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ABSTRACT

The geothermal heat pump (GHP) is winning praise for its ability to help schools reduce energy costs while providing a clean, comfortable, quiet, and aesthetically pleasing heating and cooling capability. This pamphlet examines the benefits of installing a GHP system in new and existing school facilities, suggests the type of planning and partnerships needed for forming a GHP project, and discusses the assessment process for valuing a GHP system. Finally, the pamphlet examines how using the GHP system in the United States can ultimately reduce energy costs for fossil fuels and strengthen the country's economy, while lowering air pollution levels. Appendices list national GHP groups and associations that can provide support and information for a GHP effort and the names of schools in each state that already are GHP equipped. (GR)

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United States
Environmental Protection
Agency

EPA 430-K-97-001
September 1997

Air and Radiation (6202J)

EPA

# Schools + GHPs = Savings & Efficiency

ED 425 618

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Office of Educational Research and Improvement
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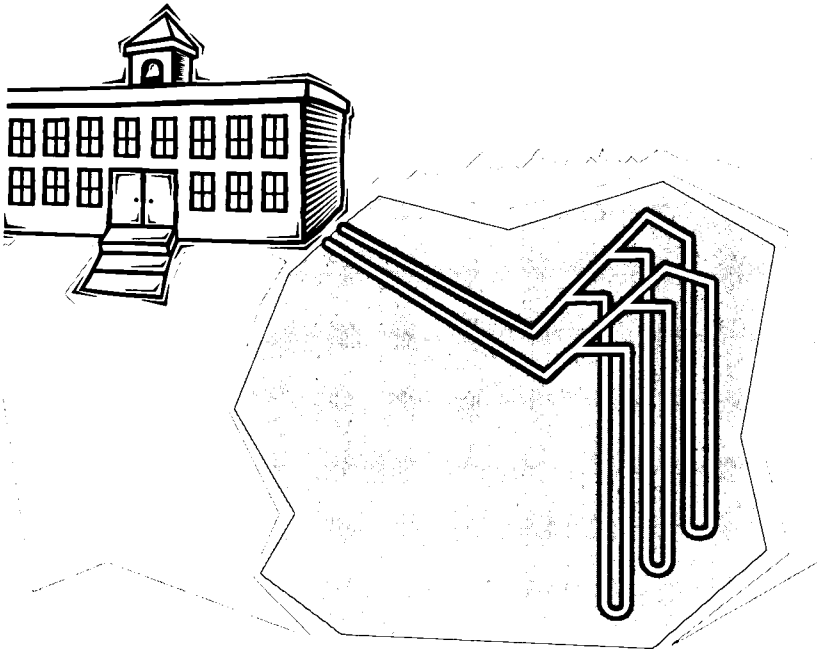

EF 005 114



## ENERGY STAR® Programs and GHP Technology Get An A+

The U.S. Environmental Protection Agency's (EPA) Atmospheric Pollution Prevention Division offers a broad range of pollution-prevention programs that work with private industry and state and local governments to voluntarily and profitably reduce air pollution. These innovative programs help consumers, businesses, and other organizations save energy and save money. They include the GREEN LIGHTS® Program, ENERGY STAR® Programs, and other initiatives that seek to improve our environment while also improving the bottom line. These programs are designed to help achieve the goals of the U.S. Climate Change Action Plan, which aims to cost effectively reduce U.S. greenhouse gas emissions to 1990 levels by the year 2000.

In 1993, EPA published the report, *Space Conditioning: The Next Frontier*. This report identified geothermal heat pumps (GHPs) as the most environmentally friendly and energy-efficient technology for the majority of areas in the United States. Based on this information, EPA encourages schools to consider GHP technology. In fact, approximately 650 schools in 30 states already enjoy the benefits of GHPs, including lower heating and cooling system operating costs.



