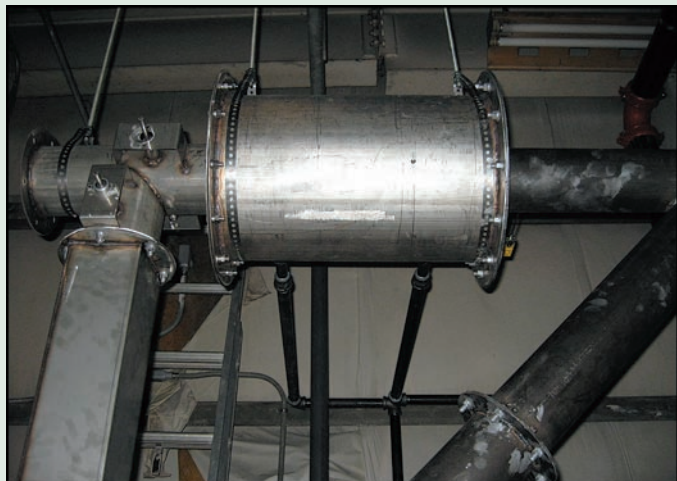


# Green Glass: Eddie Bernard, Wet Dog Glass and STARworks

By Shawn Waggoner



*Heat exchanger transfers heat from glass furnace exhaust to STARworks Biofuels glycol tank.*



*Eddie and Angela.*



*STARworks Garden in front of STARworks Biofuels refinery.*



*STARworks Glass furnace recuperator with diverter and heat exchanger.*

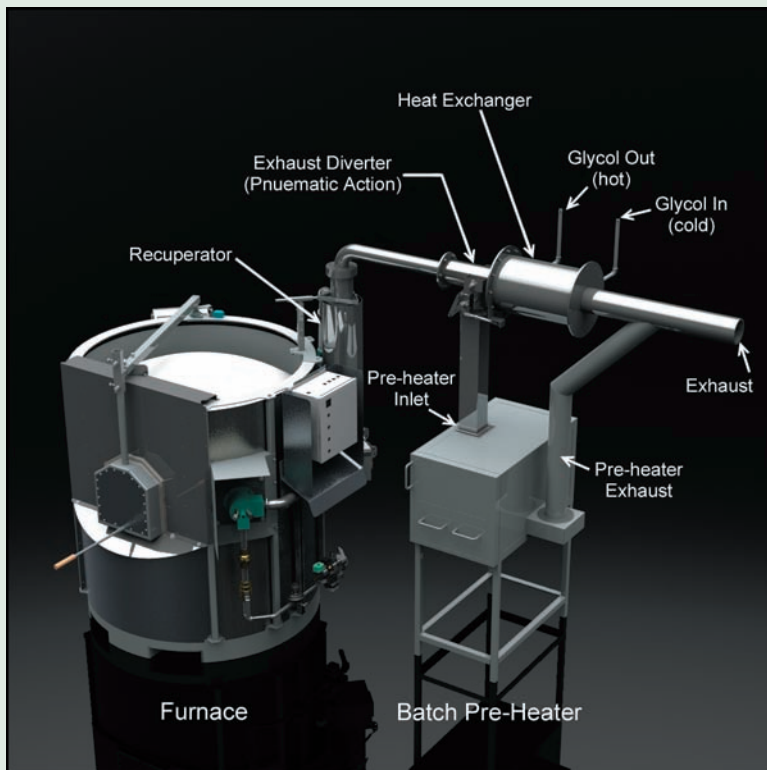
The 2007, 2008 and 2009 Glass Art Society Conferences, held in Pittsburgh, Portland and Corning respectively, featured panel discussions on how to make glass art more sustainable. Eddie Bernard, owner of Wet Dog Glass LLC, Star, North Carolina, played a vital role as organizer and/or panel member at all three events. He also attended Penland's Glass Technicians Summit held in February 2009 and is one of many involved glass artists/technicians seeking to reduce his carbon footprint.

