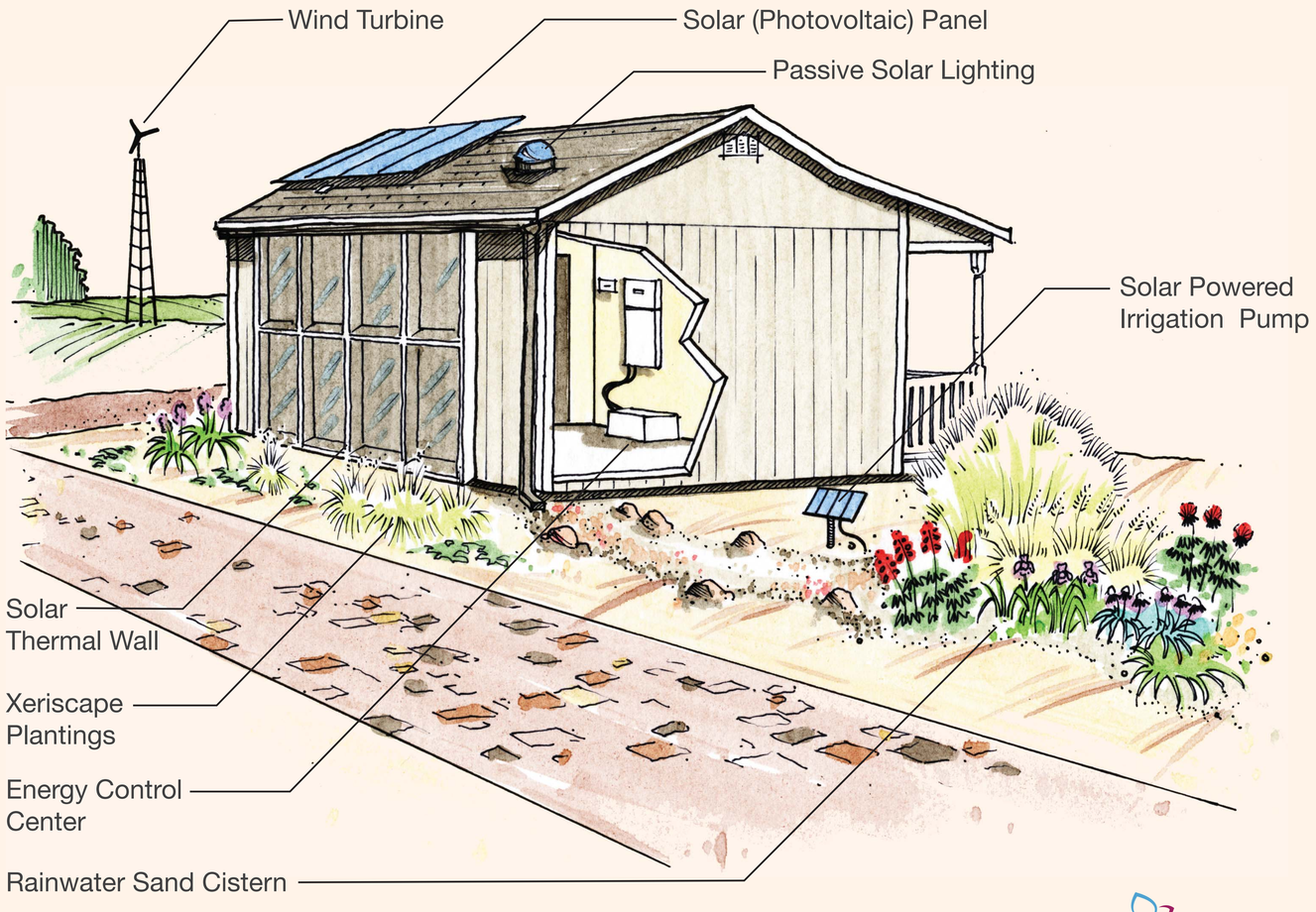
The GREEN Cottage

WHAT IS THE GREEN COTTAGE?

The GREEN Cottage employs a variety of alternative energy and resource conservation techniques applicable to the home landscape. Green systems include passive solar heating and lighting, electrical energy from the sun and wind, rainwater capture and redistribution, and a water saving landscape plan. The GREEN Cottage serves as an educational tool and research site. Systems are monitored regularly and collected data is used to evaluate the viability of such systems for Oklahoma consumers. The first step in adopting renewable energy is conservation to reduce demands on the energy and water systems.