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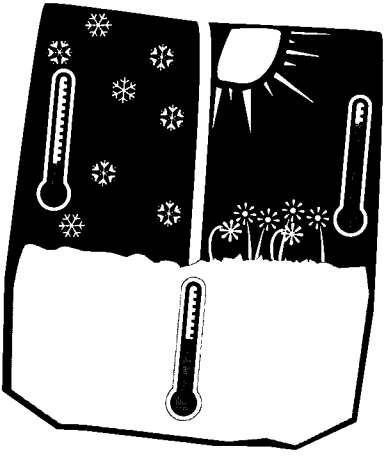

## The ABCs of GHP Technology

GHPs work by moving heat, rather than by converting chemical energy from a fossil fuel into heat by burning it. In fact, they work like ordinary air conditioners or heat pumps, but use the constant temperature of the ground—rather than the outside air—to provide heating and cooling. GHPs are able to supply as much heating or cooling as a more traditional system using 25 percent to 75 percent less energy. By using less energy, GHPs save money and reduce air pollution.

In the winter when the outside air is cold, the ground is still relatively warm—anywhere from 45 to 70 degrees. In the summer the ground is still 45 to 70 degrees and therefore cooler than the outside air. GHPs take advantage of these relatively stable ground temperatures by concentrating and moving that heat (or coolness) into the building.

GHPs capture that energy in one of two ways: 1) by pumping ground water up, extracting energy from it, and then either reinjecting it or disposing of it; or 2) by burying pipes underground that circulate water; the water is warmed or cooled by the ground and then returns to the system. In either case the GHP concentrates the heat or coolness (using a vapor compression cycle just like your refrigerator or air-conditioner) and delivers that warmed or cooled air to the building.

The geothermal heat pump uses electricity to operate the compressor, pumps, and controls, but the majority of the energy provided by the system is the abundant, renewable, clean energy stored in the earth.

## GHPs in Schools: Chalking Up Savings

Schools can significantly decrease operating costs, such as utility bills and maintenance expenditures, by installing GHPs. The money saved is then available to be reallocated to meet other school needs such as books, computers, or teacher salaries. U.S. schools that switched to GHPs saved an estimated $6 million in 1995 alone.

In almost all cases, operating costs associated with GHPs are lower than those of other heating and cooling systems. Although energy savings can vary, savings of 40 percent or more on annual heating and cooling expenditures are not uncommon. The actual savings will depend on the type of system being replaced and the characteristics of a given location, such as other heating and cooling system options, utility rates, availability of natural gas, weather, hydrology, and geology. The energy and financial savings potential on a national basis is tremendous. In fact, if every school district that needed to replace heating and cooling systems over the next ten years decided to install GHPs, the total energy savings over that time would exceed $11 billion.

**Projected Energy Dollar Savings from GHPs, 1996–2005**
**(in billions)**

| | Percent of Schools Installing GHPs | | | |
|---|---|---|---|---|
| | 25% | 50% | 75% | 100% |
| ***Savings*** | ***$2.9*** | ***$5.8*** | ***$8.7*** | ***$11.6*** |

The financial benefits of GHPs clearly surpass those of traditional heating and cooling equipment. In Austin, TX, an engineering firm conducted a *value engineering study* to compare GHPs, conventional heating and cooling systems with chillers and boilers, and air source heat pumps. The study determined that given the current cost of energy and equipment, GHPs were the most financially beneficial heating and cooling choice for their schools. The study also predicted that as energy costs increase, the advantages of the GHP system will increase even more.



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## New Schools & GHPs a Winning Combination

While the capital costs of installing a GHP system may be more than conventional systems, GHPs' decreased operating costs make it economically prudent for new schools to invest in this technology at the outset rather than waiting for a renovation project.

For instance, at Lake City High School, in Coeur d'Alene, ID, an engineering firm initially proposed the use of GHPs. When a fifty-person steering committee of teachers, administrators, architects, engineers, and utility experts considered the pros and cons of GHPs, their primary reason for installing this system was lower life cycle costs. And, in 1984, a GHP system was installed in a new classroom wing at an Austin, TX, elementary school, saving the school $30,000 in annual energy costs. In fact, more than half of the 100 schools in the Austin Independent School District are saving money with GHPs.

