Energy Efficiency the Untapped Fuel to Fund Districts

National School Boards Association

Nashville, Tennessee

March 23, 2014

WARREN COUNTY PUBLIC SCHOOLS
WHERE CHILDREN PREPARE FOR SUCCESS

NEED
Putting Energy into Education

KENTUCKY SCHOOL BOARDS ASSOCIATION
KSBA
"A brighter future through better public schools"

ENERGY STAR AWARD 2014
PARTNER OF THE YEAR

SCHOOL ENERGY MANAGERS PROJECT
SEMP
Kentucky School Boards Association

Kentucky Schools

- 173 Districts - Boards
- 675,000 Students
- $50,428 Average Teacher Salary
- 1233 P-12 Schools
- 109,000,000 Square Feet
- 187 Day School Year

Statutory & Policy Drivers

- **KRS160.325 – School Energy Management** (July 2008)
  - Develop/ Implement/Monitor Energy Management Plan
  - Annual Report to Board, Cabinet and General Assembly
- **Governor's Energy Plan "Intelligent Energy Choices for Kentucky Future"** (November 2008)
  - Strategy 1: Improve the Energy Efficiency of Kentucky's Homes, Buildings, Industries, and Transportation Fleet
  - Key Player in that strategy is Kentucky's Public Schools

SEMP's Message:
Best Fuel Source – Energy Efficiency

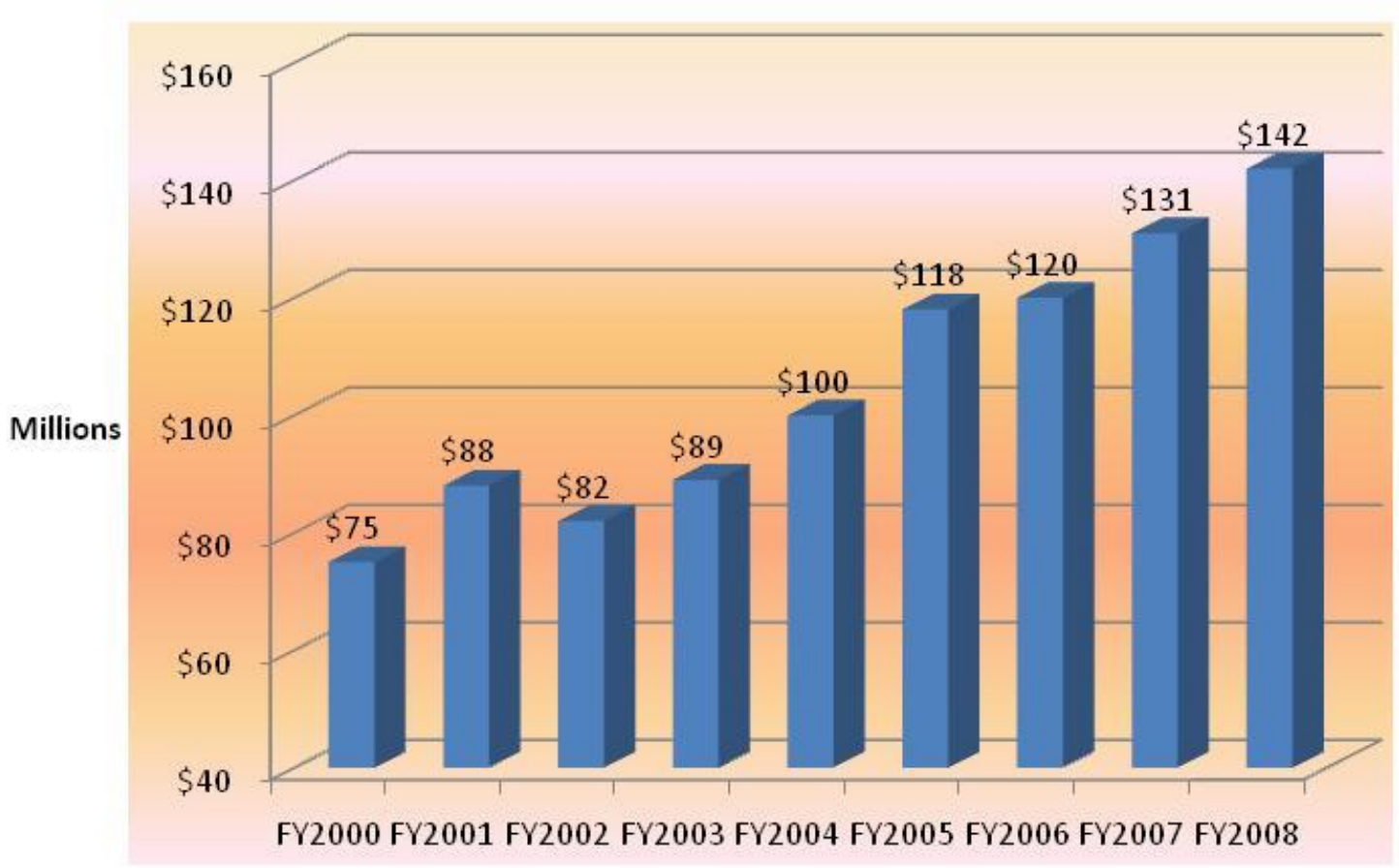
- Doesn't require new technology
- Can do it today
- Reduces Greenhouse Gas
- Lowers Cost
- Improves Energy Security

KENTUCKY SCHOOL BOARDS ASSOCIATION KSBA "A brighter future through better public schools"