"One disturbing trend is that attendance at these meetings and conferences that focus on Green Glass is shrinking," says Bernard. "At the 2007 GAS conference, the room was overflowing. The next year's Portland conference was also well attended. But at the following conference in Corning, attendance dwindled to about 90 people compared to 300 the previous year. When speaking with other panel members, the one reason we could pinpoint was that gas prices went down, and perhaps concern went down with them."

Bernard has a long history in developing and fine-tuning glass making equipment. A native of Louisiana, at age 17 he worked with Paulo Dufour, the son of Paul Dufour, who started the first MFA program in stained glass in Baton Rouge at LSU. He later attended RIT, and in his third year started rebuilding the equipment in the glass shop. By the end of his fourth year, RIT awarded him for his equipment expertise to the tune of \$1,800, which he used to finish school. He finished a semester early and went to Corning to help get the Studio of the Corning Museum of Glass up and running. There he met Fred Metz of Spiral Arts and learned quite a bit more about equipment building. The Studio hired him as a technician and teaching assistant for Bill Gudenrath, assistant to the Artist-in-Residence and stained glass department founder and teacher. After four months, he returned to Louisiana, where he could focus on building his first company, Wet Dog Glass, LLC ([www.wetdogglass.com](http://www.wetdogglass.com)), which he founded during his last semester of college in 1996.

In 1998, he drove to California to build his first out-of-state shop equipment. Says Bernard, "I spent a month out on the sidewalk in Berkeley during El Nino weather building a furnace and glory hole, marver and rolling yoke. That work landed me another job in Oakland building a furnace. Then Tulane hired me. I needed more work, so I set up a tech display booth at the Glass Art Society conference in Tampa in 1999. I worked in the backyards of the places we lived in New Orleans for the first few years, and





*Batch Pre-Heater Illustration.*



*STARworks Glass furnace with recuperator, exhaust heat reclamation train and batch preheater.*

I think it was the year 2000 when I finally rented a shop space for \$200/mo to start producing more work. It was an outdoor space, and we set up tarps to protect us from sun and rain. It was rough, but we spent about nine months there until we found a larger space with a concrete floor and a roof. I pulled a desk out of the dumpster at Tulane and set up a makeshift office in the corner of the old wood mill.”

He and two employees learned html and built the first Wet Dog Web site. In 2002, Bernard and wife Angela decided to start a glass studio and found a 7,000-square-foot space to house it. At night he worked in the new space, and in the day he worked at the old place, finishing up the glory holes for the Tacoma Museum of Glass – the last project to be shipped from that location.

Bernard’s studio, Conti Glass, allowed local glass artists to rent time and make their own work, something that was relatively unavailable in New Orleans at the time. The studio hosted demonstrations in glassblowing for the 2004 Glass Art Society (GAS) conference in New Orleans, after which GAS asked Bernard to be on its Board of Directors.

Wet Dog Glass eventually became a leader in glass studio systems. The company built its own control panels and designed and built combustion and safety systems. Bernard would often travel to install and start up glass studios. When hurricane Katrina hit, Wet Dog had 13 employees. One high point was the sale of a double pot furnace and a double-ended glory hole to Nagoya University in Japan. The company also shipped products to China, Australia, Mexico, Italy, India, Cayman Islands, Bermuda and just about every state. Eventually Wet Dog expanded its interests and ventured into other industries as well, supplying combustion and safety components for several large factories, including a microbead factory in India.

The hurricane of all hurricanes impacted everything in its path, and Wet Dog Glass was no exception. Bernard was forced to turn down a big contract for the Toledo Museum of Glass — an order for several glory holes, annealing ovens, furnaces and many accessories. “I knew about this studio plan for four years, and I wanted so badly to get the job because it was where the Studio Glass Movement was born. It was a huge honor for us, and when I decided to step out of the bidding process, I was informed that



*Nick Fruin, STARworks Glass Studio Coordinator, boiling water while blowing glass.*



*Students using STARworks Glass' three port glory hole.*

they had, in fact, made the decision to hire us. All the jobs we had to let go because of Katrina equaled nearly a million dollars."

After Katrina, Conti Glass was resurrected as a non-profit organization called NOCGI (New Orleans Creative Glass Institute). "Now it belongs to the community, and we like it that way," says Bernard.

