Application/Case Study HVAC-1

one of a series of applications for Fulton products

Subject: Evansville Vanderburgh County School Corporation saves nearly $500,000 annually on utility bills

Evansville, IN - Washington Middle School is a stately brick Georgian-style building on 15 acres along one of Evansville's older thoroughfares. Built in 1937 and added to over the years, the well-preserved school is the heart of its surrounding middle-class neighborhood. It is part of the Evansville Vanderburgh County School Corporation (EVSC), one of the fastest growing in Indiana.

In 1995, the school received a complete new heating and cooling system under a comprehensive multi-school guaranteed energy savings program adopted by EVSC.

Due to its age and structural design, Washington Middle School, like most of the 49 other buildings managed by the school corporation, was not energy efficient. When classes started each August, its 460 plus student population suffered terribly from southern Indiana's stifling heat and humidity. Heat in the old building's 32 classrooms during winter months was uneven.

In 1995, administrators and school board members were looking at solutions when they learned the advantages of guaranteed energy savings contract legislation passed by the Indiana General Assembly.

Indiana General Assembly passed legislation to allow school corporations to seek energy conservation

The legislation allows public school corporations to advertise for Self-Funding Energy Conservation Proposals from qualified Performance Contractors. These projects must, by law, generate sufficient savings, over a period of not more than 10 years, from Energy, Operations and / or Capital Budgets, to pay for all design, construction and financing costs associated with the project. The school corporation accepted a performance contract proposal from Energy Systems Group (ESG) for a comprehensive scope of improvements addressing 35 school buildings. ESG, head quartered in Evanvsille, Indiana, is a limited liability corporation

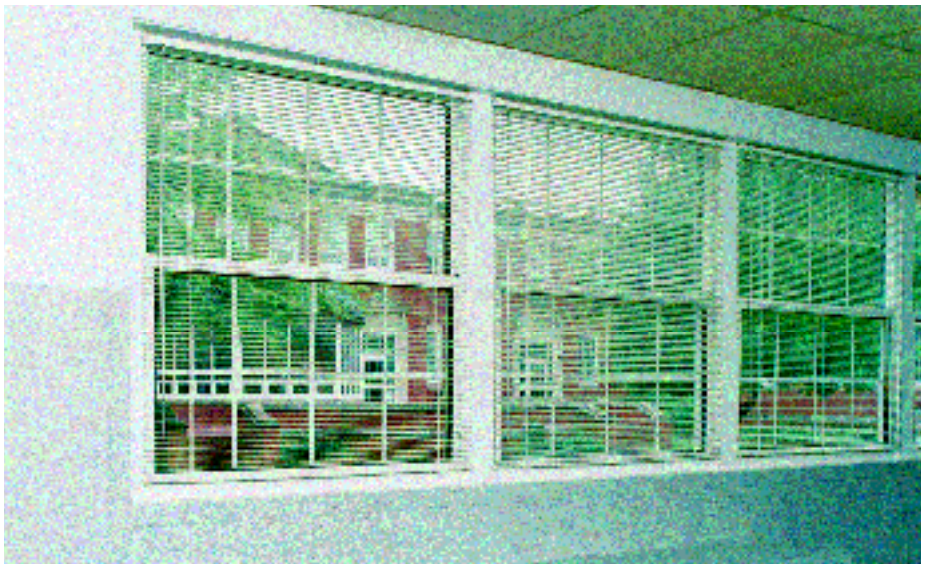
owned equally by three Indiana utility companies: Indiana Gas, Citizens Gas and Coke, and Southern Indiana Gas and Electric Company (SIGECO).The ESG performance contract with EVSC totaled over $35 million.

Dan Sanders, Account Executive for ESG, claimed they had to guarantee $369,000 savings annually for 10 years on utility bills.

This was and may still be the largest performance contract of its kind ever completed in North America. The scope of the contract included a completely new, "revolutionary", two pipe HVAC system in 19 buildings. This was combined with new lighting, windows and doors. If the savings are not realized, ESG must pay the school corporation the difference.

Energy Systems Group recommended use of Fulton pulse combustion gas boilers at 11 elementary and eight middle schools, including Washington Middle School.

Most of that building's existing heating system had been installed when the school was originally constructed.



New insulated windows conform to period architecture

boiler. Rated at 5,250,000 BTU's per hour, both had been converted from coal to gas-fired. These cast iron sectional boilers operated independently of each other and only one was required to heat the building, except on the coldest days of the year when both were used.

The low pressure steam supply and condensate return piping was routed to and from the fan-powered unit ventilators through a tunnel beneath school halls. Steam con-

Dan Sanders, Account Executive for Energy Systems Group

densate was returned back to the boilers by a vacuum pump system. The majority of the existing fan powered unit ventilators were heating-only units with outside air capability.

Energy Systems Group proposed installation of a fully automatic summer / winter changeover system that would provide heat or cooling as needed, depending on outside air temperature and room occupancy.