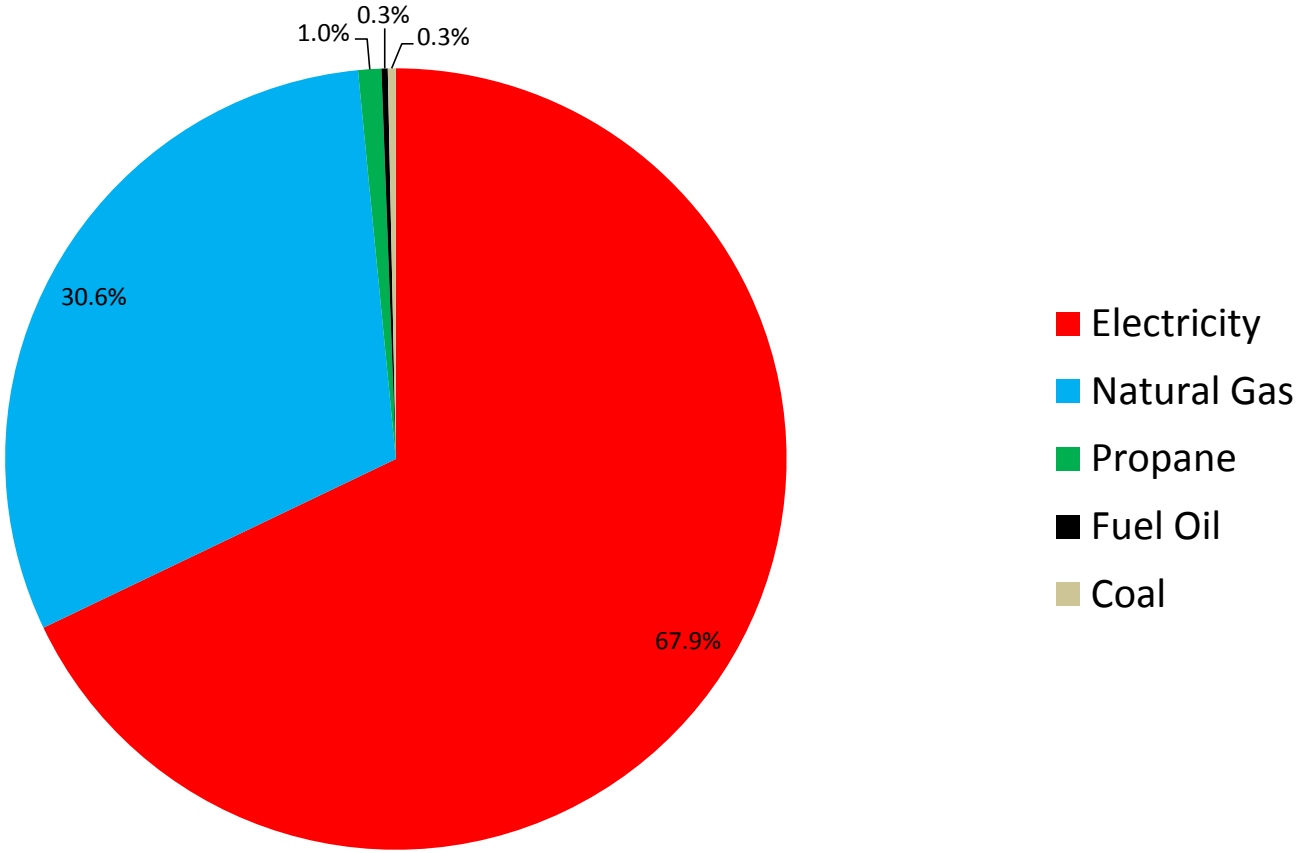
ENERGY STAR AWARD 2014 PARTNER OF THE YEAR

SCHOOL ENERGY MANAGERS PROJECT SEMP Kentucky School Boards Association

MUNIS K-12 Facility Energy Expenses
FY2000 - FY2008



Kentucky School Energy Profile



Energy Utilization Index
(EUI) Kbtu per square foot

	2010
National	73
Kentucky	**65**
ENERGY STAR	50
KY'S Best District	**43**
Net-zero Ready	<25

KENTUCKY SCHOOL BOARDS ASSOCIATION KSBA "A brighter future through better public schools"

ENERGY STAR AWARD 2014 PARTNER OF THE YEAR

SCHOOL ENERGY MANAGERS PROJECT SEMP Kentucky School Boards Association

Fundamental Challenge

- Core Business of Schools is Education
  - Difficult to fund non-classroom position
  - Look for grants
- Personnel Background is Education – not finance or energy
  - Fill positions from within district
- "not my money….just pay the bill"

Why an Energy Manager?

- Dedicated resource:
  - No priority shuffling
  - Significant ROI
  - Knowledgeable connection to utility companies

- Skilled resource:
  - Evaluates and presents energy saving options
  - Facilitates policy compliance
  - Translates technical information

"Boots on the Ground"

KENTUCKY SCHOOL BOARDS ASSOCIATION KSBA "A brighter future through better public schools"

ENERGY STAR AWARD 2014 PARTNER OF THE YEAR

SCHOOL ENERGY MANAGERS PROJECT SEMP Kentucky School Boards Association

District Energy Manager

- Coordinates Requirements of Board Policy
- Develops & Implements Energy Management Plan
- Commits to Performance Goals
- Analyzes and Implements ECMs
- Accumulates and Provides Data
- Saves Districts Energy and Dollars

KSBA SEMP Oversight

- Funding Sources for Energy Manager
- Professional Development
- Analytical & Engineering Support
- Outreach & Partner Collaboration
- Data Consolidation
- Reporting

Best Practices

- Data Integrity & Reporting
- Building Audits
- Energy Management Plans
- Building Automation Systems
- Lighting
- Building Envelope Integrity

Professional Development

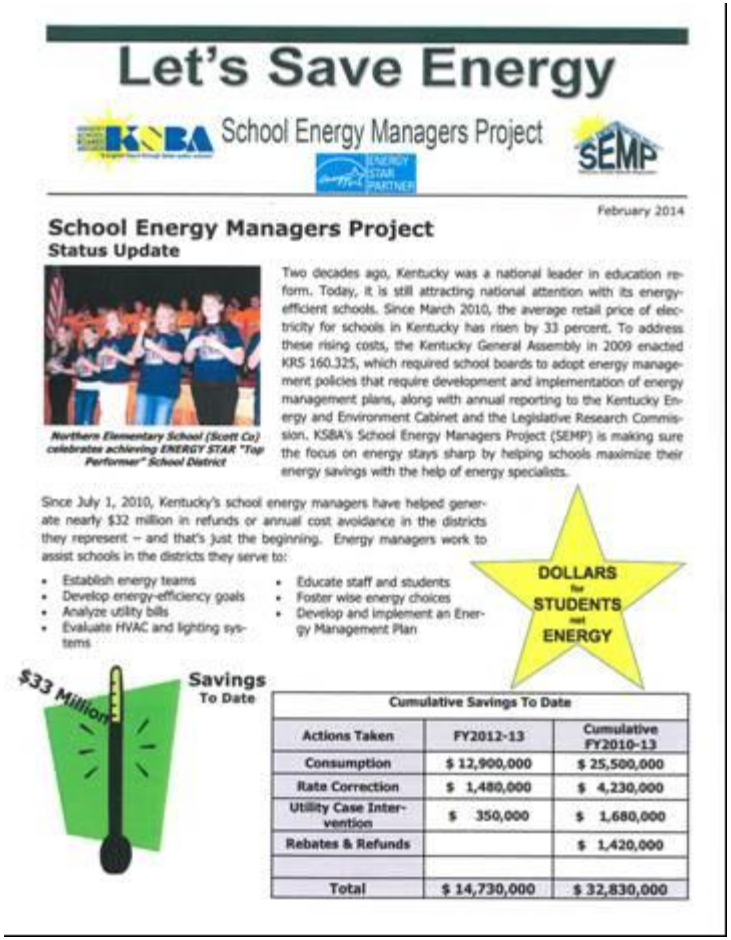
- Semi-annual Conferences
  - KY School Plant Managers
  - KY Assoc of Manufacturers
- Regional one-day
- Webinars

KENTUCKY SCHOOL BOARDS ASSOCIATION KSBA "A brighter future through better public schools"

ENERGY STAR AWARD 2014 PARTNER OF THE YEAR

SCHOOL ENERGY MANAGERS PROJECT SEMP Kentucky School Boards Association

Outreach



Let's Save Energy

KSBA School Energy Managers Project — SEMP

February 2014

School Energy Managers Project
Status Update

Northern Elementary School (Scott Co) celebrates achieving ENERGY STAR "Top Performer" School District

Two decades ago, Kentucky was a national leader in education reform. Today, it is still attracting national attention with its energy-efficient schools. Since March 2010, the average retail price of electricity for schools in Kentucky has risen by 33 percent. To address these rising costs, the Kentucky General Assembly in 2009 enacted KRS 160.325, which required school boards to adopt energy management policies that require development and implementation of energy management plans, along with annual reporting to the Kentucky Energy and Environment Cabinet and the Legislative Research Commission. KSBA's School Energy Managers Project (SEMP) is making sure the focus on energy stays sharp by helping schools maximize their energy savings with the help of energy specialists.

