

BioGlass Member Hugh Jenkins: Accomplishing Eco-Efficiency One Studio at a Time



by Shawn Waggoner

BioGlass is a global, nonprofit organization that develops and presents solutions, educational opportunities, research and development for sustainable glassmaking, and information about eco-efficient glass studio practices. Its interactive, international website, BioGlass.org, provides information to assist glass artists in improving their economic stability while lowering fuel costs. A few of BioGlass' members are already making hefty strides in reducing their carbon footprint and increasing eco-efficiency.

Hugh Jenkins

Hugh Jenkins has worked in glass since 1969 and was introduced to glassblowing at the Foundry in Honolulu, Hawai'i. He introduced glass to the Punahou School art department in 1972 and continued to teach there until 1998. During summers and sabbatical leaves, he has also taught glass at Penland School of Crafts in North Carolina. His glass has evolved through several functional and sculptural phases, usually including highly polished optical surfaces. In 1999 and 2000, he created a glass teaching program at Waimea on the Big Island, then moved to Honoka'a in 2001 to set up his studio, Big Island Glass.

Jenkins has earned a reputation for his knowledge of and dedication to building more efficient hot glass equipment. At his studio, he built a heat recuperating furnace that now runs on vegetable oil, a move which has allowed his studio to stay in business. He has attended many conferences where he participated in panel discussions on the topic and has authored several articles including "Bioglass, Green Studios Benefitting Artists and the Environment," which appeared in the 2008 *Glass Art Society Journal*, and an article in *Ceramics Monthly*, December 2007. He is currently helping other glassblowers improve the efficiency of their equipment.

Big Island Glass

From his studio on the Hamakua Coast, Jenkins works out of a shop building on his home property just above Honoka'a town on the northeast coast of the Big Island of Hawai'i. Initially he set up a small 80-pound furnace, glory hole, and annealer. Since then Jenkins has built newer equipment as needed. He now has a 135-pound furnace with three different glory holes and three annealers of different capacities. All of the hot equipment is recuperated, with the furnace now operating on recovered cooking oil.

Says Jenkins: "In some of his earliest writing, Dudley Giberson spoke about leaving some resources for future generations. 'You can't burn the same gallon of propane twice,' was the theme. I was a single-teacher program at Punahou and had to justify my budget every year based on the number of students, cost of fuel, etc. I could see the cost going up from 30 cents a gallon in '72 to 80 cents by '79.

"The move to multiport glory holes was a huge step in controlling the cost per student hour. *The Hot Glass Information Exchange*, published in 1981, brought out many clever ideas about the reuse of waste energy from glass furnaces. By 1985, Charlie Correll was working on practical systems to use in furnaces to recuperate heat, the capture and return of waste heat from the furnace exhaust by preheating the incoming combustion air. There's a direct relationship between the temperature of combustion air and fuel savings."

For his second sabbatical in 1989 to 1990, Jenkins set out to apply some of this new information. It was also time to rebuild some of the aging equipment at Punahou. He was invited to teach a spring class at Penland, and along with Bill Worcester, he built the first recuperated furnace there using Correll's system. Jenkins then built the first recuperated furnace at Punahou and was committed to that technology.



Hugh Jenkins and Stephanie Ross, *Big Island Glass*, New Eruption, 8" x 8" x 15", 2003/2005. Photo by Macario.



*Hugh Jenkins and Stephanie Ross,
Big Island Glass, Kilauea, 8" x 8" x 12",
2009/2010. Photo by Sarah Anderson.*

“My own attempts to design and build a recuperator started in ’96 to ’97, not long before I decided to leave teaching,” says Jenkins. “To me, blowers had always been a weak point in operating glass furnaces. I started using venturis—a pressure-driven air intake normally using the gas pressure as the power source—with high-pressure air in place of blowers in my burners, including for the air power in the Correll recuperators. It struck me at some point that a venturis out of refractory could be used to pull air down a stack heat exchanger, then push the hot air into a burner. I made just enough of an experiment at that point to know that the idea would work, at least to some extent.”

After leaving teaching in 1998, it took a few years for Jenkins to find a suitable place for a studio. In the meantime, he installed some traditional furnaces, but was thinking about the design issues that needed to be worked out for recuperation. He started his studio with traditional burner designs in 2001, but the cost of using 900 to 1,000 gallons of propane a month was painful. Later that year, Jenkins remodeled the furnace and began saving 300 gallons a month.



*Hugh Jenkins and Stephanie Ross,
Big Island Glass, Grotto, 7-1/2" x 7" x 5",
2010. Photo by Sarah Anderson.*

“I also started thinking more about glory holes,” says Jenkins. “In 2003, Charlie and I presented together at GAS in Seattle, and I was confident in saving 50 percent or more on furnaces. Though I had started work on a glory hole, I was not ready to make predictions. By the 2007 GAS Conference in Pittsburgh, I had reduced the fuel use in my studio with larger equipment to 320 gallons a month. Propane had tripled in cost by then, so I was just keeping up. But I had promised to work on vegetable oil.”



Hugh Jenkins and Stephanie Ross, Big Island Glass, Birth of an Island, 7- 1/12" x 7-1/2", 2009/2010. Photo by Sarah Anderson.

Vegetables—Good for You *and* Your Furnace

Using vegetable oil has been its own adventure for Jenkins. Problems of reliable supply, contamination, storage, filtration, and burner design each caused delays in progress. Jenkins finally decided to work with food-grade soy oil to get a working burner, then see how reclaimed oil would work. He can now claim two years of successful glass melting with oil as well as increasing efficiency and reliability of operation.

“In 2010, we produced the best glass quality in my studio’s history. And with recuperation and veggie oil, we had a lower energy cost than in 2001 by about 25 percent,” says Jenkins. “However, the availability of used vegetable oil is already becoming more of a challenge. Not only are diesel cars being converted, but there is an increase in the use of vegetable oil for biofuel electric generation within the utility companies. This will, of course, drive the price up and make it harder for the public to reliably make use of this resource.”

Inspired more by survival than the current politically correct notion of “going green,” Jenkins never forgot Giberson’s words from the early 1970s that reducing energy use would become a matter of survival someday. With energy taking a large bite out of gross income, most successful glass studios will have to pay some attention to efficiency. But it does take investment to make these changes, whether with recuperation, vegetable oil, or both.

“I think the interest is there,” says Jenkins, “and now that the possibilities are proven, other shops will join in. The attendance at energy discussions is still very strong, as was shown in Louisville, Kentucky. I think school shops have to take some leadership in this area as well.”

Most of the necessary information on recuperation is out there and essentially free. Jenkins cites the book *Glass Notes* by Henry Halem as well as Internet sites such as Craftweb and Hand-made Glass as good sources of information. The most effective time to incorporate recuperation is when building new equipment, but Jenkins has extensive experience retrofitting older furnaces.

For vegetable oil, there is little in print. Jenkins garnered much inspiration and many ideas from the Altfuel discussion board on Yahoo. Though this group is mainly working to make heating their homes and water more ecologically responsible, their experimental approach and relatively open sharing of information was a guiding light for Jenkins when he came upon stumbling blocks to progress. Another Yahoo group he visited for energy conservation ideas is Wastewatts.

Jenkins continues to help studios that have the same vision to do more with less. He knows, however, that progress will be one studio at a time.

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BioGlass is actively seeking partnerships, collaborations, and grant funding. For more information go to BioGlass.org.

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