Unique two-pipe heating system was designed by Tom Durkin, P.E., Director of Engineering at Veasey Parrott & Shoulders (VPS) of Evansville

According to Durkin, "All of ESG's teammates contributed to the energy savings: VPS' piping scheme and efficient control sequences; Fulton's boiler design features; excellent installation work by the contractors; and the scheduling of the school building's operating schedule by the EVSC staff."

Four PHW series 1,000,000 BTU input Fulton pulse combustion gas boilers were installed at Washington Middle School after the old boilers were removed.

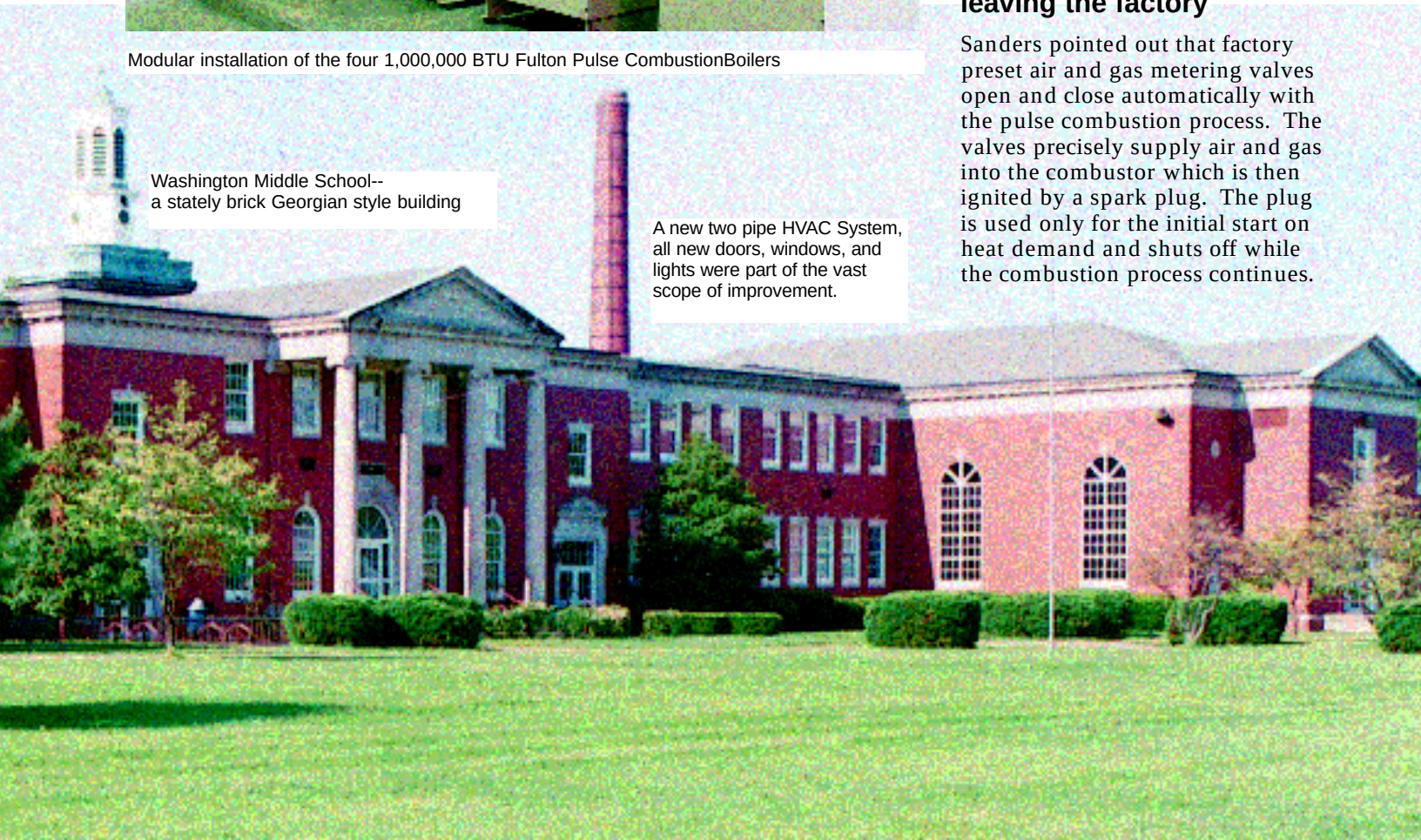
According to Sanders, "We chose Fulton boilers for a number of good reasons. They're highly efficient; have a stainless steel heat exchanger, and don't require an additional recirculation pump. They offer a high rate of heat transfer and Durkin's piping scheme has all the boilers at temperature all of the time, whether they are firing or not, which means no start-up losses. The Fulton boilers are non-modulating, which means fewer moving parts, lower first cost and less maintenance. Again, Durkin's piping schematic addresses the non-modulating issue in a way that does not penalize operating economy or cause temperature fluctuations and comfort issues."