Since July 1, 2010, Kentucky's school energy managers have helped generate nearly $32 million in refunds or annual cost avoidance in the districts they represent – and that's just the beginning. Energy managers work to assist schools in the districts they serve to:

- Establish energy teams
- Develop energy-efficiency goals
- Analyze utility bills
- Evaluate HVAC and lighting systems
- Educate staff and students
- Foster wise energy choices
- Develop and implement an Energy Management Plan

DOLLARS for STUDENTS not ENERGY

Savings To Date

Cumulative Savings To Date		
Actions Taken	FY2012-13	Cumulative FY2010-13
Consumption	$ 12,900,000	$ 25,500,000
Rate Correction	$ 1,480,000	$ 4,230,000
Utility Case Intervention	$ 350,000	$ 1,680,000
Rebates & Refunds		$ 1,420,000
Total	$ 14,730,000	$ 32,830,000

- Presentations
  - Kentucky General Assembly Special Subcommittee on Energy
  - Midwest Energy Efficiency Alliance Benchmarking Conference
  - UK School Finance Officer Training Certification
  - KSBA's Annual Conference – "Is your energy score "Distinguished, Proficient or Needs Improvement?"
  - "Kentucky Public Schools Energy Management Report" at the High Performance Sustainable Schools Workshop
  - Kentucky Association of School Business Officials
  - Kentucky congressional delegation, Edison Electric Institute and Federal Department of Education Green Ribbon Schools Coordinator

KENTUCKY SCHOOL BOARDS ASSOCIATION KSBA "A brighter future through better public schools"

ENERGY STAR AWARD 2014 PARTNER OF THE YEAR

SCHOOL ENERGY MANAGERS PROJECT SEMP Kentucky School Boards Association

Energy In Education Collaborative

Working Together to Support Kentucky's Initiatives

DEDI
KENTUCKY DEPARTMENT for ENERGY DEVELOPMENT & INDEPENDENCE

The NEED Project
Putting Energy into Education

KENTUCKY Green & Healthy Schools
SCHOOL BUS

SCHOOL ENERGY MANAGERS PROJECT
SEMP
Kentucky School Boards Association

Student Involvement

The NEED Project

National Energy Education Development Project

Putting ENERGY into EDUCATION!

- Not-for-profit education association
- Founded in 1980
- Energy Curriculum for K-12
  - over 130 curriculum guides
  - correlated to NGSS (Next Generation Science Standards)
  - updated annually
  - FREE on the NEED website
- Student Engagement – Impacting Energy Behaviors in their schools, homes and communities.

Kentucky NEED
Success with Funding Partners

AEP KENTUCKY POWER®

LG&E® KU®

PPL companies

DUKE ENERGY®

Kentucky's Touchstone Energy Cooperatives®

DEDI
KENTUCKY DEPARTMENT for ENERGY DEVELOPMENT & INDEPENDENCE

Kentucky NEED
Success with Facilitation Partners

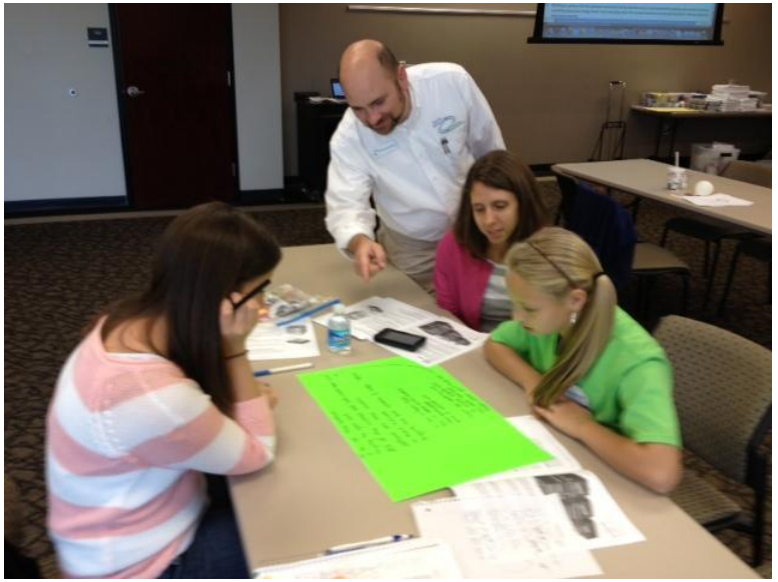
Success Story: Teacher Workshops

Providing professional development on ENERGY CONTENT.
To understand the SCIENCE of Energy – the SCIENCE of SAVING ENERGY

Success Story: Curriculum and Content Connections

Curriculum guides for:

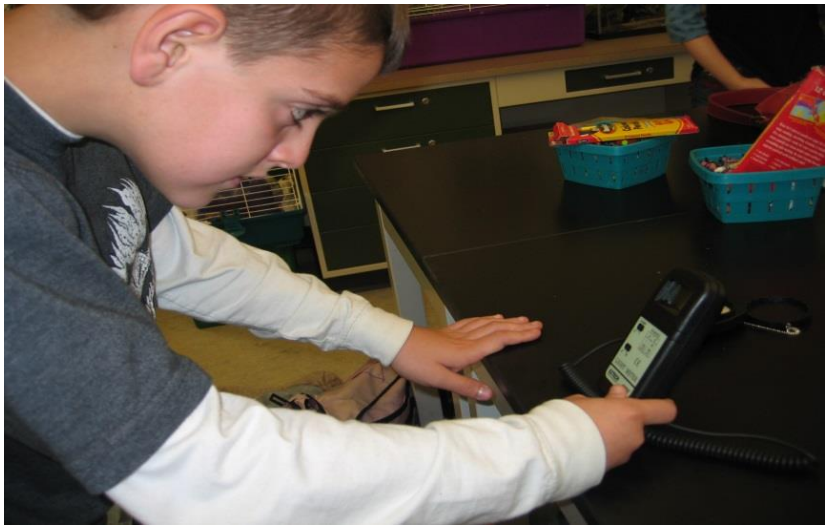
- Primary
- Elementary
- Intermediate
- Secondary



Interdisciplinary Approach to Teaching About ENERGY

- Science
- Math
- Social Studies
- Music and Drama
- and more!

