Investments Influence Community Goals

- Children's health
- Fiscal health of local and state government
- Open space and farmland preservation
- Traffic congestion
- Environmental goals – air quality, water quality, climate change
- Revitalization of downtown and existing neighborhoods
- Community character
- Social equity

During this time of great investments in school building…

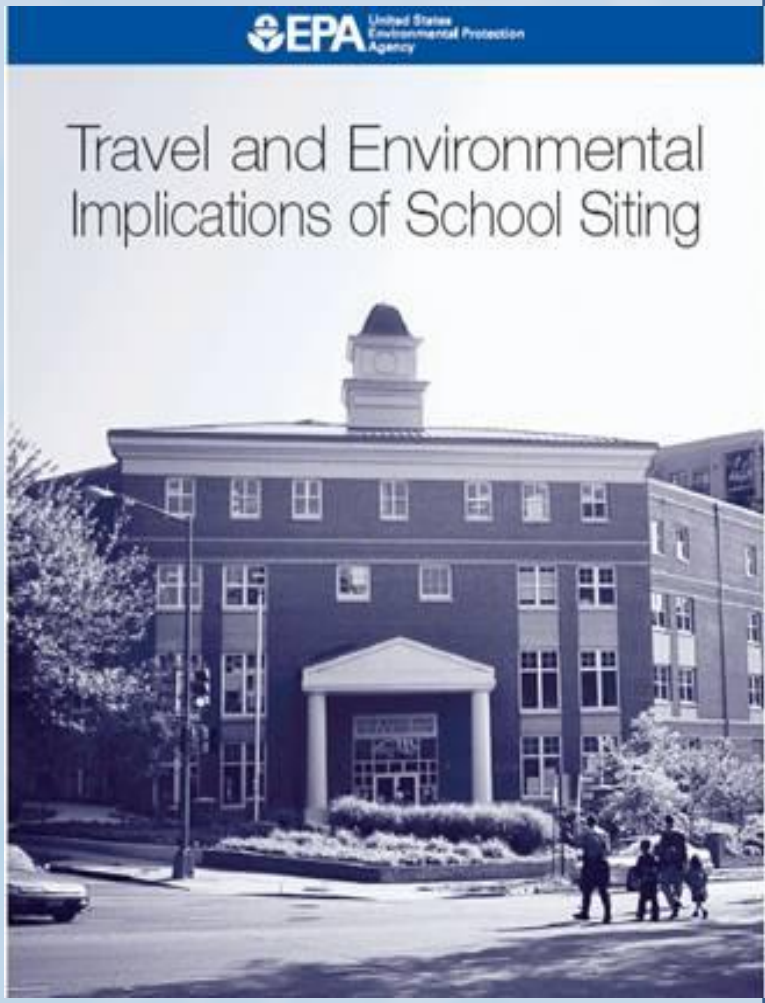
- 1969: 48% of all children walked or biked to school
- 2002: 14% of kids walk or bike to school
- This is an extraordinary shift.
- It’s almost as if we planned it that way.

Update: It's Unanimous!!! Distance is #1 Factor

- Living less than 1 mile from school increased the odds of walking/biking by at least a factor of 160 over those living 3 or more miles from school. (McDonald)
- The percentage of students living close to school has declined over time:
  - In 1969, 66.1% of students lived less than 3 miles from school.
  - By 2001, the figure was 49.5%. (McDonald)

Where you put the School Matters

- Schools built close to students, in walkable neighborhoods:
  - Can reduce traffic
  - Yield increase in walking and biking
  - Reduce emissions



www.epa.gov/smartgrowth/publications.htm

Moms Become Cab Drivers

Everything is a Drive Away

Suburban mothers spend
17 full days a year
behind the wheel, more than the average parent spends dressing, bathing and feeding a child

