

GFX Inventor Says Malpractice at NAHB Research Center Hurt His Business

Carmine Vasile, president of WaterFilm Energy (Medford, New York) and inventor of the GFX drainwater heat recovery system, has filed a complaint with the Inspector General's Office of the US Department of Energy (DOE), alleging that a publicly funded research project was grossly mismanaged, resulting in a big waste of taxpayers' money and serious damage to his company. Vasile has also requested "whistle blower" status to protect himself and his company from possible retaliation.

At the center of the controversy is a 1999 report from the National Association of Home Builders Research Center (NAHBRC — Upper Marlboro, Maryland) titled *Installed Performance of a Drainwater Heat Recovery System*. Sponsored by DOE and five electric utilities, the report analyzes the measured field performance of the GFX system in several dozen single-family homes. The findings were not encouraging. NAHBRC researchers Dan Cautley and Jeannie Leggett reported that the payback on GFX would range from 14 to 17 years — much longer than most designers, builders, or homeowners would even consider.

But, as Vasile points out in his complaint, NAHBRC's negative findings were in sharp contrast to other reports done on GFX, including studies by Virginia Power, Pennsylvania Power & Light, and Arthur D. Little (Cambridge, Massachusetts). For example, the Arthur D. Little report, *Electric Water Heating Situation Analysis*, estimates the payback on the GFX at just 3 to 5 years, depending on the home's hot water usage. Other positive analyses have been released by Oak Ridge National Laboratory (ORNL) and by DOE's own Inventions and Innovations Program. In fact, it was development grants from DOE that helped launch GFX in the first place (see Figure 2).

"I believe NAHBRC personnel engaged in scientific misconduct under a federally funded program, which constitutes grounds for an investigation," Vasile says. "Their so-called 'detailed analysis' is a sham and a clear misrepresentation of the facts."

Vasile alleges that NAHBRC failed to invest in the instrumentation needed to do the field tests properly and that the methodology was flawed from the start. "Some of the homes had multiple drain lines, which allowed huge amounts of drainwater to bypass the GFX," he claims. "An unbiased evaluation would have selected homes having either a single drain or, if homes with multiple drains were to be used, required the installation of multiple heat exchangers with their coils piped in series." Vasile tells *EDU* that NAHBRC's methodology was so flawed that some of the test homes actually showed a net loss in energy, which, he says, is a "physical impossibility."

In July 1999, just before the report was to be released, Vasile wrote a letter to NAHBRC Director Liza Bowles, pleading with her to quash the report. "Please be advised that its release to the public will open NAHBRC to liability because it contains gross errors caused by data so corrupted that error correction is impossible," Vasile wrote. But NAHBRC proceeded to release the report to its utility clients, which included American Electric Power, Minnesota Power, NE Utilities, Portland General Electric, and Virginia Power.

In an interview with *EDU*, Bowles asserted that the field study and report are "scientifically sound" and that none of the utilities that cosponsored the work have expressed any dissatisfaction. She did allow, however, that the instrumentation could have been better had the budget been larger, "which is always the case," she notes.

It's clear, however, that some officials inside DOE and the National Renewable Energy Laboratory (NREL), which managed the project for DOE, have serious reservations about the study. In fact, the report has never been released through DOE or NREL because of these concerns.

"The NAHBRC study taught us that GFX is a difficult technology to measure in the field and that the margins of error can be large," says Dr. Paul Torcellini with NREL's Center for Buildings and Thermal Systems. "It's very difficult to accurately measure flow, especially when there are solids. Even measuring

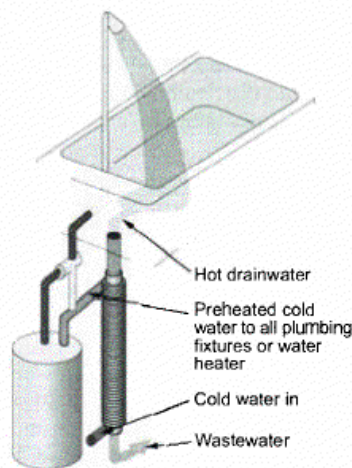


Figure 2 — GFX is a counterflow heat exchanger made from ½- or ¾-inch copper tubing that's tightly wrapped around a 3- or 4-inch diameter copper pipe. The device is installed vertically in the plumbing system. As wastewater flows down through the center pipe, it naturally clings to the walls of the pipe and transfers heat from the wastewater to the incoming cold water. There is no pump, no storage tank, no electricity required, and no operating cost. The system works best when it is installed for balanced flow.

the temperature can be difficult." Torcellini tells *EDU* that the NAHBRC report was never peer-reviewed or validated by NREL and that "there needs to be a lot more work before we can come up with definitive conclusions one way or the other."