Success Story: 100 Student Energy Teams



Success Story: Student Leadership

Success Story: High Performance Sustainable Schools Workshop

High Performance Buildings


Alvaton • Briarwood • Bristow • Cumberland Trace • Lost River • Natcher • North Warren • Oakland • Plano • Rich Pond • Richardsville • Rockfield • Warren Elementary • Warren East High • Warren Central High • South Warren High • Greenwood High • Drakes Creek Middle • Henry Moss Middle • South Warren Middle • Warren East Middle
WARREN COUNTY PUBLIC
SCHOOLS
WHERE CHILDREN PREPARE FOR SUCCESS

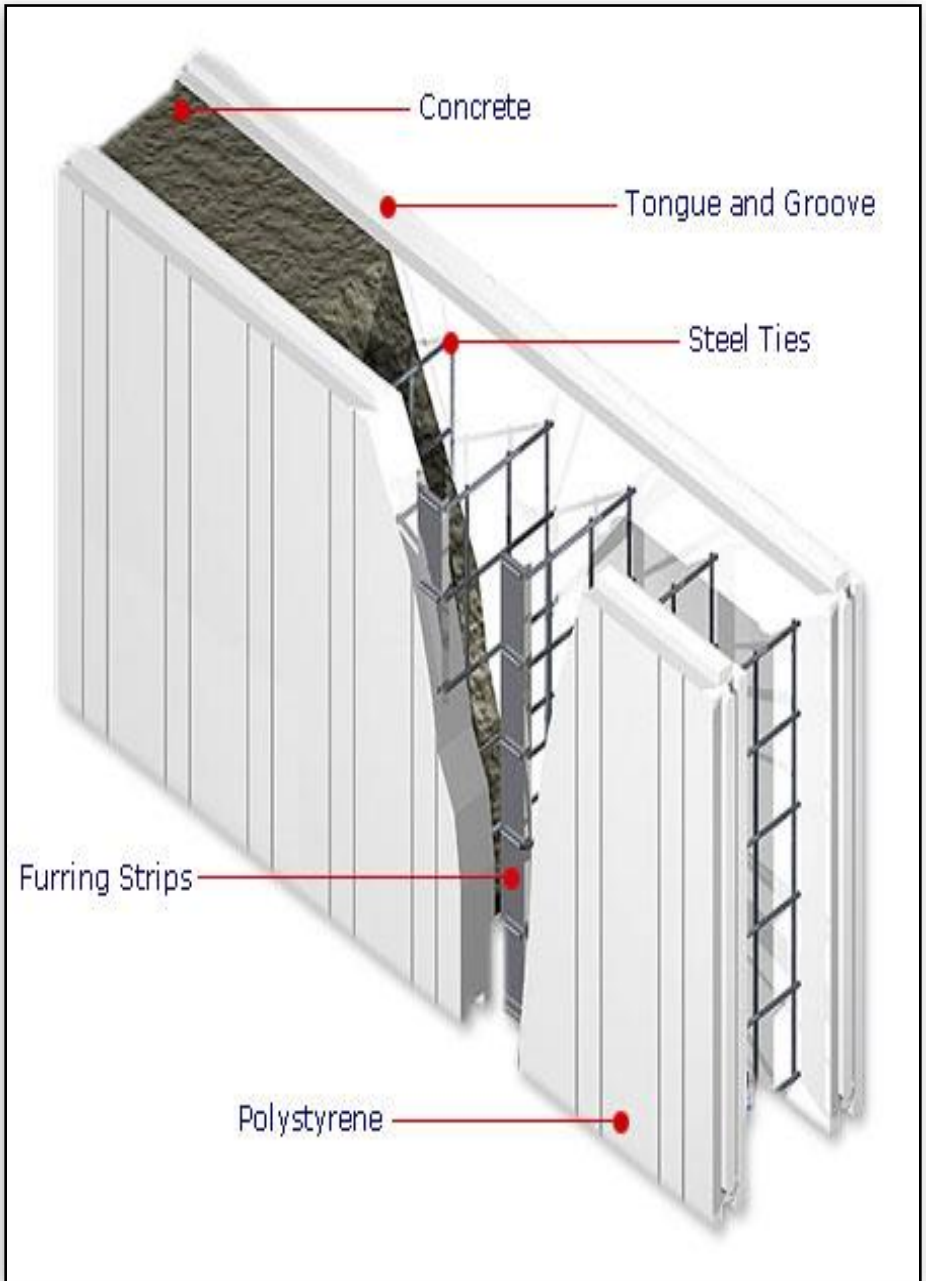
As our School District grew, so did our mindset.

- WCPS implemented an energy-savings program in 2003 that so far, has saved **$9 million** in energy costs.
- We have progressively designed our buildings to consume less energy while still being **cost effective.**

- In 2005, we looked for what we could do to increase our energy conservation efforts as we began **designing** for a new Alvaton Elementary School.

- Alvaton was the **first school** building in Kentucky built using Insulated Concrete Form (ICF).

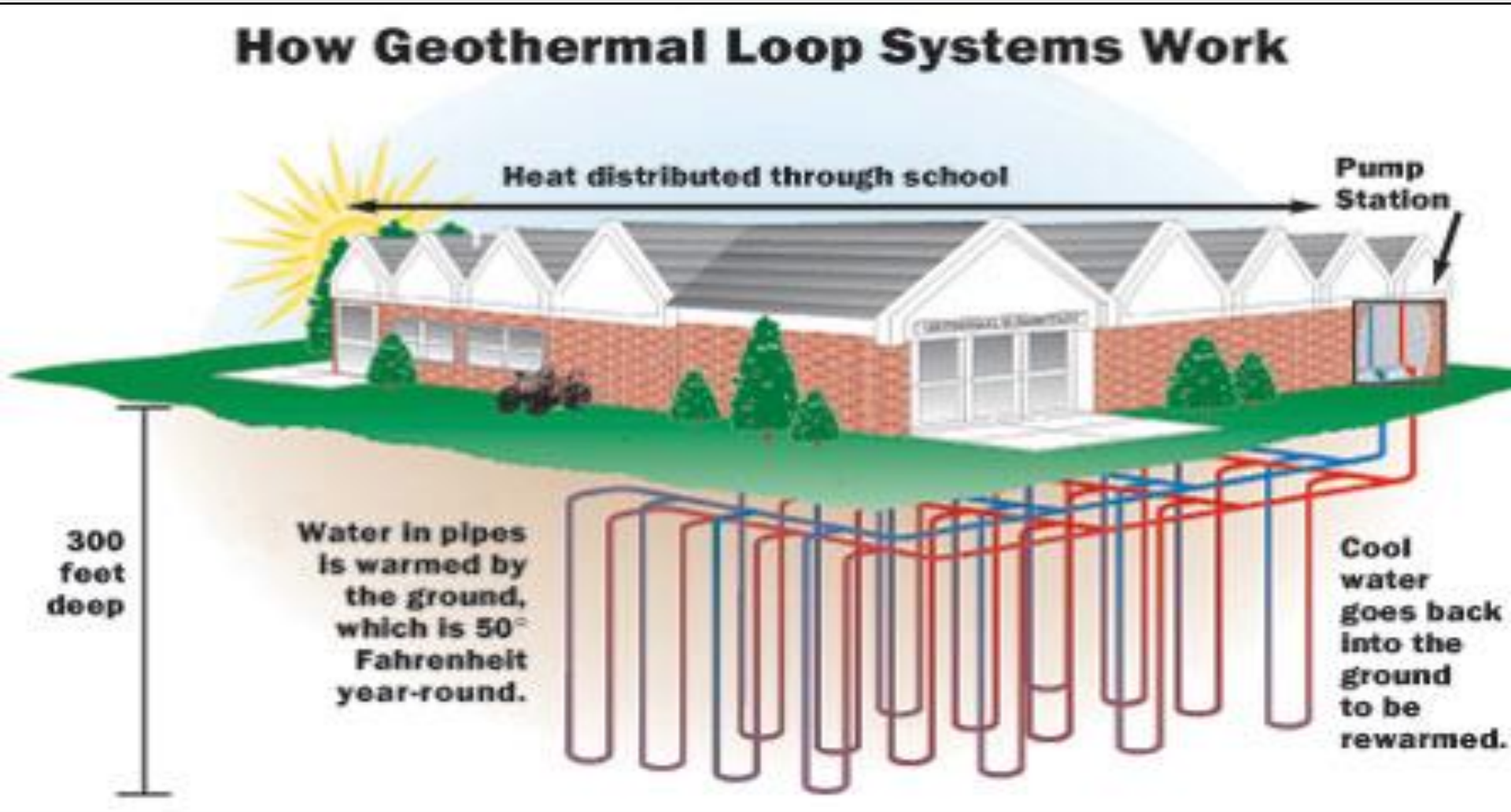
- ICF blocks are concrete-filled forms and they provide **triple the amount of insulation** most buildings feature.