Source: Surface Transportation Policy Project

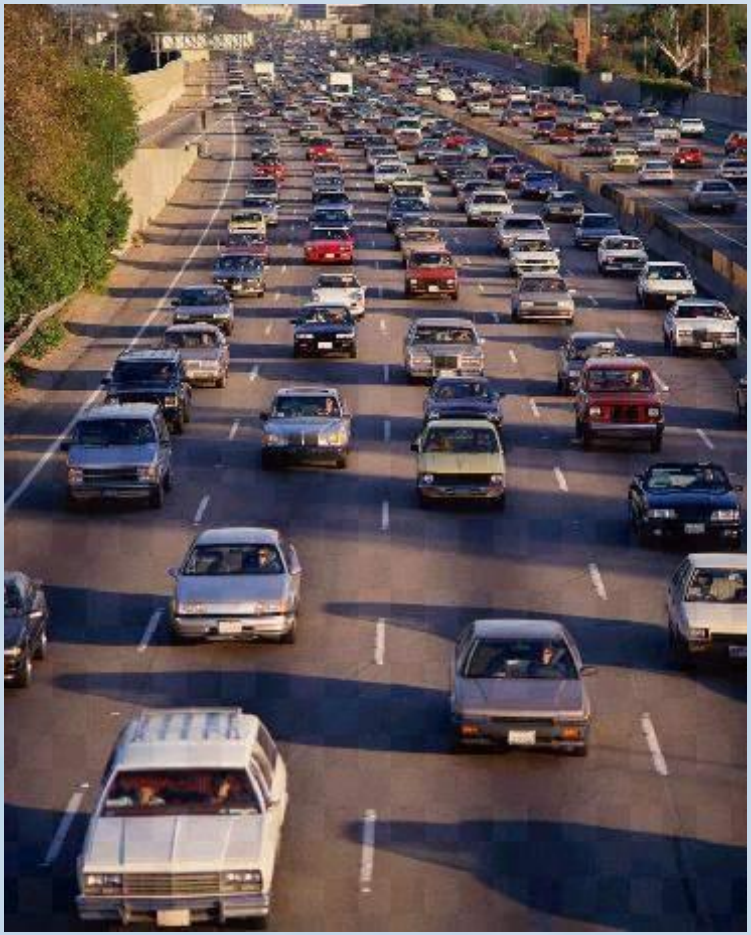
Home

Recreation

Workplace

Implications for Household Budgets

- Transportation costs account for 19 % of all household expenses.*
- Most families spend more on driving than on health care, education, or food.



* STPP “Driven to Spend”, 2004.

Health Implications

- The percentage of overweight children, aged 6 to 19 years, has doubled in the United States since 1968
- One in three children in the United States is now overweight

Source: Journal of Occupational and Environmental Medicine 2002

Health Impacts – Physical Activity

Big schools on edge of town

- ↑ trip distances
- ↑ vehicle trips
- ↓ walking

↑ overweight
↑ obesity

Richard Jackson , MD, MPH, Center for Disease Control

American Academy of Pediatrics (2009)

Policy Statement: The Built Environment: Designing Communities to Promote Physical Activity in Children

- "An estimated 32% of American children are overweight, and physical inactivity contributes to this high prevalence of overweight."
- "The most universal opportunity for incidental physical activity among children is in getting to and from school."
- "Factors such as school location have played a significant role in the decreased rates of walking to school, and changes in policy may help to increase the number of children who are able to walk to school."