Prior to the hurricane, Wet Dog Glass was in need of a larger working space. After Katrina, when they decided to go back into business full swing, Bernard realized New Orleans didn't have any available, affordable space. Cost of living in the Crescent City had skyrocketed. They were looking at Columbus, Georgia, when they discovered a group called STARworks, in Star, North Carolina. This non-profit organization asked Eddie and Angela to visit its site and judge if the space would be suitable for a hot glass studio, for which they had received a grant to build in this region of North Carolina known as Central Park.

The STARworks Web site ([www.starworksn.org](http://www.starworksn.org)) states that the "project advances the Central Park strategy of providing a focused means of growing and developing creative enterprises and individuals for placement in the downtowns of our small communities and to develop agricultural entrepreneurs to replace the farmers that are retiring. Job creation programming at STARworks is entrepreneurial in nature and designed to serve the creative, agricultural, and alternative energy sectors of our regional economy."

After the Pittsburgh glass conference, Eddie and Angela drove through Star, North Carolina, on the way home to New Orleans to look at the STARworks space – a 180,000-square-foot sock factory.

"We hadn't considered moving out to the country, but when we started looking around, we discovered many potters as well as a diverse population attracted to the area because of the pottery tradition. We asked if there was a part of the building that might be suitable for us, and they showed us this dark, decrepit area. They said if we'd move there, they'd try to find the money to fix it up. In one day, we made the decision to move to North Carolina."

STARworks also wanted Bernard and Wet Dog Glass to build a studio for them. This studio is set up as a community access studio, an important part of the energy conservation picture according to Bernard, and run by STARworks in collaboration with Wet Dog Glass employees. Because it was built free of labor charges and with 0 percent mark up on materials, Wet Dog employees receive a great deal on rental rates (\$10 per hour). They're also developing a product line that STARworks can sell for income. And Wet Dog Glass has been permitted to experiment with the studio to increase heat reclamation and efficiency.

Bernard writes in GAS News: "Next year's discussion in Louisville, Kentucky, at the Glass Art Society conference will be titled 'Glass Studio as Energy Source.' The reason I came up with this

title is that I have numerous schools and firms approaching me saying they want to 'go green' or go LEED Silver on a new glass studio facility, and then I see the building being designed with no real attention to the fact that there is lots of energy to be harvested from the glass studio.

"STARworks has recently completed setting up a biodiesel refinery that will use waste heat from our 250-lb furnace for all the process heat required for waste veggie settling tanks and the methanol reaction. The furnace has a recuperator that pre-heats combustion air for the furnace to roughly 650 degrees F. The exhaust exiting the recuperator is still 1200 degrees F, which is enough to use for another process. We have a manifold that directs the exhaust heat from the top of our recuperator to either a batch preheater or the biodiesel heat exchanger. The batch preheater allows us to preheat our batch to 500 degrees F when charging and put that heat (stored in the batch) directly back into the furnace. This reduces melt time from an hour and 20 minutes for a 35-lb charge to an hour and 15 minutes for a 50-lb charge. It also reduces thermal shock on our furnace. Glycol circulates in a closed loop through the biodiesel heat exchanger and an insulated 550-gallon glycol storage tank. This tank stores heat gained from the exhaust over night, and each time we process a batch of biodiesel, we will circulate that hot 220-degree glycol through four tanks of locally collected waste vegetable oil and methanol. We are



hoping to use the glycerin byproduct as a fuel to fire our glory holes, and possibly the furnace.

"The large glory hole is positioned adjacent to the annealing ovens, and when we have time, we will finish ductwork that will send its exhaust to a jacket around the annealing ovens. This will offset the internal/external temperature differential, thereby requiring less heat for the annealing process.

"Our small glory hole has a hoist hanging over it, and we actually brew beer directly over the glory hole. Even with all the doors closed, we can heat 7.5 gallons of water from 70 degrees F to 170 degrees F in an hour and 15 minutes. This is just enough time for the mashing process to be complete before needing the second pot of hot water. The water we use to cool the wort and wash containers goes into plastic drums and is ultimately used to water our Community Supported Organic Garden. We are in the process of setting up a 2600-gallon tank between two roofs to collect rainwater, and at that point, we will simply circulate the rainwater from the big tank, through the beer in a copper tube to cool the beer from boiling to 80 degrees F, and return it to the storage tank. Effectively we will have reduced our cooling water down to a net use of zero. We collect all brown non-twist off bottles and bottle our beer in them.