ENERGY CONSERVATION

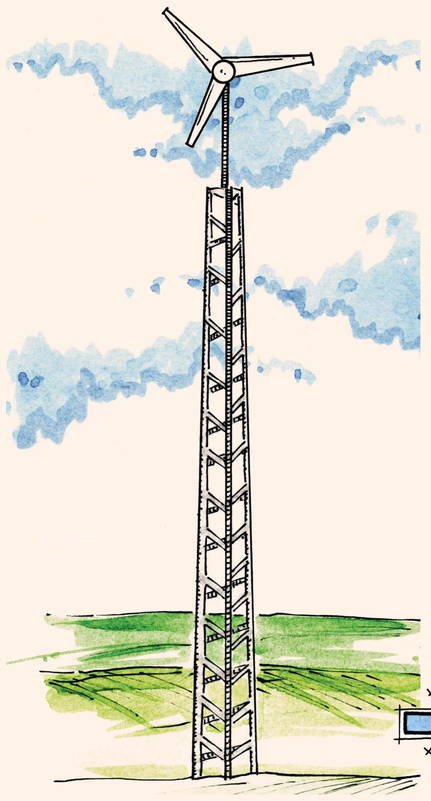
- Passive solar lighting
- Compact fluorescent light bulbs
- Solar heating
- Adequate building insulation
- Energy efficient appliances and tools
- Occupancy sensors and timers
- Summer ventilation for natural cooling

WATER CONSERVATION

- Efficient irrigation systems
- Rainwater collection and reuse
- Xeriscape (low-water use) landscape designs
- Mulching to conserve soil moisture
- Selecting the “Right Plant for the Right Location”

THE BOTANIC GARDEN

Wind Power

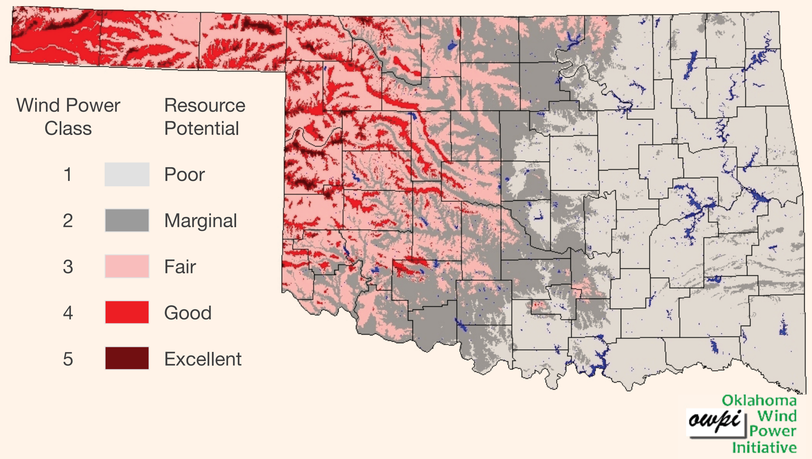


THE POWER OF WIND

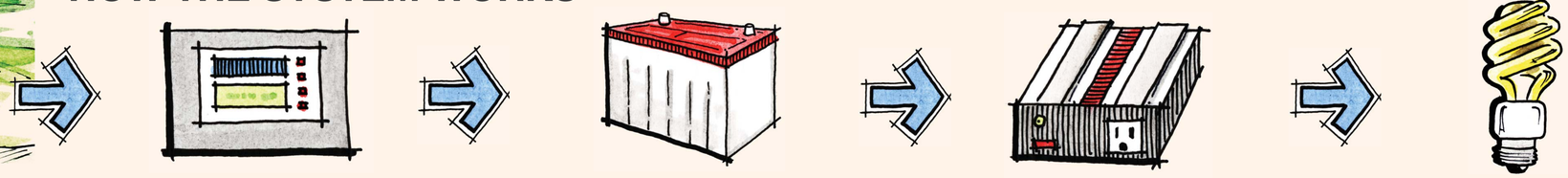
The renewable energy system providing electrical power to The GREEN Cottage is a combination solar photovoltaic (PV) and wind turbine generator system. Often times, the wind is blowing on days the sun is not shining. The wind turbine works in conjunction with the photovoltaic system to keep the batteries charged during cloudy conditions. The hybrid solar-wind system was installed to demonstrate the full range of possibilities of renewable energy for the home landscape. Our system converts direct current (DC) electricity to alternating current (AC), the power found in common household electrical outlets.