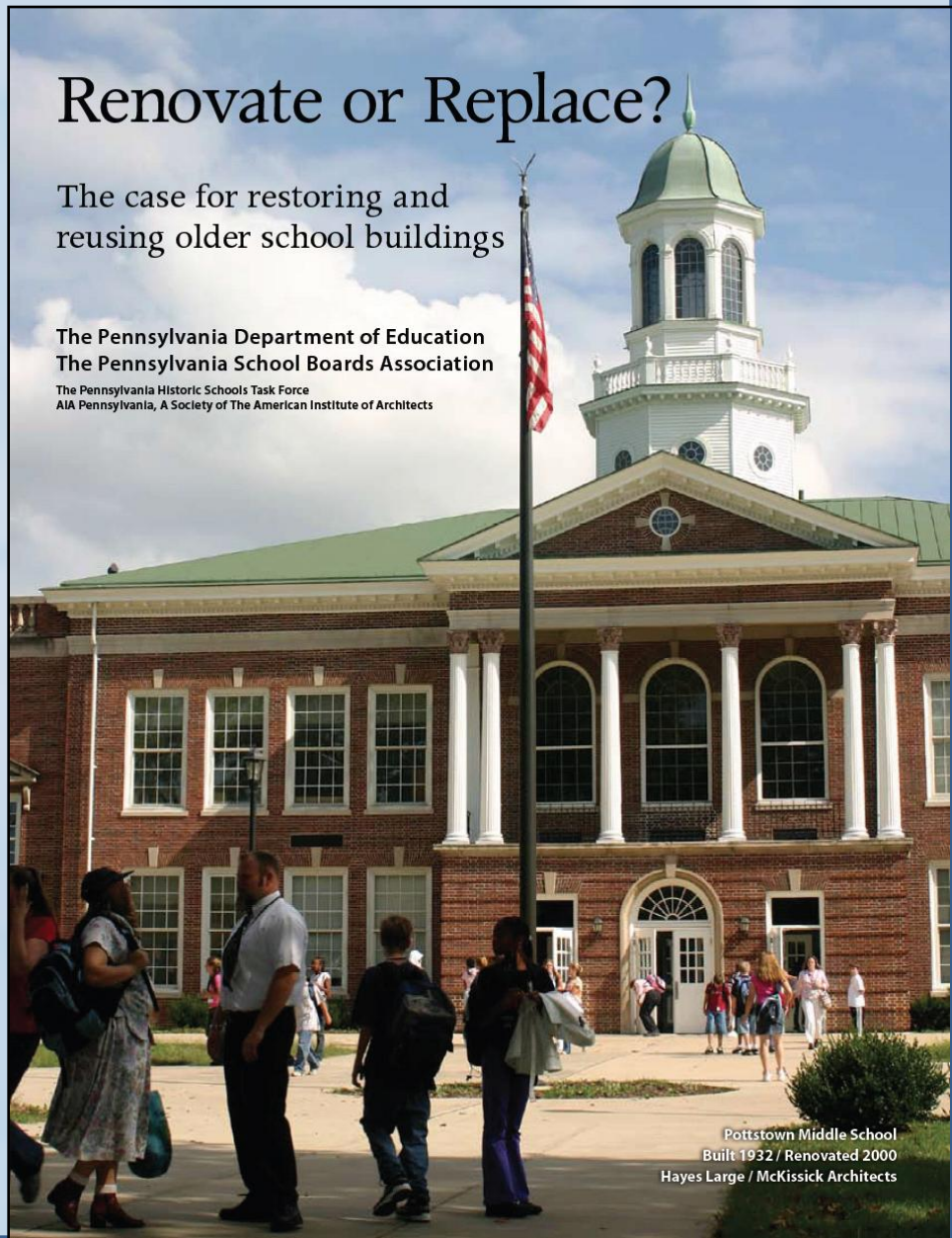
Implications for student performance

- Smaller schools are better for students:
  - education outcomes
  - social involvement
  - behavior
  - attendance rates
  - dropout rates
- All this "is particularly true for disadvantaged students, who perform far differently in small schools…"*

Raywid, Mary Anne; *Small Schools: A Reform That Works*; Educational Leadership, December 1997/January 1998, Volume **55** | Number **4**; Pages 34-39.

State Solutions

- Pennsylvania policy now makes renovation easier.
- Maryland's School Construction Program favors renovating versus constructing new schools.