GHPs decrease maintenance costs. They are much simpler than central boiler and chiller systems, so there is less potential for costly maintenance. Several years after installation at the Austin, TX, elementary school, not a single unit had failed, saving the school roughly $10,000 to $15,000 dollars in annual maintenance costs.

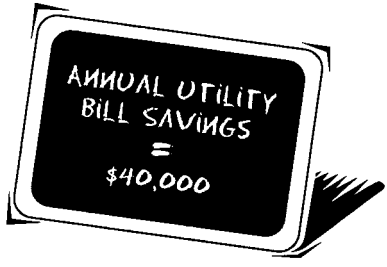

GHPs occupy less physical space than conventional heating and cooling equipment, leaving additional room for other uses. For instance, the grounds superintendent at a school in North Dakota used the extra space in a mechanical room to store athletic equipment. Building designers may even reduce their school's required total square footage, cutting construction costs.

The energy from the GHP refrigerant cycle can also be designed to preheat the building's hot water supply, heat a swimming pool, or be directed for other specialized needs, reducing the associated costs. Currently, as engineers and contracting firms gain experience with this technology they are finding ways to design the systems into new schools at no additional or even reduced costs over traditional systems.

## Existing Schools Make the (Up)Grade

Existing schools can also save money by upgrading from other heating and cooling systems to GHPs. In fact, since older heating and air conditioning units are often less efficient systems, upgrading buildings built prior to 1979 results in the greatest, comparative cost savings. The retrofit cost varies depending on the type and configuration of the system it replaces.

In the case of a southern Virginia middle school originally constructed in 1955, the benefits are clear. In 1994, school officials decided the school needed a complete upgrade. Following a local utility's recommendation, the school installed a vertical closed-loop system. While the utility did not offer the school financial rebates, school officials justified the initial upgrade costs by recognizing the long-term savings of the energy-efficient technology. With annual energy savings of roughly $40,000, the GHP system would pay for itself in approximately five years and continue to reap operating cost savings throughout the lifetime of the system.




Another Virginia school, located in the Washington, D.C., metropolitan area, experienced major cost savings after upgrading to GHPs. Originally constructed in 1953, the school went through a major renovation in 1994. Part of the renovation included bringing the ventilation system into compliance with 1989 standards, which triple the amount of fresh air required in the building. Since GHP technology is so efficient, the school was able to meet the new ventilation requirements, using less energy than traditional technology, and provide a healthier environment for the students. Even with extra ventilation, 10,000 square feet of new space, and the introduction of air conditioning into the school, the 1995–96 school year utility costs were 25 percent less than the 1991–92 school year.



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## GHPs Add to School Spirit

In addition to financial savings, this energy-efficient heating and cooling technology provides clean, comfortable, quiet, natural, and aesthetically pleasing heating and cooling.

Both new and upgraded schools benefit from GHPs.

- GHPs provide clean and quiet operation and can be easily designed to improve ventilation. Adequate building ventilation improves indoor air quality conditions and creates a healthier educational environment, reducing absenteeism and improving student learning. Prior to converting to GHPs, students at Schuyler Elementary School in Queen City, MO, complained about stuffiness in the school. The installation of GHPs improves ventilation rates to meet current code requirements, dramatically improving the school's air quality.

- Since GHPs require less energy than other technologies, less fossil fuel is burned and fewer air pollutants are emitted. *(See table below.)* Schools that install GHPs set an example as conscientious and environmentally-aware community leaders. Schools with GHPs serve as real-world educational resources by teaching students and community members about saving money while saving energy and protecting the environment. In fact, GHPs can actually double as laboratories, serving as the focus of science and environmental projects.

- GHPs enable teachers and administrators, at lower cost than conventional systems, to heat or cool one area without heating or cooling the entire facility. This provides greater control over individual classroom temperature, allowing both teachers and students to work more comfortably and effectively.