Some areas of Oklahoma are better suited to capture the power of wind. The Oklahoma Wind Resource Map on the right depicts yearly average wind speed over time. It represents the potential energy of the wind throughout Oklahoma.

OKLAHOMA WIND RESOURCE MAP



HOW THE SYSTEM WORKS



Wind Turbine: Turns only when needed. When the batteries are full, it shuts down to reduce wear.

Charge Controller: Properly charges batteries and prevents over-charging

Deep-cycle Batteries: Store electrical (kWh) energy as direct current (DC)

Inverter: Converts direct current (DC) to alternating current (AC)

Electrical Appliances (Load): Lights, tools, and appliances powered by the system

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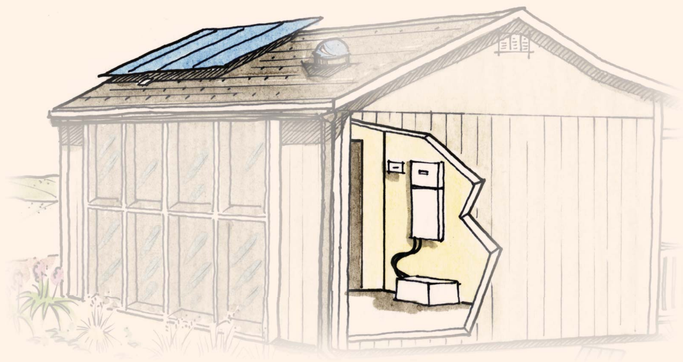
Solar Energy



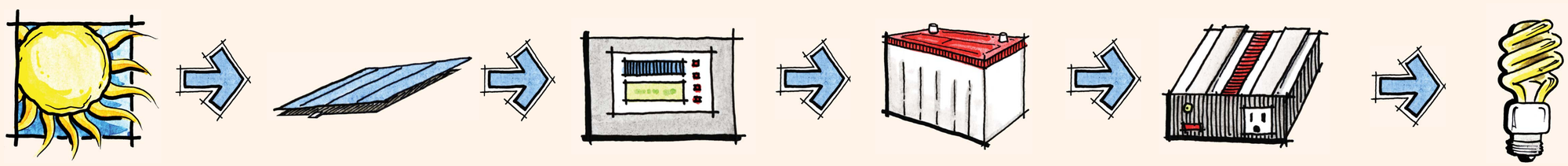
THE POWER OF SUN

A combination solar photovoltaic (PV) and wind turbine renewable energy system provides all the electrical power to The GREEN Cottage. It is a stand-alone system and is not connected to the electrical grid. Solar radiation provides the main source of energy supplying approximately 90% of the stored electrical power. Because homeowners are more familiar with alternating current electricity, our system converts direct current (DC) to alternating current (AC). This allows us to use common household tools and lighting systems inside The GREEN Cottage.

SOLAR FACTS

- Source of all energy on Earth except for radioactivity
- Distance from Earth (average) = 92,750,000 miles
- Sun will last another 5,000,000,000 years
- Average peak solar energy on surface of Earth = 1,000 Watts per square meter
- Average daily solar energy on surface of Earth = 250 Watts per square meter
- Yearly average daily solar energy available in Stillwater, Oklahoma = 5,590 Watt-hours/day
- Average efficiency of commercial Solar Cell = 12%

CAPTURING THE SUN'S ENERGY



Sun: Produces radiant energy

Solar (PV) Panel: Semiconductor material converts light into electrical current

Charge Controller: Properly charges batteries and prevents over-charging

Deep-cycle Batteries: Store electrical (kWh) energy as direct current (DC)

Inverter: Converts direct current (DC) energy to alternating current (AC) energy

Electrical Appliances (Load): Lights, tools, and appliances powered by the system