http://www.saveourlandsaveourtowns.org/

Good News: Safe Routes to School

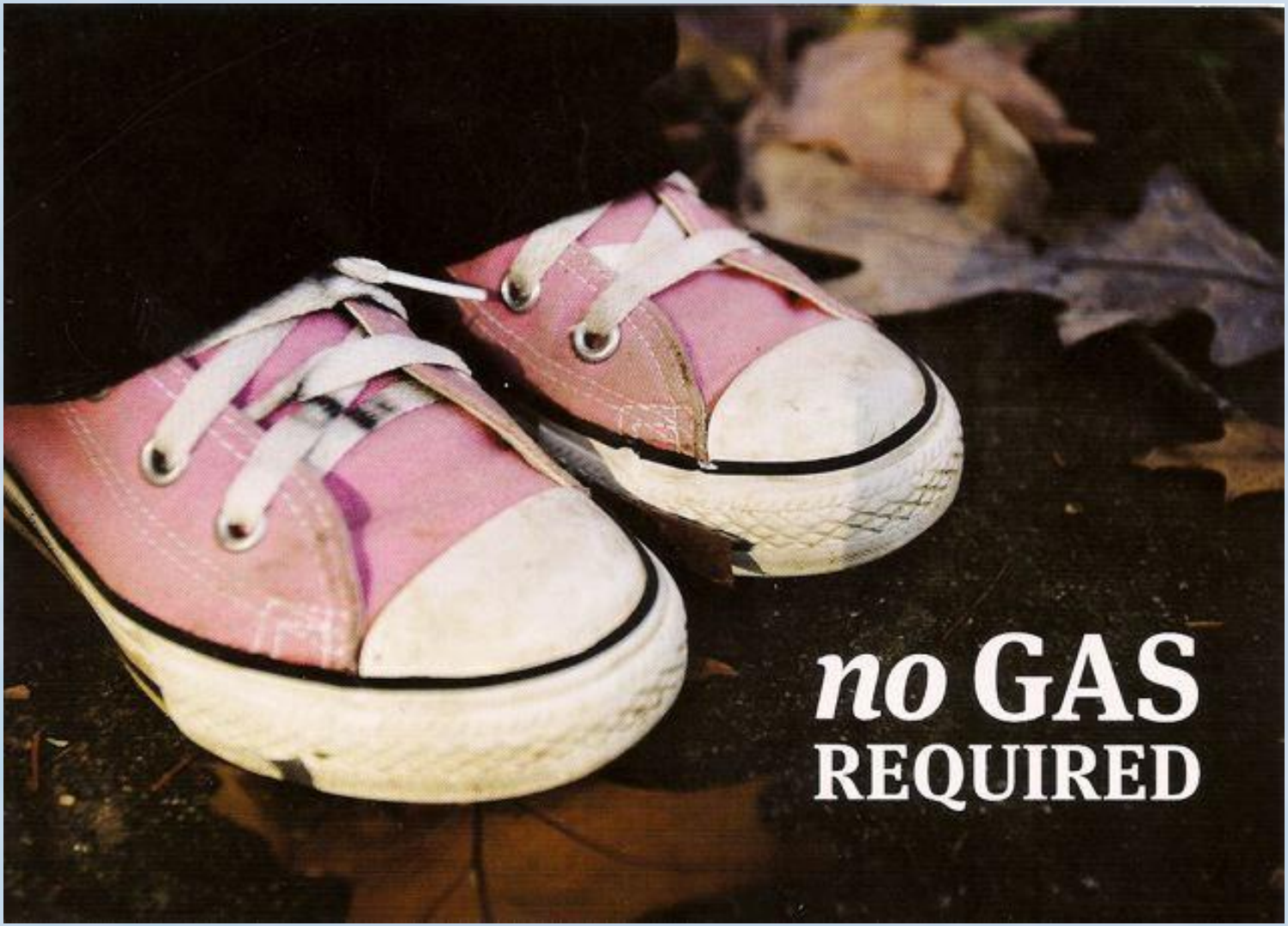


Image courtesy of: www.saferoutesinfo.org

John A. Johnson Achievement Plus Elementary School

St. Paul, Minnesota

YMCA

Infant day care

John A. Johnson Achievement Plus Elementary School
St. Paul, Minnesota

Some Important Characteristics:

- The compact, multi-story building fits seamlessly into the community
- Restoration of the school has had a positive effect on the surrounding neighborhood
- Attended by residents of all ages, the new facility is a hub of community life
- Only 8 of over 300 students ride the bus

EPA Voluntary School Siting Guidelines:

Energy Independence and Security Act of 2007

Sec. 502. Model Guidelines for Siting of School Facilities

Not later than 18 months after the date of enactment of this section, the Administrator, in consultation with the Secretary of Education and the Secretary of Health and Human Services, shall issue voluntary school site selection guidelines that account for—

(1) the special vulnerability of children to hazardous substances or pollution exposures in any case in which the potential for contamination at a potential school site exists;

(2) modes of transportation available to students and staff;

(3) the efficient use of energy; and

(4) the potential use of a school at the site as an emergency shelter.

Model School Environmental Health Program

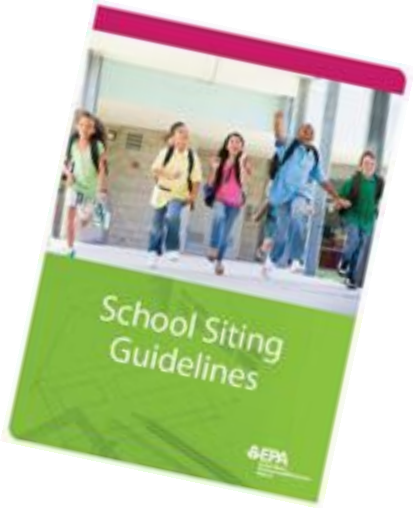
Kara Belle
US EPA Office of Children's Health Protection

Response to EISA

EPA has taken the following actions in response to the EISA mandates:

1. **Siting Guidelines** (Released Fall 2011) – Guidance to help school districts and community members evaluate environmental factors to make the best possible school siting/location decisions.

2. **State School Environmental Health Program Guidelines** (Plan to be released October 2012) – Guidance to help states, tribes, and territories establish and sustain K-12 school environmental health programs to support schools and school districts in creating healthy learning environments.



Model K-12 School Environmental Health Program

- Five Key Components of a K-12 School Environmental Health Program
  - There are five broad components of environmental health issues that schools need to address to ensure school environments are healthy and promote high achievement.
  - The five components are:
    - Routine Cleaning and Maintenance
    - Prevent Mold and Moisture
    - Manage Chemicals and Environmental Contaminants
    - Maintain Good Ventilation
    - Control Pests and Reduce Pesticide Use

Model K-12 School Environmental Health Program

- Five Key Components of a K-12 School Environmental Health Program
  - The five components are organized into a three-tier structure to demonstrate how every school can take actions to improve environmental health.

Tier 1
Actions are low cost fixes schools can make immediately, and are a good starting point for schools with little or no previous experience with environmental health programs.

A

Tier 2
Actions are essential components of a fundamental K-12 school environmental health program.

A+

Tier 3
Actions are provided for schools that have established a successful K-12 school environmental health program and are looking for ways to enhance their pre-existing program.

A++

Model K-12 School Environmental Health Program

- Additional Opportunities for Promoting Environmental Health in School Facilities
  - This section contains three major topics:
    - New Construction and Renovation Projects
      - This topic presents practices and actions schools and school districts should consider during the design and planning phases of construction projects and building renovations.
    - Enhancing Classroom Comfort
      - This topic presents actions schools can take to address environmental distractions (e.g., poor lighting, glare, poorly controlled temperature and humidity, excessive ambient noise, and poor acoustics).
    - Energy and Water Efficiency
      - This topic presents actions schools can take to make their facilities more energy and water efficient while saving money, conserving resources, and enhancing the health and quality of the learning environment.

