

A Masonry Stove Retrofit

by Albert Bates

In last autumn's issue of *the Green Living Journal*, Doug Kalmer wrote about his built-in masonry stove that also moderates summer heat, pre-warms his solar hot water system, and adds a nice aesthetic feature to his and Claudia's solar home. This past November we added a masonry stove to our living room at the Ecovillage Training Center, and I wanted to describe that process for anyone who might like to give it a try. The benefits of a small masonry stove retrofit is that it provides a nice even heat to the room (especially beneficial in a greenhouse), keeps radiating heat long after the fire has died, and depending on what shapes you give it, can take on additional functions—bread oven, sock drier, foot warmer and cook-stove, for instance.

To begin with, a masonry stove is *a lot* heavier than a conventional wood heater, so work for us began under the house. We have a small cellar below the living room, and it has a four-inch concrete pad, so we added a single column of 8-inch block to support the floor joist that ran directly under the location of our stove.

We bought an inexpensive welded box stove from a local welder on Highway 20, nothing fancy, just a 14 x 14 x 24 inch box of ¼-inch steel with a large firebox door, a smaller ash/flu door, and four legs made of bent rebar. We nailed down a thin sheet metal flashing, about four-foot square, to protect the wood floor from heat and cinders.

We put down a layer of unmortared brick around three sides of the stove, staying on the metal flashing. This was to protect the cob from water, such as when the floor is mopped. For stability, we laid the brick alternating orientation, two bricks east-west, two bricks north-south. We were careful that the inside edges of the bricks were even with the outside walls of the stove, neither under the stove nor too far removed. On this stable brick base we started a cob wall, filling the holes of the bricks with the first batch of cob, and moving up plumb with the firebox. The width of the cob wall matched the size of the brick.

It was easiest for us to make the cob on a tarp right outside the back door and then wheelbarrow it into the living room, but a cob toss would have accomplished the same thing with twice the fun had we had enough hands. I was usually working with only one other person much of the time, so the wheelbarrow was better. As we built the cob wall up, we threw in some large river stones to add to the mass of the wall. Stone, brick and cob have slightly different thermal qualities, so by mixing our media we had the benefit of all three types of storage and radiant heat.

After the first 12 inches of wall we put in another course of brick. Cob has a tendency to slough if you build it up too much before it can harden, and it can take days or weeks to harden, so by having a course of brick, and using stiff cob, we could stabilize the wall-in-progress and keep going.

I drew a chalk line on the side of the stove in a sweeping S-curve and we built the cob up to that line. Then we stuck in some flat creek stones for ornament, which followed my chalkline. After that we continued the cob wall up, leveling it to the top of the stove and beveling around the door-frame to give the firebox door a full range of motion.

There is an important addition that also went in while the cob was still wet. Between the cob wall and the firebox we slipped some scraps of hardy-plank (cement fiberboard) that we had left over from building a geodesic dome. If you don't have hardy plank, scraps of glass or ceramic tile would also work. The hardy plank serves to insulate the clay from the hot metal surface of the firebox and prevent cracking.

Once we reached the top of the firebox we had several options. We could stop and retain the top of the stove as a cooking surface. We could cob-over the top and increase the radiant thermal battery effect. Or we could do as we did, which was to keep half the surface as a grill for tea kettles or pots of chili (we chose the rear half, closest to the stove pipe) and make the other half into a baking oven. We also added some features to the rear of the stove — some carved alcoves for warming your feet on a cold winter day and some knobs and knolls for drying woolens.

To make the baking oven, we used some wedge-shape firebrick from a defunct pottery kiln, making sure we had enough depth for bread pans and enough ceiling for bread to rise. Building the arch 2-bricks deep accomplished the right depth, although the natural curve of our form was such that we ended up with more elevation than we had anticipated. Rather than build a brick base as we did, if I had it to design over I might either dispense with the base or start it lower down the outside of the firebox. As it is, we ended up with an oven you can do two-shelf baking in.

Building arches is a science, and it's something we teach here as part of our natural building courses. We used a 10-gal plastic barrel as our form, propped up on wood shims, both to make the barrel stable during construction and easy to extract after the arch was completed. We used 1-inch bamboo for spacers as we lay the brick, with a just a dab of mortar at the narrow end of each wedge. We used a 3-foot level to keep the bricks level and plumb. Once the keystone was in and the arch was in tension, we backfilled with cob and removed the bamboo spacers. Then we pulled the form and Voila! — a compression arch.

We had a nice piece of marble that fit the hole at the back of the oven. We cobbled that into place and cobbled over the top of the arch, connecting it all to the cob wall below. Finally, after a few days to harden and a very small fire to accelerate the drying process, we plastered with a mix of sand and lime, and put in some ornamentation with a clay alis, a bit of carving, and some bone, turtleshell, and colored bottles. The bread oven door is carved white oak.

So now when we have a fire we can also make cornbread and chili, bake bread, and the stove radiates heat long after the fire has died.

Albert Bates is founder of the Ecovillage Training Center at The Farm in Summertown and author of The Post-Petroleum Survival Guide and Cookbook: Recipes for Changing Times (New Society Publishers, 2006). This article has been provided courtesy of the Green Living Journal, a project of the Center for Holistic Ecology and the Cumberland Green Bioregional Council.