Concrete
Tongue and Groove
Steel Ties
Furring Strips
Polystyrene

- Automated Lighting Controls.

- Also, an energy management system for HVAC scheduling.

Alvaton Geothermal




Alvaton Elementary
EMENTARY SCHOOL
Kentucky's First ICF School Building

- In 2007, Warren County Public Schools built an additional Elementary School (Plano Elementary)

- More growth = more opportunity!!!

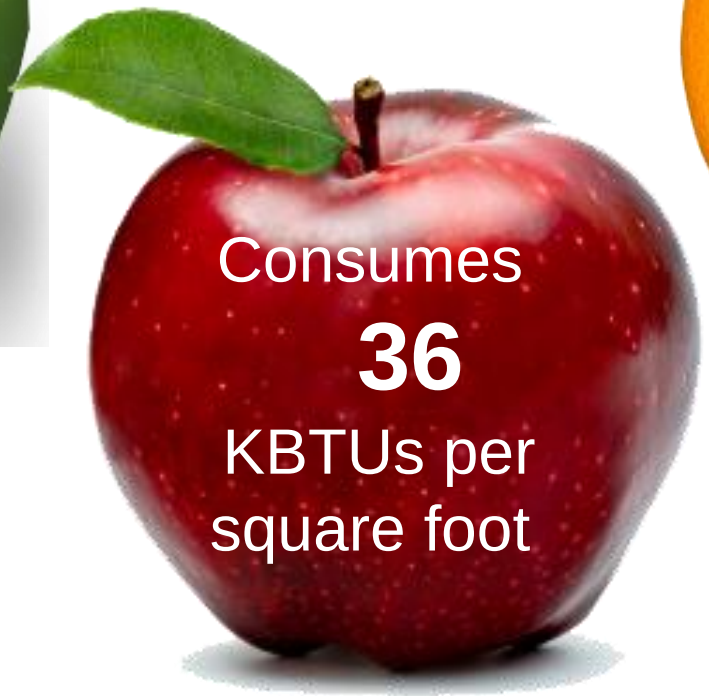
- We took all of the strategies we learned at Alvaton, and challenged ourselves to improve.

- For example, geothermal pumps to decentralized pumping.

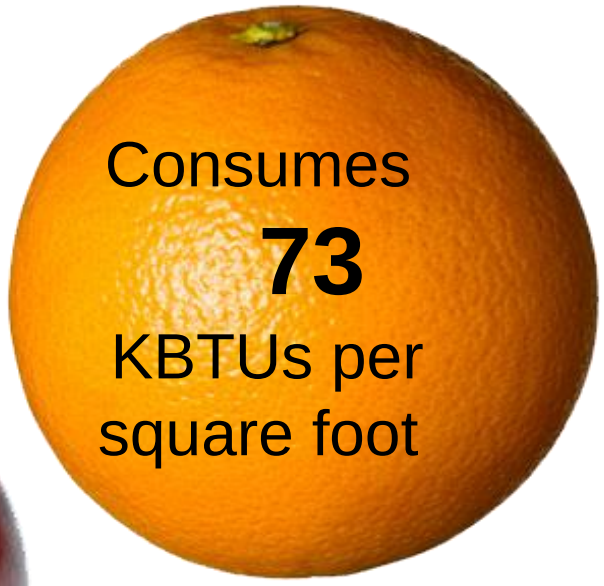
- Other strategies also included incorporating a super insulated roof covered with highly reflective material.

What Difference Did That Make?