Model K-12 School Environmental Health Program

- Faculty and Staff Training
  - Training ensures school faculty and staff understand their roles and how they can contribute to the success and sustainability of a K-12 school environmental health program.
  - This section describes specific issues and topics that training activities should address for each of the key components of the model program.
- Student Curriculum
  - Students should be educated on environmental health policies and procedures, and instructed on how they can contribute to sustaining a K-12 school environmental health program.
  - Environmental health projects can easily be incorporated into appropriate lesson plans (e.g., science and health).
  - Student involvement will give them a sense of ownership and accountability in the program.

Case Studies

- Case studies from existing programs at the state level (guidelines) and the school/district level (model program) are highlighted to demonstrate best practices for establishing and sustaining a school environmental health program.
  - Colorado Connections for Healthy Schools
  - Kentucky Energy Efficiency Program for Schools (KEEPS)
  - Connecticut Tools for Schools Program
  - And others

For More Information

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The Role of ENERGY STAR in Sustainable K-12 School Environmental Health Programs

Presented by Kudret Utebay
Consultant to EPA's ENERGY STAR Program

U.S. Environmental Protection Agency

2012

Agenda

- ENERGY STAR Overview
  - ENERGY STAR for K-12 Schools
- Energy Efficiency and Indoor Air Quality
- Cost Savings Potential
  - Reduce energy costs and invest in IAQ
- ENERGY STAR Resources

What is ENERGY STAR?

- Voluntary climate protection partnership backed by EPA
- Strategic approach to energy management, promoting energy efficient products and practices
- Helps organizations save money and protect the environment
- Influential brand recognized by over 80 percent of U.S. households

ENERGY STAR for Buildings

- ENERGY STAR certified buildings use 35 percent less energy than average buildings

- As of June 2012, more than 16,500 buildings have earned the ENERGY STAR for energy efficiency

ENERGY STAR Labeled Building Profile

Ada County Courthouse & Administration Bldg
200 W Front Street
Boise, ID 83702

The Ada County Courthouse and Administration building is a five-story, 356,300 square foot building located at 200 West Front Street in Boise, Idaho. Construction of the facility began in January 2000 with occupancy in January 2002. It is a multi-purpose facility with offices and meeting rooms for County Commissioners and County employees in various administrative departments, as well as space for County court-related functions such as the Public Defenders' Office and Prosecuting Attorneys' Office. The facility serves the public by providing courtrooms for magistrate courts and district courts, along with other county services such as Vehicle Licensing and Welfare services.

The Ada County Courthouse and Administration building earned the EPA's ENERGY STAR largely as the result of excellent design and top-notch operations and maintenance (O&M) practices. The original design and equipment specifications incorporated energy efficient measures including a geothermal heating system, multi-staged chillers, variable drive pumps and motors, and fresh air economizers, all automatically controlled by a direct digital control (DDC) system. Other steps taken to increase efficiency include insulated ductwork, insulated water lines, Low-E (emissivity) glass, and window tinting. Energy efficient lighting was installed using mainly electronic ballasts and T-8 lamps. Modular workstations have a transparent panel on the top portion of the cubicle walls to allow the natural daylight to penetrate further into the space.

Energy efficiency and environmentally-responsible design was a priority from the beginning, but good O&M practices are equally important to keep the building operating as designed. Ada County is very proud to have earned the first ENERGY STAR through NACo's ENERGY STAR Courthouse Campaign.

Building Owner:* Ada County

Property Manager:* Ada County

Year(s) Labeled : 2008, 2007, 2006, 2005, 2004

Facility Type: Courthouse

Total Floorspace: 356300 sf

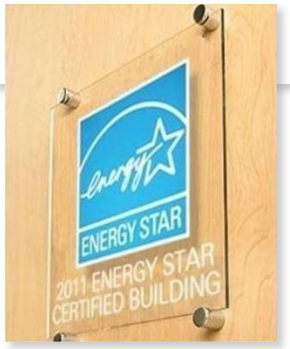
Year Constructed: 2000

Energy Intensity: 63 kBtu/sf/yr

Contract Type: None

Technologies Used:

Stage 2-Lighting
+ Daylighting
+ Electronic Ballasts
+ T8 or T5 Lamps
Stage 4-Fan Systems



K-12 Statistics

- The nation's 17,450 K-12 school districts spend more than **$8 billion** annually on energy
- The least efficient schools use **three times more** energy than the best energy performers
- Top performing ENERGY STAR certified schools cost **40 cents per square foot less** to operate than the average school

ENERGY STAR and K-12

- Over 6,100 ENERGY STAR certified K-12 buildings
- Over 1,100 K-12 ENERGY STAR Partners
- 223 of the 262 ENERGY STAR Leaders are from the K-12 sector

*** figures current as of September 2012**

Why Incorporate Energy Efficiency and Indoor Air Quality?

