



**The Renner Residence**  
© 2009 Mike and Elida Renner

Mike and Elida Renner began work on their home long before “green” was the “in” thing. Today, their home is a model of energy efficiency and solar energy equipment. Mike has personally installed 4,500 watts of solar panels, solar radiant heat, a 10,000 watt Bergey wind generator on a 100’ home-built tower, and three solar hot water systems on their home and greenhouse. The main solar hot water system on the house provides hot water for domestic use (dishwashing, bathing, etc.). The second system is used for in-floor radiant heating in the winter. A third solar hot water system heats the greenhouse in cold weather. Their solar electric system has battery backup, so they always have electricity, even when utility power fails. A large rainwater capture system with more than 7,000 gallons of storage rounds out their system, saving water and energy by reducing the amount of water they need to pump from their well.



36 PV panels rated 4,520 watts. Average output is 25 kW-h per day.



Custom, home-built electronics enclosure cabinet.



The "business end" of the solar power system inside the custom cabinet.



Transformer for wind turbine. (Note the large cooling fan!)



The 10,000 watt Bergey wind generator. Note its size compared to Mike.



The big lift. A large crane raised the wind generator to the top of the tower.



The wind generator almost in place. That's Mike on the top of the tower!



100 feet up in the Texas wind!



Solar in-floor radiant heat under construction.



The solar greenhouse. Windows allow cool air in during summer.



Translucent panels allow sunlight to enter the greenhouse.



A vent on the greenhouse roof opens to allow hot air out in the summer.



Cover panels removed reveal greenhouse solar hot water collector pipes.



Black barrels of sun-warmed water prevent plants from freezing in winter.



Interior view of the greenhouse with more barrels of water. (Far wall.)



Cinder blocks and concrete provide added mass for heat storage.



A fan circulates the air in the greenhouse. It's 100°F inside!



Home-made electronic temperature controller. Note the pipe insulation!



Sunlight shining through the roof.



Doors at both ends allow additional ventilation.



A small pump (red device in line with the pipes) circulates solar-heated water.



Rainwater capture on the shed.



350 gallons of rainwater storage.



The stored water is insulated to keep it from freezing. It also reduces algae.



Two 350 gallon tanks plumbed together for increased reserve.



500 gallons of water storage capacity ready to be installed..



Carport rainwater capture. Enclosed area (behind green barrel) is storage.



Garage rainwater storage insulated to prevent freezing and algae growth.



Rainwater capture on the greenhouse. (Black barrel.)



55-gallon drums serve as rain barrels for watering plants near the house.



5,000 gallons of rainwater are housed in this enclosure.



Plumbing routes rainwater from the house roof to dual 2,500 gallon tanks.



Rainwater enters the top of tank #1....



Gravity feeds the water from tank #1, through a filter, and into tank #2.



A pump moves the water from tank #2 to where it's needed.



A home-made 55-gallon drum composter. They recycle for the garden too!

# Renner Home Renewable Energy and Rainwater Capture Systems Overall Summary

## Residence

2,256 square feet, two-story, cinder-block construction

## Home Photovoltaic System

Total of 36 PV panels, comprised of:

16 each Kyocera KC120 (120 watt) and 20 Kyocera KC130 (130 watt) PV

Six PV are trailer-mounted.

Total rated PV output: 4,520 watts.

Average daily output: 25 kW-H

## Wind Generator:

Bergey XL, 10,000 watts peak output

## Battery Backup

8 each 6-volt, 220 amp-hour wired for 48 volts (10.56 kW-h)

4 each 12-volt, 130 amp-hour (6.24 kW-h) on the trailer)

## Solar Hot Water

Collector Area: 64 square feet

Storage Capacity: 100 gallons

## Radiant Heat System

Collector Area: 80 square feet

Storage Capacity: 80 gallons

There is also significant warmth stored in 288 square feet of concrete.

## Greenhouse Solar Hot Water System (for heat)

Collector Area: 192 square feet

Storage Capacity: 250 gallons

## Rainwater Collection Systems

House 1,300 square feet

Pole barn 480 square feet

Car port 400 square feet

Total 2,180 square feet

Total Storage: 7,500 gallons (for all systems combined)