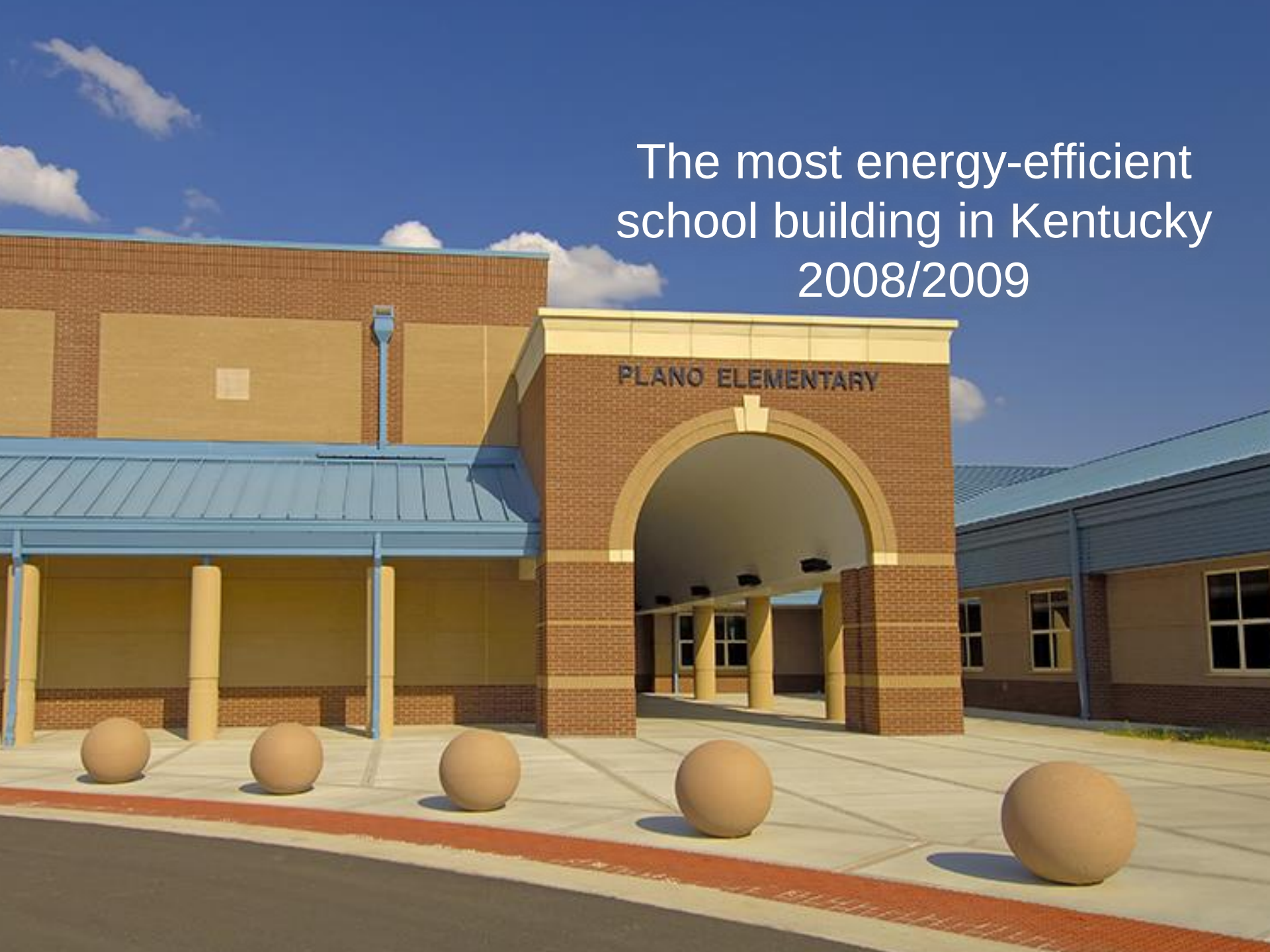
Plano Elementary



Alvaton Elementary



U.S. Average
School



The most energy-efficient school building in Kentucky 2008/2009

Beating the Best

Growth and Aging Buildings allowed us the opportunity to improve even more

The Net Zero Concept

- The questions then became: Could we create a building that **consumes a minimal amount of energy**?
- Could we then offset that consumption of **energy**?
- How?

Looking Closer At Plano

- By metering all areas of Plano school and finding the most energy consuming areas, the construction designs for replacement buildings at Bristow and Richardsville Elementary Schools began.

- The kitchen area was our big consumer of energy at Plano Elementary.

Mixing in the New

We sent our Food Service Director and others to North Carolina to learn best practices/ appliances from Duke Energy

- Our schools have gone to **combination ovens** to replace fryers

- These ovens use a combination of **steam and convection** to cook foods. Even French Fries are made healthier and better with these ovens.

Cooking up Savings

Duke Energy recommends using energy-efficient microwaves instead of stove tops

- By reducing the amount of heat/grease produced with stove ranges and skillets, we were able to use a more efficient hood.
- The hood has steam sensors and turns itself only if needed.

Richardsville Design

- Every element of the building design had to be considered for efficiency.
- To improve on previous design, the entire building, not just its perimeter, was made of ICF
- Architects used day lighting strategies to maximize sunlight usage to a whole new level

Richardsville Elementary

The Nation’s First Net Zero School

Sunny Days

- The school was designed to face the sunrise in the east
- The classrooms feature clerestory windows (a row just below the ceiling) that use light shelves to bounce light onto a specially designed ceiling


Solar Tubes exterior

Solar tubes have been placed in the second-story classrooms to provide sunlight—natural lighting directly into the building - classrooms.

They look like regular ceiling lights but give students the benefit of natural daylight

Automated dimming capable lighting in Richardsville dims or brightens accordingly to keep classrooms and hallways bright on even rainy days.

The HVAC uses carbon dioxide sensors to detect people/carbon dioxide in the rooms reducing HVAC run-times by turning off the outside air.

Meeting Tech Needs

- To reduce consumption, we opted to use laptop and iPad carts that can be wheeled into classrooms for usage.

Both Richardsville and Bristow feature a nanogel translucent window that provides twice the efficiency of a typical translucent window.

The gymnasium floors are made of bamboo because it is a more renewable source. A bamboo tree reaches maturity in only seven years.

Solar Energy

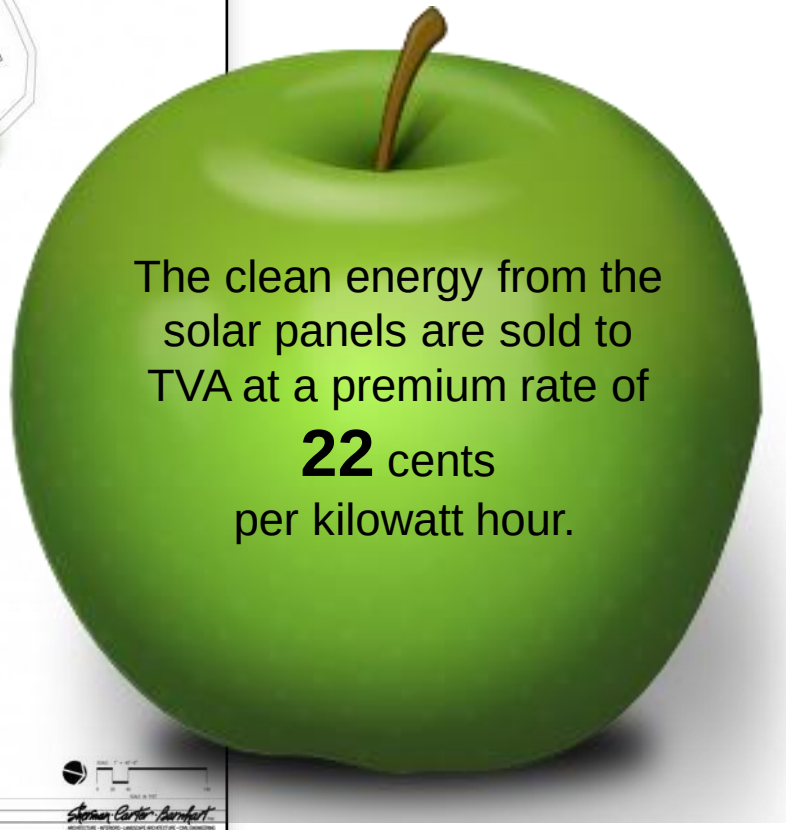
- The roof of the 77,000 square-foot building has 2,000 solar panels and a neighboring parking structure has 700 additional panels.

- The panels can create about 2,500 kilowatt hours of energy per hour on a sunny day -- enough to energize 50 homes.