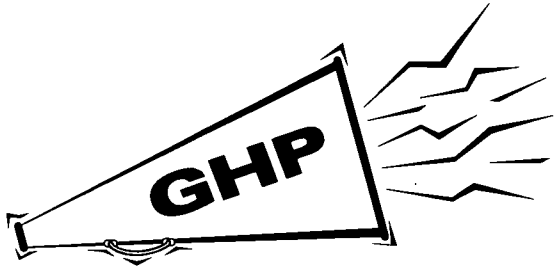
- By locating GHPs throughout the school and connecting the heat pumps by a water loop, the system can actually move heat from large, special-use spaces, such as gymnasiums, to cooler classrooms. They can also be used to heat swimming pools and for other special purposes.

- Compact operating units are located indoors and piping systems are underground, protecting systems from harsh weather and vandalism, reducing safety hazards, and eliminating the need for large equipment spaces. School grounds are also safer for children and the natural aesthetic is preserved.

**Pounds of Pollutants Prevented in 1995**

| | |
|---|---|
| $CO_2$ | *119,998,328* |
| $SO_2$ | *910,136* |
| $NO_x$ | *425,981* |

*assumes 600 schools*




## Making the Varsity Team

Every winning team has a game plan. For GHPs it begins with a *champion* promoting the technology and enlisting support. Then the champion works with others to educate decision makers about GHPs. The next steps address financial barriers and, if possible, develop partnerships. Finally, the system is installed.

In most successful GHP programs one person decides that GHPs provide schools with major economic and environmental benefits. Generally, this individual promotes GHPs to decision makers in the school district and the community. This *champion* is commonly a school administrator, vendor, electric utility representative, engineering contractor, or representative of a well driller. For example, in Coeur d'Alene, ID, the engineering firm hired to build the new Lake City High School proposed installing GHPs. The firm had experience installing GHP systems and convinced school administrators that GHPs had the best cost/benefit ratio of any heating and cooling system being considered.

While the project's champion is instrumental in initiating the GHP effort, a successful GHP project can not progress without the support of other decision makers. The champion must gather and disseminate accurate information regarding the benefits of GHPs to enlist project support. For this information, the champion can look towards local electric utilities, manufacturers and distributors, drilling companies, and homeowners who use GHPs. The champion may also contact national GHP groups and associations (See

Appendix A). Once information is obtained, the champion can educate other key players, garnering support for the project.

Gathering information and educating others are two key steps in the GHP game plan, particularly for schools that are the first in their town or state to express interest in upgrading heating and cooling technology. For instance, in 1988, when the Wahpeton School District in North Dakota was building a new middle school, no other school in the northern plains had installed GHPs. However, many homes and the community church were equipped with GHPs. By soliciting the opinions of people with firsthand experience, school district representatives were convinced of the technology's superior performance and economic value. Similarly, the Berlin School District was the first in New Jersey to install GHPs. The superintendent and board secretary used the expertise of the local electric utility to educate the school board about GHPs. Due to their trailblazing efforts, the technology is being implemented throughout the state's school systems.

**Partnerships**

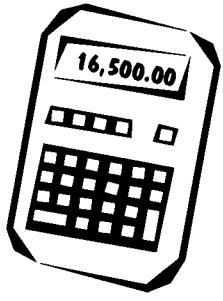
In the process of gathering information and enlisting supporters, school officials take the next step in the GHP process–forming partnerships. These partnerships often develop in the early stages of the GHP project. For instance, school officials at Great Bridge Middle School in Chesapeake, VA, joined with their utility, Virginia Power, to find the most economical and energy-efficient heating and cooling system for the school. By forming a partnership with Virginia Power, officials determined that GHPs had the lowest projected cost over the life cycle of the system.

School officials also work with engineering firms, architects, and other specialists to develop GHP projects. Partnerships helped officials at Taylor Elementary School in Arlington, VA, implement GHPs. To develop a GHP package for members of the school board, the county energy specialist worked with Virginia Power and a mechanical engineering firm. The board

subsequently approved the project. The collaborative efforts of partnerships ensure that every GHP design best fits the unique needs of each school.

Partnerships also address the financial issues of the GHP project. These financial arrangements may include an energy savings performance contract, utility rebates, and bond financing. These financial agreements, which are described in the following section, *GHPs: You Do the Math*, make it possible for schools to install energy-efficient GHPs.