"Also, they are able to withstand the thermal shock associated with a two-pipe system, when the return water reaching the boilers can be as low as 50-55 degrees F."

Modular installation of the four 1,000,000 BTU Fulton Pulse CombustionBoilers

Boilers are preset before leaving the factory

Sanders pointed out that factory preset air and gas metering valves open and close automatically with the pulse combustion process. The valves precisely supply air and gas into the combustor which is then ignited by a spark plug. The plug is used only for the initial start on heat demand and shuts off while the combustion process continues.



Washington Middle School--
a stately brick Georgian style building

A new two pipe HVAC System, all new doors, windows, and lights were part of the vast scope of improvement.

Sanders said several Evansville firms installed Fulton boilers as part of the new systems at EVSC Schools: Precision Piping & Mechanical, Inc., Spahn and Goebel, Inc., and Goedde Heating & Plumbing, Inc.

Tom Durkin, designer of the two-pipe system advised the project. School facilities' director, Virgil Miller, and Steve Johnston, manager of EVSC buildings and grounds, were also consulted.

The units fit through a standard 34 inch door opening so there were no walls to remove.

"The old-style boilers were as big as a train engine.," Sanders said. "These new modular Fulton boilers are about the size of a large refrigerator.

"You don't need a masonry chimney (stack) with them either—you can vent them through a side wall or roof with small-diameter tubing," he said.

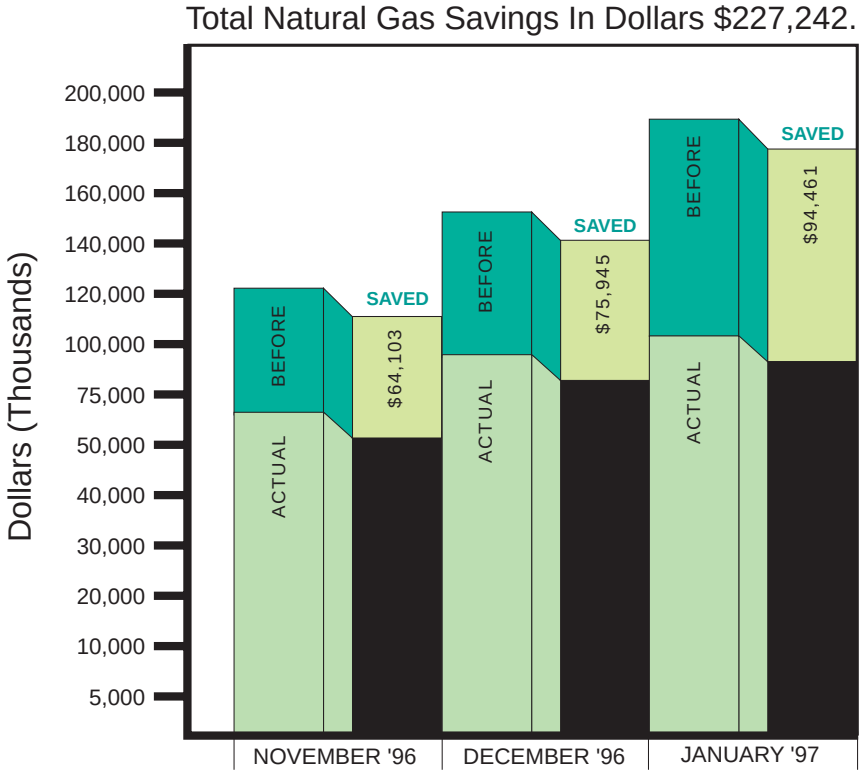
Sanders said the Fulton boilers are staged as needed using microprocessor technology. The Fulton Pulse Control 7865 used with Johnson Controls Metasys Building Automation provides automatic burner sequencing, system status indication, system or self-diagnostics and trouble shooting. He said the new system had lowered natural gas consumption considerably—45 to 55 percent in the first year of use.

Microprocessor Energy Management System

Steve Johnston praised the ease of installation, minimal training needed and "practically zero maintenance" required on the new Fulton boilers.

"The school corporation spent an average of $5,000 annually to maintain each of our old boiler," he said. "Every year we had to replace sections or retube. We've determined these new boilers are 93 to 96% efficient."

School corporation architect Jim Sutton said figures based on the energy saving program's first 15 months look promising. "The corporation was originally told the plan would save about $369,000 a year. Now, we're looking at savings of a half-million dollars annually."



November 1996 normally called for 176,646 therms. After the new system was installed actual usage was 139,098. December normally called for 311,246 therms. Usage was 173,407. January's normal usage was 350,008 therms and actual usage was 228,114. Three months' total amount of therms saved was 328,847.

The Fulton Pulse Combustion Boilers were supplied by Fulton's Authorized Representative, A. B. Young Co., Inc., Indianapolis, IN.

Fulton Boiler Works, Inc., Fulton Thermal Corporation, Pulaski NY 13142, Phone (315) 298-5121 Fax: 298-6390

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