"With our furnace waste heat, the exhaust is cooled to around 290 degrees F as it goes through the glycol heat exchanger. We have a greenhouse that we could send warm water to in an insulated water pipe. If we can cool our exhaust down to below 122 degrees F, we will harvest the water created in the combustion process. Sixteen percent of the product of combustion is water. This is water that is actually created in the combustion process when hydrogen and oxygen atoms bond to form the water molecule. In locations where water is a dwindling resource, harvesting this newly created water could be very beneficial. We will use that water whenever possible after doing a chemical analysis on it. Essentially we could filter it and use it in the cold shop, for flushing toilets, for the garden, for mixing refractories, etc.

"Another main product of combustion obviously is CO<sub>2</sub>, and a long-term idea might be to carbonate our beer using that CO<sub>2</sub>, but we have also begun to research algae photobioreactors (we could definitely use an intern for this huge amount of research) or much easier into the greenhouse where the plants would make good use of it. Many of these ideas have come from or been inspired by the discussions we have at the GAS conferences.

"We have begun to make good use of a superior insulating material called Micro-porous in our furnaces. Its insulating value is about three to four times that of ceramic fiber, so because it's quite pricy, we use it in parts of the furnace that are intrinsically thin or that would lose more heat than other parts, such as the door, the entire front face which we try to keep thin, and on top of the arch.

"We paint the insides of our furnace and glory hole skins reflective silver to reflect heat inward. Where our customers have a renewable electric source, like water or wind, we recommend electric furnaces."

To the average studio owner or reader of this article, these goals might seem a bit lofty and out of reach. It was exactly that notion — that all of this was very theoretical — that inspired Bernard to try to make it a reality.

"To that end, we have invested in monitoring and analysis equipment such as a combustion analyzer, power meter, lots of thermocouples, infrared thermometer and a data logging system. All the equipment in our shop communicates with a central brain through Ethernet cables, so we really can get a sense of the performance of our equipment."

Bernard continues, "We want to try to do this because we realize there are very few examples. When people ask how to do some of these things, as technicians we want to be able to tell them. We are developing a heat exchanger people could retrofit to the front of their gloryholes to create a water heater. We are collaborating with an engineering firm named Industrial Integration to design these systems."

On the most basic level, Bernard says any studio can start "going green" by reducing through better work habits, using better insulation profiles or utilizing better seals on doors, and better gas/air mixtures. Small studios and individual artists can buy locally and reuse materials, such as metal and glass.

While involved with rebuilding in the city of New Orleans, the waste Bernard saw in the construction process inspired his interest in being more environmentally frugal in his business. He began to ask: "Why can't the glass studio become the power source for the building?"

*Two Web sites have been created to foster the exchange of ideas and the sharing of information on these topics: [bioglass.org](http://bioglass.org) and [energyandatmosphere.blogspot.com](http://energyandatmosphere.blogspot.com). If you are a company, artist or studio, big or small, incorporating green practices in your art and business, contact us at [editor@glassartmagazine.com](mailto:editor@glassartmagazine.com). We'd love to hear, and possibly publish, your story. ♦*

# GAI

## TOYO Professional Series™

### Toyo Professional Series

tools are designed to handle the challenge of cutting fused glass and the new double-thick art glass.

The cutters feature Toyo's TAP Wheel™ cutting heads, honed to a 153° angle and capable of scoring glass up to 3/4" (19mm) thick.

#### Toyo TAP Wheel™ Pistol-grip Supercutter®



#### Toyo Power Breaker (16:1 leverage assist)



#### Toyo TAP Wheel™ Circle Supercutter® (up to 24" radius)



**30+**

Celebrating more than 30 years of innovation. See the complete line of Glass Accessories International Toyo tools at your retailer or at [www.glassaccessories.com](http://www.glassaccessories.com).