By following these steps, school officials can gather information, educate key players, garner support, and develop partnerships to create a successful GHP game plan and team.




## GHPs: You Do the Math

To assess the value of a GHP system, decision makers must recognize that decreased life cycle costs make returns on the initial investment very attractive. Schools are ideal candidates because they are built to be used for many years, so savings will continue for the life of the building.

Some energy services companies even profit by recognizing the value of GHPs' decreased life cycle costs. In an energy savings performance contract, an energy services company pays all capital and operating costs for the project, including maintenance. As payment the company takes a percentage of the energy savings. For instance, through an energy savings performance contract, Honeywell Corporation provided the New Egypt Elementary School, in New Jersey, with a GHP system. According to the agreement, Honeywell incurred the capital costs and gave the school district a written guarantee of energy savings. Honeywell also provides all maintenance on the system as part of the contract, reducing risk to the school district. The bottom line is that the school district spends less every year for this system without paying a penny in up-front investment.

Another way for schools to finance GHPs is through bonds. After receiving a cost estimate from the project architect, school officials send out a referendum to the school district voters. Once the voters approve the referendum and the cost estimate, the school board votes on the project. The architect then hires an engineer to design the GHP system. After a public bidding process, the school chooses a contractor and floats the bond issue. Generally these bonds yield between 4 percent and 4.5 percent. Like an energy savings performance contract, bond financing allows schools to install GHP systems without providing the initial capital cost. In many cases the savings will exceed the costs of the additional financing. In other words, the school district can make money by financing the project, using the savings to pay additional bond payments, and keeping the difference.

Local electric utilities may assist with system planning, organize demonstrations at schools with GHP systems, and negotiate technical specifications and construction costs. Some utilities also offer rebates toward the capital cost of GHP systems. These rebates may offset completely the additional cost of the system. Other utilities give special rates or reduce peak load charges to encourage GHPs. For example, the Wahpeton School District received a $16,500 rebate toward the capital cost of their GHP system from the local electric utility. With the rebate, the school purchased a diesel generator for backup power. This enabled them to negotiate an off-peak rate on the condition that the generator be used during periods of heavy demand. Another local utility, in Ely, NV, gave the White Pine County High School roughly $50,000 of rebates and a 12-year, low-cost financial package to cover the $350,000 of additional project costs.

Any school system investigating GHPs should contact their local utility company early in the process to gather their support and expertise.


## GHPs and The Big Picture

By reducing the amount of money our nation spends on energy and lowering consumption of nonrenewable fossil fuels, GHPs strengthen our country's economy. According to the U.S. Department of Energy, an average U.S. home uses 9,965 kilowatt-hours of electricity per year. By the year 2000, the electricity required to power one million homes for one year would be saved if every school that could use GHPs did so. By spending less money on energy, our nation can invest more in people, education, and technology.

Moreover, using energy efficiently reduces air pollution. Our nation relies heavily on coal, oil, and natural gas to meet our current energy needs. Burning these fossil fuels contributes to a host of air pollution problems such as smog, acid rain, and global climate change. Installing GHPs in our nation's schools can dramatically reduce emissions of such pollutants. *(See table below.)*

**Projected Pounds of Pollutants Prevented, 1996–2005**
**(in millions)**

| | Percent of Schools Installing GHPs | | | |
|---|---|---|---|---|
| | 25% | 50% | 75% | 100% |
| $CO_2$ | *50,854* | *101,708* | *152,582* | *203,417* |
| $SO_2$ | *385* | *771* | *1,157* | *1,542* |
| $NO_x$ | *180* | *361* | *541* | *722* |

Replacing conventional equipment with GHPs, in all applicable cases, would provide benefits equal to:

- Planting 8 million acres of trees
- Reducing the need for 61 million barrels of oil

- Removing 37 million cars from the roadways
- Saving 2.6 billion gallons of gasoline

## A Smarter Future for Schools

As the most energy-efficient heating and cooling technology available, GHPs represent an economically and environmentally sound option for our nation's schools. GHPs provide schools with additional funds to purchase educational resources, such as books and computers, strengthening the quality of education delivered in each school.