- Energy savings can be used for facility improvements to enhance student health
- ENERGY STAR certified buildings are on average 35 percent more efficient than similar buildings
- ENERGY STAR certification requires conformance with industry IAQ standards:
  - ASHRAE standard for thermal comfort
  - IESNA standard for lighting/illumination
- Many energy efficiency measures compatible with IAQ

Some Best Practices for Energy and Indoor Air Quality Management

- Seal off construction areas and use temporary fans and ducts to direct work zone air directly outside during building retrofits.
- Ensure that air filtered back into the building is clean at all times.
- Maintain proper ventilation by increasing mechanically supplied air as necessary, particularly if insulation has been increased during a retrofit.
- Keep fans operating to ensure adequate ventilation during regular building operation.
- Do not reduce HVAC operating hours so much that occupant comfort is compromised.

Source: Energy Efficiency/Indoor Air Quality - http://www.energystar.gov/index.cfm?c=k12_schools.bus_schoolsk12_indoor_airquality

Energy Efficiency Measures with Benefits for Indoor Air Quality

- **HVAC maintenance and tune-ups**
  - Remove contaminants
- **Programmable thermostats**
  - Improve thermal comfort
- **Lighting and equipment upgrades**
  - Reduce excess heat / improve thermal comfort
  - Eliminate and properly dispose of PCBs
- **Well-sealed ducts**
  - Reduce pollutant sources

Source: Energy Efficiency/Indoor Air Quality - http://www.energystar.gov/index.cfm?c=k12_schools.bus_schoolsk12_indoor_airquality

Colorado Springs School District 11

- Indoor air quality (IAQ) goals
  - Temperature, humidity, and lighting levels
  - Ventilation, CO_2 levels, and minimized airborne contaminants
- Energy efficiency (EE)
  - ESPC
  - Installed heat recovery units with CO_2 monitors
  - Lighting retrofit and increased use of natural light

IAQ and Energy Efficiency Goals Met

- ≤ 25 kBtu/sf/year
- ≤ 700 ppm CO_2 during occupied hours
- ≤ 0.7 watts/sf artificial light
- 35 footcandles in classrooms
- $1.8 million annual savings

EPA

Carrollton-Farmers Branch Independent School District

- Holistic approach to indoor environmental quality (IEQ) and energy efficiency
  - Educates students and staff on how energy use impacts IEQ
  - Energy efficiency improvements benefitting IEQ
    - Lighting controls
    - DDC controls for HVAC

TIMES created in 2002

- *T**ools for Schools* (IAQ *TfS*)
- **I**ntegrated pest management
- **M**oisture management
- **E**nergy
- **S**afety and Security

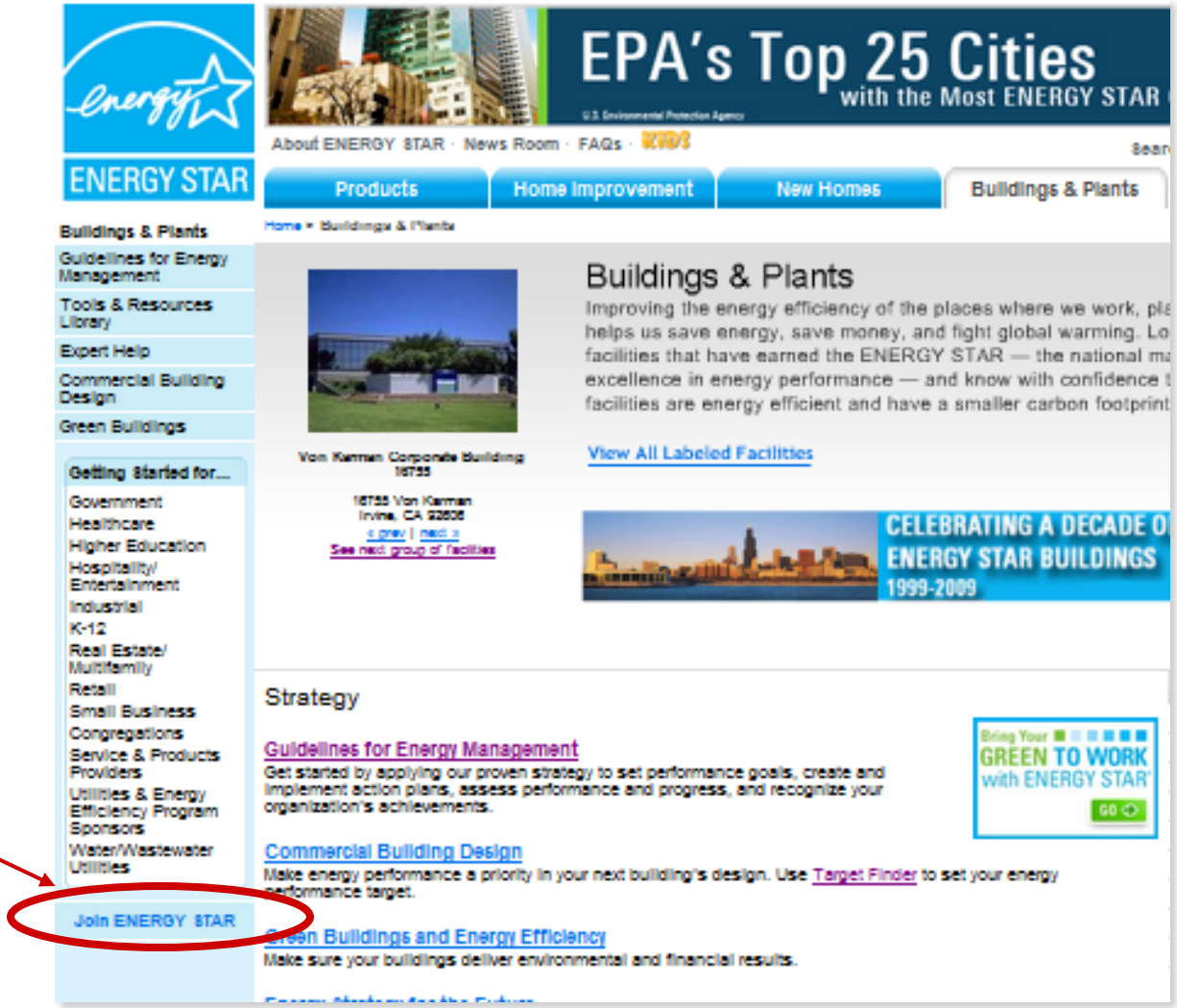
- In 2010, district expanded by approximately 100,000 sf without increasing energy use, due primarily to behavioral modifications