At least two additional field studies on GFX are already well under way. NREL is monitoring an off-the-grid home in Idaho Springs, Idaho, that includes a GFX system. And researchers at ORNL are measuring GFX performance at a triplex in Duluth, Minnesota. Preliminary findings from the latter study show that, over a one-year period, the GFX saved between 25% and 30% of the total energy needed for hot water production, which would result in \$225 a year in savings (at \$0.08/kWh). "Operating cost savings should be sufficient to justify GFX installations with short, simple payback times," the preliminary findings state.

Vasile acknowledges that DOE and NREL never formally endorsed or released the NAHBRC report and is encouraged by the fact that additional field studies may vindicate GFX. But the damage has already been done, he says. "The release of the NAHBRC report to those utilities, who have in turn made it available to others, has almost killed my company," Vasile claims. "Utilities, energy service companies, state governments, and others who were very positive about GFX and willing to promote it, dropped the idea once they saw the long paybacks described in the NAHBRC report." Vasile further asserts that the negative report was partly to blame for souring his relationship with Vaughn Manufacturing (Salisbury, Massachusetts), which was licensed to build and distribute GFX. (Doucette Industries [York, Pennsylvania] has since become the new licensee and distributor.) "I think it's up to NREL and the sponsoring utilities to force a retraction of this report," he says.

Vasile says he would also like the DOE Inspector General to find out why the Arthur D. Little report, sponsored by DOE and the Edison Electric Institute (EEI), was "illegally concealed" for several years and never referred to in the NAHBRC report. In fact, the Arthur D. Little report, which presented lifecycle costs for GFX, solar water heating, high-efficiency electric water heaters, heat pump water heaters, and point-of-use water heaters, barely saw the light of day. Apparently, many state energy officials and private energy analysts — even people inside DOE — don't know of its existence. *EDU* questioned several top-level DOE officials on the matter, all of whom refused to make any comment on the record. "Look, there may have been government incompetence here," one of them allowed, "but there was no conspiracy to conceal that report. EEI lost interest in the project because it had to turn its full attention to deregulation issues."

Be that as it may, conspiracy theories (in which we put no stock) have cropped up on the Internet lately. The allegations suggest that GFX is such a powerful energy saver that electric utilities view it as a threat to their base water-heating load. Hence, goes the theory, they have worked behind the scenes to bury the Arthur D. Little report and broadcast the NAHBRC study. (Seems we heard this same kind of jabber back in the 1980s about utilities and solar water heating.)

"Such wild allegations don't do anything to advance the truth," says Bion Howard, president of Building Environmental Science & Technology (Edgewater, Maryland). "But considering the fact that we have contradictory results from different taxpayer-funded studies, it would seem that some sort of investigation is called for." Howard, who has previously worked both at NAHBRC and with DOE's Energy Star program, says that he's reviewed field data on many GFX systems and that their "good performance speaks for itself."

We agree with Howard's assessment and would refer *EDU* readers to our original article on GFX, published in December 1996, in which we stated that GFX can save 30% or more on a home's total water heating costs. Keep in mind, however, that the payoff will generally be much better in new construction than in retrofit, because the installation costs are lower, and in homes that have electric water heating and use large volumes of hot water. As noted in our original story, GFX also greatly increases the heating capacity of a water heater, so that designers may be able to downsize the tank (e.g., from a 50- to a 40-gallon model). This would deliver even more savings over the lifecycle of the GFX, an important element that has not — to our knowledge — been considered in existing studies.

More information on GFX is available at www.endlessshower.com and www.eren.doe.gov/buildings/emergingtech.

Wanted: A Few Good Men and Women for ICF Boot Camp

Few would argue that walls built with insulating concrete forms (ICFs) are one of the best new building technologies around. They excel in energy efficiency, strength, durability, and acoustics. But instead of taking the world by storm, ICFs remain on the fringe of the construction industry, stymied by a lack of skilled contractors.

"Without a doubt, the biggest shortcoming now is the lack of qualified ICF contractors," says Henry DeWerth, chief technology officer for ICF Homes (St. Augustine, Florida). "We have no shortage of manufacturers. There are 45 or 50 of them in North America. We have no shortage of performance data or code approvals either. But finding someone to build an ICF wall properly can be a real frustration." DeWerth says that a lot