Each school that installs GHPs takes an important step towards improving not only the national environment, but also towards enhancing their school's own educational atmosphere. Clean, quiet, and natural heating and cooling enables teachers and administrators to make students comfortable and focus on their primary responsibility—education.

In addition, teachers and students view their school as an example of successfully implemented, environmentally beneficial technology. By knowing that fewer pollutants are emitted in the operation of their school facility, students recognize the importance of environmental awareness, a lesson they can take with them throughout their lives.

EPA and the U.S. Department of Energy support the implementation of energy-efficient GHPs in schools nationwide. Schools that install GHPs choose the smartest heating and cooling option available, earning them an A+ for energy efficiency!

For more information about geothermal heat pumps or to obtain case studies about schools mentioned in this report, or other schools that have installed GHPs, call the toll-free ENERGY STAR Hotline at 1-888-STAR-YES (1-888-782-7937) or visit our World Wide Web site at **www.epa.gov/energystar**

# Appendix A

## National GHP Groups and Associations

The following groups can help garner support and provide information for a GHP effort:

- The Washington, D.C.-based **GHP Consortium** promotes and expands GHP market development by supporting research, engineering, and marketing. (202 508-5500 or toll-free 1-888-833-GHPC)
- The Oklahoma State University-based **International Ground Source Heat Pump Association** supports GHPs by offering educational materials, dealer training, marketing brochures, videos, field workshops, and teleconferences to the public. (405 744-5175 or toll-free 1-800-626-4747)
- The Arlington, VA-based **National Rural Electric Cooperative Association** provides educational materials to engineers, contractors, and utility personnel interested in designing and installing GHPs. (703 907-5500)
- The Washington, D.C.-based **Electric Power Research Institute**, a nonprofit organization sponsored by electric utilities, conducts research activities to promote system optimization, standards development, training, and certification. (202 872-9222)



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# Appendix B

## U.S. Schools Equipped with GHPs

### Arkansas
Salem Elementary School, Salem

### California
Yreka Union High School, Yreka

### Delaware
Middletown High School, Middletown

### Florida
Bond Elementary School, Tallahassee

### Georgia
Ceran Language Institute, Metter

### Idaho
Lake City High School, Coeur d'Alene
Marsing High School, Marsing

### Illinois
Carbondale Community High School (SD 165), Carbondale
Centralia Junior High School, Centralia
North Side Elementary School, Fairfield
Seven Schools in the District, Centralia

### Indiana
Maywood Elementary School, Hammond

### Iowa
Atlantic High School, Atlantic
Humboldt Community School, Humboldt
Le Mar Community School, Le Mar
Mount Ayr School District, Mount Ayr
Southeast Elementary School, Ankeny
Westwood County School, Sloan
Whiting Comm. School, Whiting

### Kansas
Bracken County High School
Camp Dick Robinson Elementary School, Bryantsville
Casey County High School, Liberty
Christian County High School, Hopkinsville
College View Middle School
Crofton Elementary School
David County School District, Owensboro
Daviess County High School, Owensboro
Deer Creek Elementary
East Carter County High School, Grayson
Elizabethtown County Education Board, Elizabethtown
Estill County Middle School
G.C. Burkhead Elementary School
Gallatin County High School, Warsaw
Hopkinsville County Education Board, Hopkinsville
Indian Hills Elementary School, Hopkinsville
Jackson County High School, McKee
Jackson County Middle School, McKee
Lincoln Elementary School, Lincoln
Lincoln Middle School & High School, Lincoln
McKee Elementary School, McKee