Become a Partner

Visit www.energystar.gov

1. Go to: the "Buildings & Plants" page

2. Click on: "Join ENERGY STAR"



ENERGY STAR Building Upgrade Manual

- Use to plan and implement cost-effective energy efficiency upgrades

energystar.gov/BldgManual

- Utilizes five stages:
  - Retrocommissioning
  - **Lighting upgrades***
  - Load reductions
  - Air distribution systems upgrades
  - HVAC upgrades
- K-12 information and strategies in Chapter 10

Guidelines for Energy Management

A roadmap to help organizations:

- Make a commitment to improve energy efficiency
- Assess energy performance
- Set reduction goals
- Track savings over time
- Recognize improvements

ENERGY STAR® Energy Management Assessment Matrix

ENERGY STAR

	Little or no evidence	Some elements	Fully implemented
Make Commitment to Continuous Improvement			
Energy Director	No central or organizational resource Decentralized management	Central or organizational resource not empowered	Empowered central or organizational leader with senior management support
Energy Team	No company energy network	Informal organization	Active cross-functional team guiding energy program
Energy Policy	No formal policy	Referenced in environmental or other policies	Formal stand-alone EE policy endorsed by senior mgmt.

Portfolio Manager

- Measuring and Tracking Utility Use
  - Benchmark the energy use of all of your buildings
  - Receive an utility use intensity and for some space types receive energy performance scores on a 1–100 scale.
  - Track changes in energy and water use over time in a building, groups of buildings, or entire portfolios
  - Track and report cost savings and CO_2 emissions
  - Apply for the ENERGY STAR
- Benchmarking Starter Kit can help you get started: energystar.gov/benchmark

ENERGY STAR Energy Efficiency Competition

Launch an ENERGY STAR Energy Efficiency Competition in your district to improve the energy efficiency of your schools

