

# Solar Assisted Green House

Master Gardeners Conference

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**Solar Assisted Green House** – Heating a greenhouse is often a necessity, especially in spring and fall. Freezing night time temperatures have even been recorded in June and July. Heating a greenhouse with fuel oil, LP, or electricity is very expensive. Solar panels are still expensive and to generate enough power to run heaters takes a lot of panels and therefore space.

Marji looked for a long time for an inexpensive alternative. Water bladders would retain heat, but draining and storing them at 40 – 50 below is not realistic! Finally one late summer day, on a picnic to the Tanana River, the grandchildren built a river rock house. When the sun went behind clouds, the children curled up in their house instead of getting jacket. The rocks kept the house quite warm! Was this a solution? Why not? A little math to determine volume to retain the heat and a sketch pad --- an idea became a plan! An Innovation Grant helped finance the greenhouse construction with a river rock solar heat retention box.

#### **Heat retention box –**

Determining volume needed for a greenhouse

- 3 ft x 3 ft box about the length of the greenhouse (8 - 10 feet at peak)
- 3 ft x 2 ½ ft box about the length of the greenhouse (6 – 8 ft at peak)
- 3 ft x 2 ft box about the length of the greenhouse ( under 6 ft at peak)
- Box can be placed on the north or east side of the greenhouse or up the middle
- Box can be used to place pots or planter boxes on top.

#### **Box construction –**

- Weather treated plywood ( 7/8”) for four sides of box
- 2x4's to frame box (segments can be up to 4' long)
- Blue board insulation for all sides of box
- Sealant for all joints
- Screws
- River rock to fill box
  - Baseball size and larger
  - Mix of sizes best for air circulation

#### **Air handling system –**

- 3” pvc pipe (3” from bottom of box to 6-8” from peak.
- 3” pvc pipe ( ½ length of box)
- 3” pvc elbow joint
- 2 squirrel cage fans - 1 to force air into box, 1 to draw air out of the box

**Optional Hot Air Reservoir** – if you are building a new greenhouse or your current greenhouse is in close proximity to an existing structure (preferably insulated). This gives an additional area to generate hot air to pump into the rocks. Reservoir makes a difference in early and late operations.

- South facing wall of existing structure
- Tyvec (black) insulation (or other tight weave outdoor fabric)
- Spray sealant for make more airtight
- Rigid foam for insulation at ends and bottom
- 2X4's for framing
- Squirrel cage fan to move air from top of green house into reservoir

## General Green House Needs –

### Air Handling –

- Exhaust Fan –
  - Large enough to evacuate unneeded hot air from the top of the greenhouse
  - Away from hot air intake to box
  - Thermostatic control is worth the investment!
    - Keep hot enough to effectively heat rocks
    - Exhaust excess so plants (especially tomatoes) don't cook
- Circulating Fans –
  - Moving air inhibits plant diseases
  - Slows molds
  - Keeps plant leaves dry
- Opening doors or vents (with screens if you want to keep insects out) –
  - Air exchange maintains good growing temperature on hot day
  - Controls humidity

### Irrigation –

- Drip irrigation most efficient
  - Water goes to plant, not floor, benches, etc.
  - Better humidity management
- Directional hose
  - If you use a hose, use watering wand or other directional head
  - Water to plant only as much as possible
  - Limit water to foliage to times when it will evaporate quickly
- Fertigation system –
  - Dissolve soluble fertilizer into water source
    - We use 35 gallon water tank in greenhouse so water is warm
  - Use venture feed dispenser for dissolved fertilizer
  - Use dose delivery devise in irrigation system

### Planting medium –

- Potting mix
- Make your own soil
  - Peat sand
  - Perlite
  - fertilizer
  - Compost
    - Use weed free compost
    - Local is best because it contains local soil builders
- Hydroponics ( different planting needs so research the topic)

### Planting containers –

- Planting boxes
- Planting benches
- Pots
  - Easier to handle
  - Weed control is easier (only remove infested pot)