We received $1.4 million in ARRA grants from DEDI to help fund the solar panels

KENTUCKY AT WORK

DEDI



This revenue offsets the operational costs of the building, allowing us to achieve an “energy neutral” building

Opening in 2010 also was South Warren High and Middle Schools

When we constructed South Warren Middle and High School, we used many of our same energy-saving initiatives

At 333,000 square feet, it was difficult to achieve Net Zero

Yet it is the largest ICF building in the nation

And contains 45 miles of geothermal piping

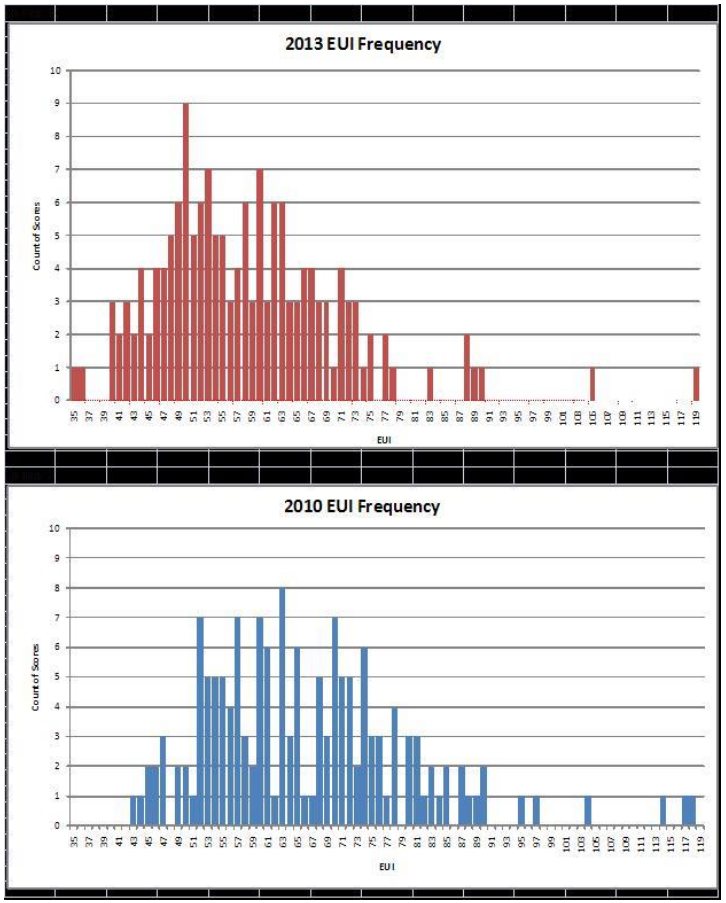
Our most recent Net- Zero ready school Jody Richards Elementary School

Improvements included solar tubes with GPS to better track the sun's movement and maximize day lighting in classrooms

The Report Card

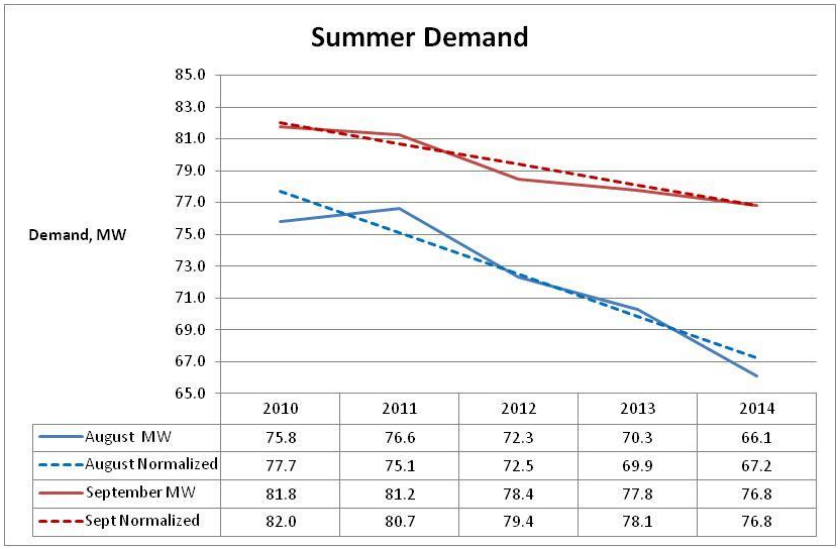
Energy Management Report

- 1st Statewide EMR Survey conducted using FY2009-10 data
  - District Information
  - Energy Fuels and Costs
  - Prior to Most Energy Managers
- 92% Participation Rate

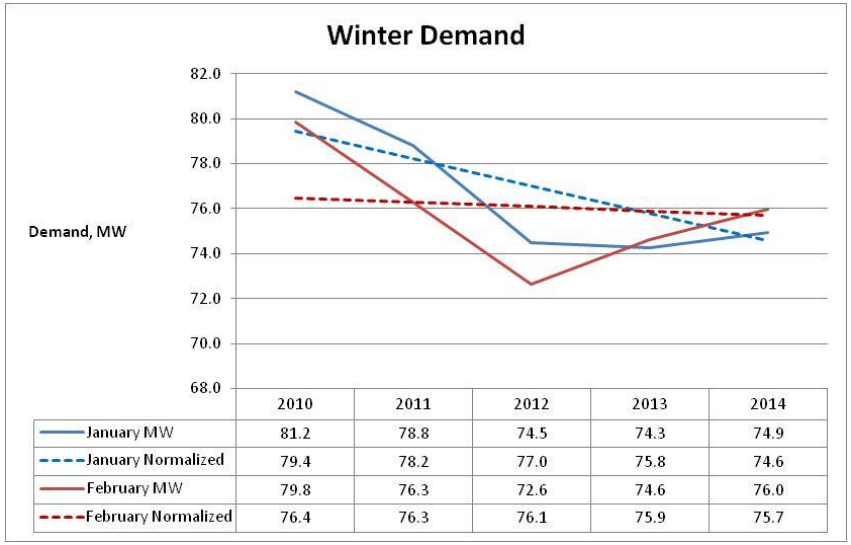


MUNIS K-12 Facility Energy Expenditures
FY2000 - FY2014

Demand Reductions



	2010	2011	2012	2013	2014
August MW	75.8	76.6	72.3	70.3	66.1
August Normalized	77.7	75.1	72.5	69.9	67.2
September MW	81.8	81.2	78.4	77.8	76.8
Sept Normalized	82.0	80.7	79.4	78.1	76.8



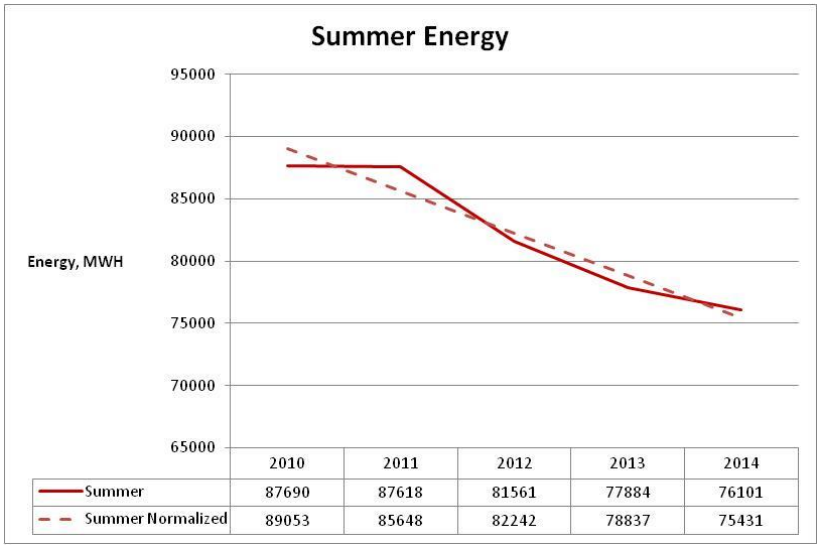
	2010	2011	2012	2013	2014
January MW	81.2	78.8	74.5	74.3	74.9
January Normalized	79.4	78.2	77.0	75.8	74.6
February MW	79.8	76.3	72.6	74.6	76.0
February Normalized	76.4	76.3	76.1	75.9	75.7

