A breadbox solar water heater is a batch type passive system which requires no extra pumps or other equipment to circulate the water or control the operation. A breadbox water heater is an attractive alternative for many people because of its simplicity and low initial cost. A person with some elementary skills in carpentry and plumbing can expect to build a breadbox unit for less than $500.00. We built one of these units during the summer of 1982 at a materials cost of less than $200.00. We estimated that the extra plumbing that would be required for a residential installation would cost an additional $50.00, for a total system cost of about $250.00. (Prices have risen somewhat during the intervening year and materials costs may also be different in other parts of the state.) A well built and properly located breadbox unit can heat 40 to 100 gallons of water to a temperature of 95 to 145 degrees in a day.

LOCATION

The breadbox unit, like any solar collector, should be installed with an open, unobstructed exposure to the south. It can be set against the south wall of a house or be set up inside a solar greenhouse, enclosed porch, or other protected area.

ECONOMICS

A typical breadbox solar water heater will not produce as much hot water or save as much on the utility bill as a more elaborate active system. However, we know of no other solar hot water system that will provide a faster return on the investment.

The low initial cost, coupled with the available Federal, State, and local tax credits, makes the economics of the breadbox solar water heater attractive. A unit, built from the plan provided, was tested in Blacksburg during the summer of 1982. During May, the unit produced tank temperatures which averaged 110 degrees F. (Temperature in the tank varied as much as 30 degrees from top to bottom). On a bright sunny day, it produced water temperatures as high as 145 degrees F in the 42 gallon tank, adequate to satisfy more than half of the daily requirements for a typical family.

The payback period for the unit, using electricity as the basis for the comparison, was estimated to be 3.75 to 4.75 years in Blacksburg and 2.5 to 3.25 years in Richmond. A more complete discussion of the economics, including the assumptions made in the analysis, will be presented in a later fact sheet.
WARM WATER OUTLET
INSULATE TO
HOT WATER HEATER

COLD WATER INLET

HINGED TOP

11/2" ANGLE IRON

2 1/2" STRIPS OF
EXTERIOR PLYWOOD

3/4" RIGID EPS
WITH REFLECTIVE
DOUBLE LAYER

PRESSURE
TREATED
2"X10"
EACH SIDE

2"X2"
FRAMING

44"

37"

DRAIN

OR TO
3/8" ROOF

OARD INSULATION
FOR FOIL BACKING
ER ALL AROUND

1" X 2" GLAZING FRAME
WITH TEFLEX FILM

NOTE:
- DO NOT OPERATE SYSTEM IN FREEZING WEATHER.
  DRAIN AND BY-PASS TANK.
- SEAL BOX WITH CAULKING.
- GLUE INSULATION WITH CONSTRUCTION ADHESIVE.
- INSTALL SUPPORT AND LATCHES AS DESIRED TO
  HOLD TOP IN OPEN AND CLOSED POSITIONS.
- IF DESIRED, SUBSTITUTE GLASS, FIBERGLASS, OR
  OTHER GLAZING.
- IF DIFFERENT TANK IS USED, ADJUST DIMENSIONS
  ACCORDINGLY.
- LOCATE UNIT ON SOUTH SIDE OF HOUSE WITH
  CLEAR EXPOSURE.

OUTLET FROM RELIEF VALVE

75 PSI PRESSURE RELIEF VALVE

42 GAL. GALVANIZED TANK, 75 PSI 20 1/2" DIA. X 32"
COVERED WITH FLAT BLACK ABSORBER PAINT, GLASS LINED.

3/8" EXT. PLYWOOD
SIDES, TOP, & BOTTOM

3" TANK
CAUTIONS

The breadbox unit is inexpensive and simple, but lacks certain protective systems that are usually included with more elaborate active systems. Consequently, there are several recommendations which should be followed to ensure effective operation.

1. The unit should be disconnected, drained, and "closed up" whenever there is a danger the water might freeze and damage the tank or piping.

2. Both hot and cold connecting pipes should be insulated separately with fiberglass, foam, or urethane.

3. Piping, connectors, and all other components should be capable of withstanding 200 degrees Fahrenheit.

4. The unit should be protected from vandalism and damage from dust, animals, or children at play.

ADDITIONAL INFORMATION

For more information, contact your local Virginia Cooperative Extension Service agent or obtain some of the following references.

1. Breadbox Solar Water Heater Systems, National Center for Appropriate Technology, Box 3838, Butte, MT. 59702


5. Solar Preheater Plan, Union Electric, PO Box 149, St. Louis, MO 63166 FREE