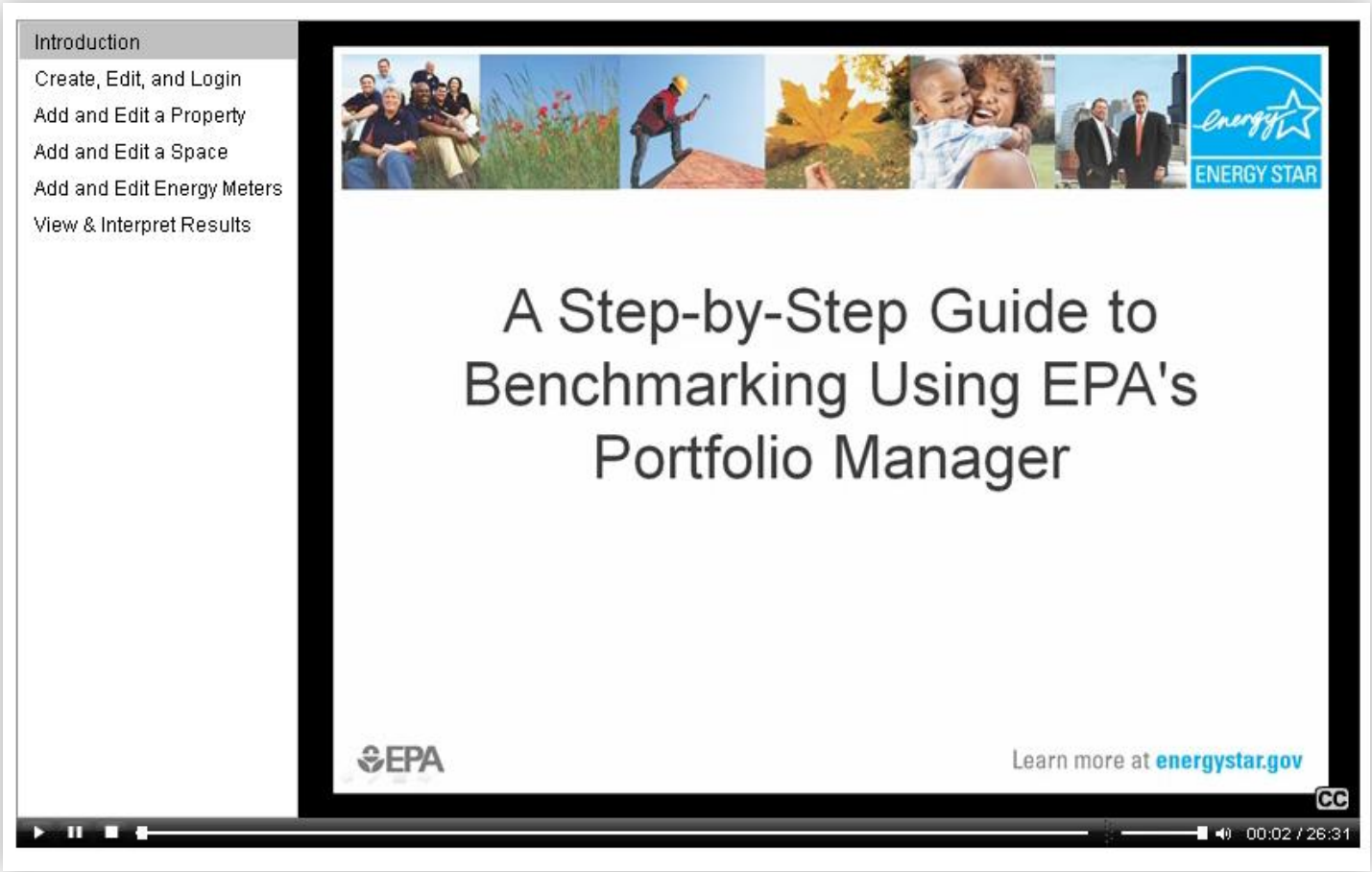
ENERGY STAR Guide to Energy Efficiency Competitions

- Significant cost savings
- Source of momentum
- Teaching opportunities
- Camaraderie & teamwork
- Positive media exposure
- Co-branding with ENERGY STAR

energystar.gov/competitionguide

ENERGY STAR Resources

- Trainings, Webinars, and Recorded Presentations



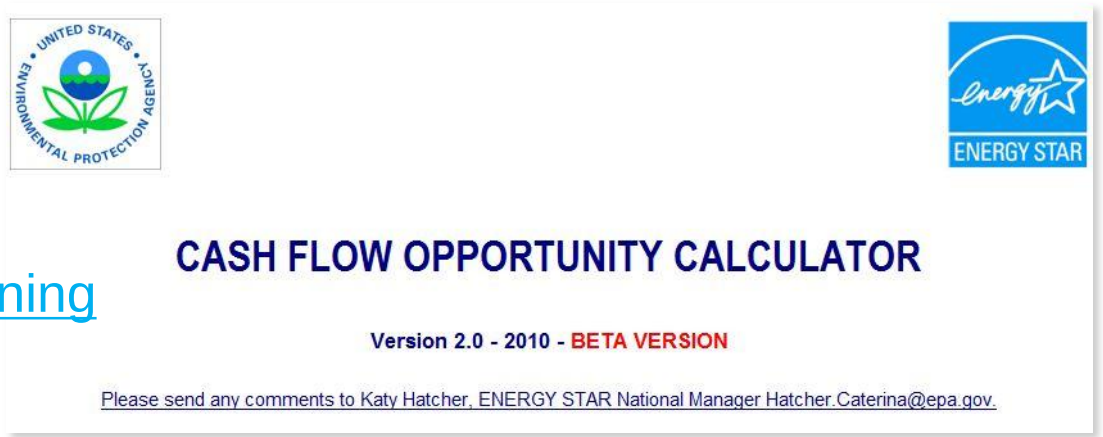
energystar.gov/buildingstraining

ENERGY STAR Resources

Cash Flow Opportunity Calculator

Addresses three critical questions about installing energy efficiency projects:

1. How much new energy efficiency equipment can be purchased from the anticipated savings?
2. Should this equipment purchase be financed now or is it better to wait and use cash from a future budget? (avoid paying interest)
3. Is money being lost by waiting for a lower interest rate?



energystar.gov/buildingstraining

ENERGY STAR K-12 Resources

- ENERGY STAR for K-12 Schools
- Database of ENERGY STAR certified schools
- ENERGY STAR for Kids
- Indoor Air Quality for Schools
- Financing energy efficiency projects
- ENERGY STAR qualified products

energystar.gov/k-12

Thank You!

- **For more information:**
  - Visit www.energystar.gov/buildings
  - Email buildings@energystar.gov