### Kentucky
McLean Middle School, Calhoun
Morningside Elementary School, Hopkinsville
North Hardin High School, Radcliff
North Warren Elementary School, Smiths Grove
Oak Hill Elementary School, Somerset
Paint Lick Elementary School, Garrard
Pembroke Elementary School, Pembroke
Richardsville Elementary School
Richpond Elementary School
Scott County High School, Georgetown
Sindgat Elementary School, Sindgat
Sinking Fork Elementary School
Somersett School, Somersett
Sorgho Elementary School
South Christian Elementary School, Herndon
Spencer County Elementary School, Taylorsville
Tyner Elementary School, Tyner
Varney Elementary School, Toler
Veterans Park Elementary, Lexington
West Carter County High School, Olive Hill
Whitesville Elementary School, Whitesville

### Lousiana
One School in the District, Shreveport
St. Francisville School District, St. Francisville

### Maryland
Lexington Park Elementary School, Lexington Park

### Massachusetts
Boston Education Board, Boston
Hastings School, Westboro
Leicester School District, Leicester
Quincy Public School District, Quincy

### Michigan
East China School District, East China (St. Clair)
St. Clair Intermediate School, St. Clair

### Minnesota
C.E. Jacobson Elementary School, Rush City
Fergus Falls School District, Fergus Falls
Heart Of the Lakes Elementary School, Perham
Kerkhoven-Murdreck-Sunburg School District, Kerkhoven
Lincoln High School, Thief River Falls
Onamia Elementary School, Onamia
One School in the District, Alexandria
One School in the District, Cromwell

Ostego Elementary School, Ostego
Perham Elementary School, Perham
Prairie Wind Middle School, Perham
Rush City High School, Rush City
West Central Area School District, Barrett
Willmar School District (SD 347), Qillwar

## Missouri

Benton County R-IX South Elementary School, Edwards
Bloomsdal Elementary School, Bloomsdale
Blue Eye High School, Blue Eye
Bolivar High School, Bolivar
Bradleyville School, Bradleyville
Branson Elementary School, Branson
Branson Middle School, Branson
Brenton County South Elementary School
Buffalo Middle School, Buffalo
Butterfield School, Marshall
Cameron Middle School, Cameron
Cassville High School, Cassville
Cedar Ridge Elementary School, Branson
Clopton High School, Clarksville
Cole County R-V School District, Eugene
Dallas County R-I School District, Buffalo
Diamond School District, Diamond
Excelsior Springs School District, Excelsior Springs
Gainesville Elementary School, Gainesville
Hickory County R-1 School District, Urbana
Hollister Middle School, Hollister
Lakeland Elementary School, Lowry City
Monett High School, Monett
Mount Vernon R-5 School District, Mount Vernon
Neosho High School, Neosho
Nixa School, Nixa
North Harrison R-III School District, Eagleville
Osage Beach School, Osage Beach
Osage County R-2 School District, Linn
Osceola Public School, Osceola
Pike/Lincoln Tech Center, Eolia
Saint Genevieve School District, Saint Genevieve
Savannah School District, Savannah
School Callaway School, Mokane
School of the Osage R-11, Lake Ozark
Schuyler Elementary School
Shelbina School District, Shelbina
South School, Warsaw
Strafford High School, Strafford
Strafford Middle School, Strafford
Trailridge Elementary School, Kansas City
Washburn Middle School, Washburn
Wellsville Middletown School, Wellsville
Willard Elementary School, Willard

## Nebraska

Amherst Public School District, Amherst
Amherst School, Amherst
Chadron School, Chadron
Homer School, Homer
Kearney Elementary School, Kearney
Kearney High School, Kearney
Kearney Middle School
Kearney Public School District, Kearney
Lincoln School District, Lincoln
Loup City Public Schools, Loup City
Meadowlark Elementary School, Kearney
Nemaha County School District 29, Auburn
Norfolk School, Norfolk
Norford Public School District, Norfolk
Norris Public Schools
One School in the District, Chadron
Oxford Public School District, Oxford
Plattsmouth School
Ponca Public School District, Ponca
Ponca School
Southern Valley School, Orleans
Sunrise Middle School, Kearney