KENTUCKY SCHOOL BOARDS ASSOCIATION KSBA "A brighter future through better public schools"

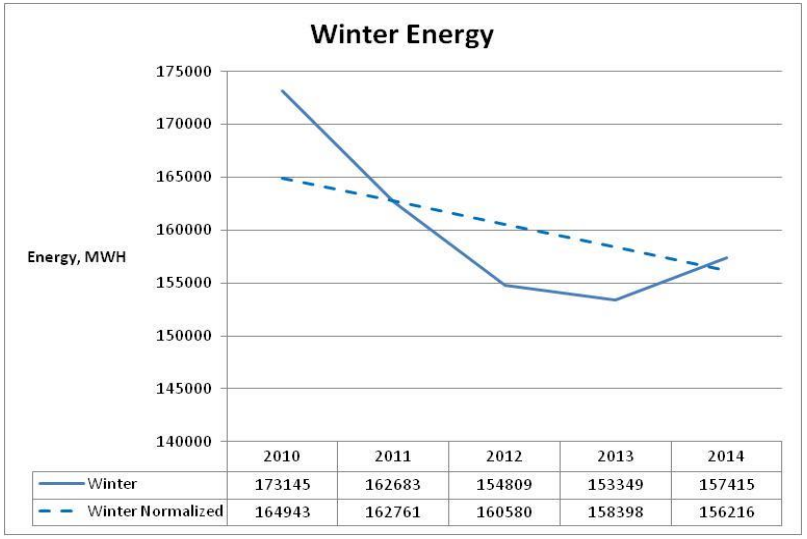
ENERGY STAR AWARD 2014 PARTNER OF THE YEAR

SCHOOL ENERGY MANAGERS PROJECT SEMP Kentucky School Boards Association

Energy Reductions



	2010	2011	2012	2013	2014
Summer	87690	87618	81561	77884	76101
Summer Normalized	89053	85648	82242	78837	75431



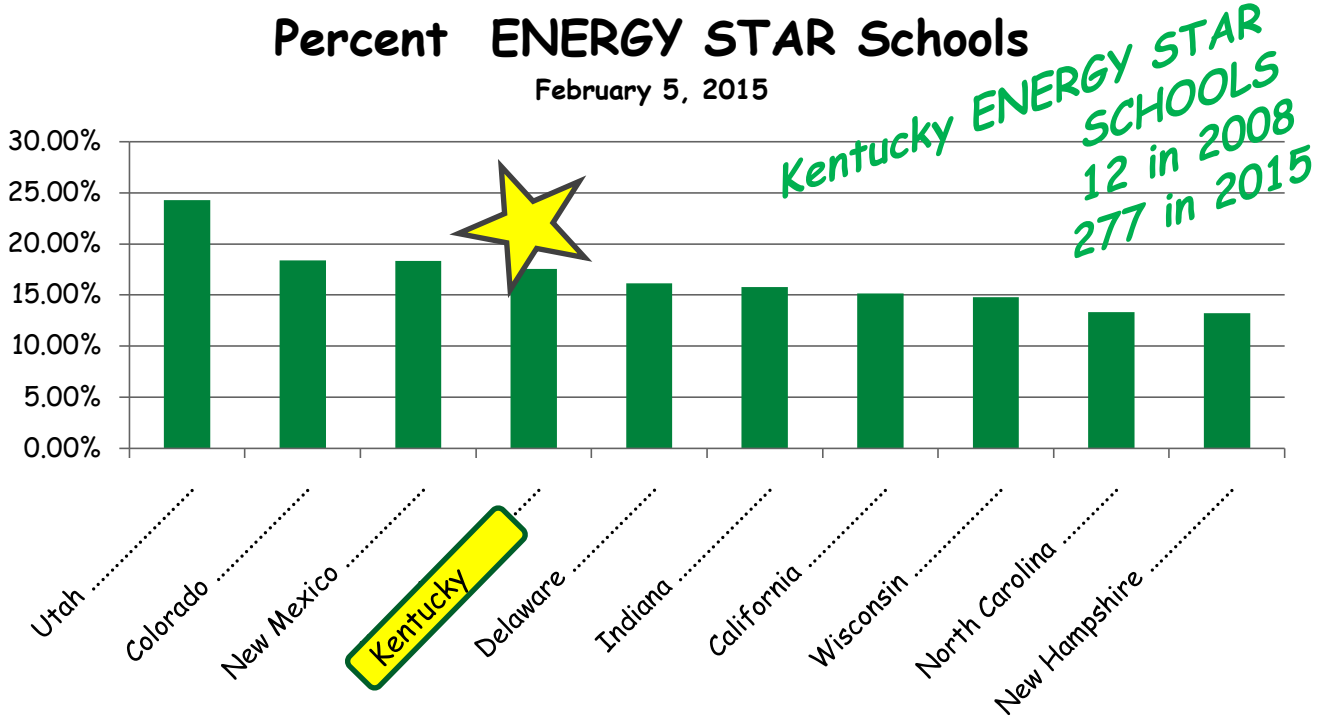
	2010	2011	2012	2013	2014
Winter	173145	162683	154809	153349	157415
Winter Normalized	164943	162761	160580	158398	156216

KENTUCKY SCHOOL BOARDS ASSOCIATION KSBA "A brighter future through better public schools"

ENERGY STAR AWARD 2014 PARTNER OF THE YEAR

SCHOOL ENERGY MANAGERS PROJECT SEMP Kentucky School Boards Association

ENERGY STAR Schools



KENTUCKY SCHOOL BOARDS ASSOCIATION "A brighter future through better public schools"

ENERGY STAR AWARD 2014
PARTNER OF THE YEAR

SCHOOL ENERGY MANAGERS PROJECT SEMP Kentucky School Boards Association

Avoided Costs

	FY13FY14	Cumulative
Consumption	$ 10,913,104	$ 37,868,024
Rebates	$ 393,528	$ 1,467,915
Refunds		$ 846,098
Rate Correction	$ 1,852,811	$ 6,081,790
Rate Intervention	$ 350,000	$ 2,032,752
Total		**$ 48,296,579**

KENTUCKY SCHOOL BOARDS ASSOCIATION KSBA "A brighter future through better public schools"

ENERGY STAR AWARD 2014 PARTNER OF THE YEAR

SCHOOL ENERGY MANAGERS PROJECT SEMP Kentucky School Boards Association

School Energy Managers Project

"ENERGY EFFICIENCY PROGRAM DELIVERY"

- Introduce Energy Managers into schools via partnerships
- Resultant Energy and Cost Savings
- As measured by
  - Increased Energy Efficiency
  - Reduced and Avoided Costs
  - # of ENERGY STAR Schools

KENTUCKY SCHOOL BOARDS ASSOCIATION KSBA "A brighter future through better public schools"

SCHOOL ENERGY MANAGERS PROJECT SEMP Kentucky School Boards Association

Questions???