## New Jersey

Absecon Township Education Board, Pomona
Barnegat Middle School, Barnegat
Berlin Township Schools
Carneys Points School District, Pannes Grove (Carneys Point)
Chelsea School, Atlantic City
Collings Lake Elementary School, Windstown
Copper Hill Elementary School, Flemington
Douglass School, Lower Township
Drew Primary School, Hightstown
Eagleswood Elementary School, West Creek
Eisenhower Elementary School, West Berlin
Hightstown High School, Hightstown
J. Clark Primary School, Mickelton
Manahawkin School District, Manahawkin
New Egypt Middle School
North Main Elementary School, Pleasantville
North Main Street Primary School, Pleasantville
Pleasantville High School, Pleasantville
Pleasantville Middle School, Pleasantville
Plumstead Middle School, Plumstead
Red Bank Primary School, Red Bank
Russell Brackman Middle School, Barnegat
Salem County Public School District, Woodstown (For Salem Co.)
Stewartsville School, Stewartsville
Toms River County School District, Toms River
Trenton Public School District, Trenton
Upper Township Middle School, Marmora

### New Mexico
Las Vegas School District, Las Vegas

### Nevada
White Pine County High School, Ely
White Pine County School, Mt. Wheeler

### New York
John Montgomery Smith Middle School, Hudson
One School in the District, Elllenville

### North Carolina
West Bertie County Elementary School, Windsor
Rick Springs School, Denver

### North Dakota
Central Vally School District, Buxton
Fargo Middle School, Fargo
Fargo Public School District, Fargo
Valley School, Buxton
Wahpeton Middle School, Wahpeton

### Ohio
North Royalton Middle School, Cleveland

### Oklahoma
Cherokee High School, Cherokee
Claremore School District, Claremore
Collinsville High School, Collinsville
Collinsville School District, Collinsville
Ketchum School District, Ketchum
Ketchum School, Ketchum
Millwood High School, Oklahoma City
Mustang School, Mustang
Ocola Phase II School, Marietta
Red Rock School, Red Rock
Skiatook High School, Skiatook
Skiatook Middle School, Skiatook
Skiatook School District, Skiatook
Tulsa School District, Tulsa
Union Middle School, Tulsa
Will Rogers High School, Shawnee

### Oregon
Junction City High School, Junction City
Laurel Elementary School, Junction City
Oaklea Middle School, Junction City
Ridgeview Elementary School, Springfield
Territory Elementary School, Junction City

### Pennsylvania
Neff Elementary School, Lancaster
Neff High School, Manhiem Township
Reading School District, Reading
Upper Perkiomen High School, East Greenville
Wattsburg Elementary School, Erie
Windber Elementary School, Windber

### Rhode Island
Providence, Providence

### South Dakota
Natrona School District, Chamberlain
Winner Elementary School, Winner
Winner Middle School, Winner

### Tennessee
Daniel Boone High School, Johnson City

### Texas
Austin Independent School District:
- Baily Middle School, Austin
- Brooke Elementary School, Austin
- Campbell Elementary School, Austin
- Cunningham Elementary School, Austin
- Govalee Elementary School, Austin
- Leander Elementary School, Austin
- Pease Elementary School, Austin

Bowie Elementary School, San Marcos
Cedar Park Middle School, Leander
Faublon Elementary School, Leander
Giddens Elementary School, Leander
Goodnight Junior High School, San Marcos
Green Valley Elementary School, Birdville
Kirbyville Elementary School, Kirbyville
Kirbyville High School, Kirbyville
Leander High School #2, Leander
Leander High School, Cedar Park
Leander High School, Leander
Leander Middle School, Cedar Park
Leander Middle School, Leander
Mason Elementary School, Leander
North Ridge Middle School, Birdville
Porter Elementary School, Birdville
Watauga Middle School, Birdville
West Birdville Elementary School, Birdville

### Virginia
Fuqua School, Farmville
Great Bridge Middle School, Chesapeake
Taylor Elementary School, Arlington

### Washington
Brewster School District Elementary School
Issaquah School District, Issaquah
Kittitas Middle School, Kittitas

EPA

United States
Environmental Protection
Agency
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Washington, DC 20460

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**Schools + GHPs =
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U.S. DEPARTMENT OF EDUCATION
Office of Educational Research and Improvement (OERI)
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