OKLAHOMA STATE UNIVERSITY

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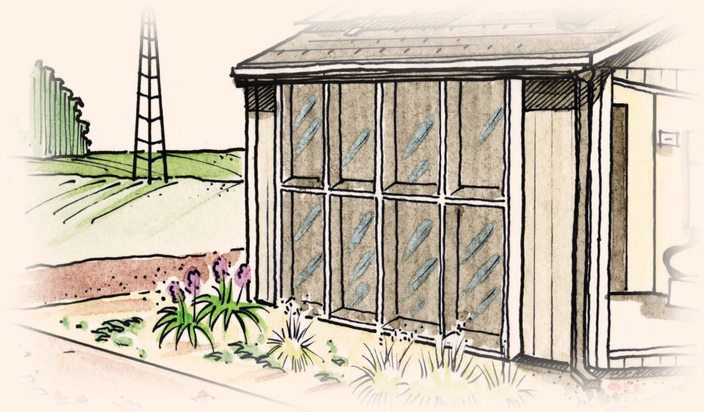
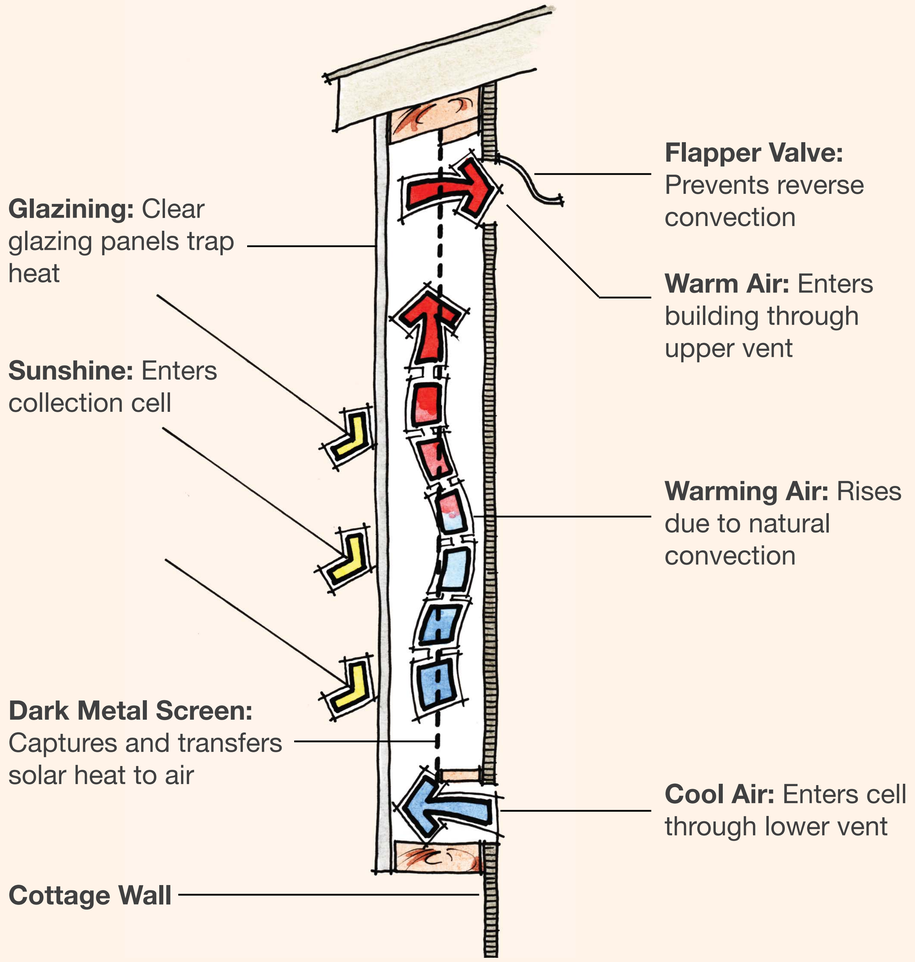
Thermal Energy



THE WARMING SUN

A passive solar thermal wall heats The GREEN Cottage in winter. This heating system does not use electrical energy; instead, it captures and circulates the heat energy of the sun. The passive solar thermal wall is easy and inexpensive to build and install. It functions much like a miniature greenhouse heating air in a wood-framed collection cell attached to the exterior wall. Black paint and a dark metal screen inside the cell maximize heat capture from the sun. Convection currents circulate air through vents cut in the wall at floor and ceiling levels. As air is heated in the collection cell, it rises and enters The GREEN Cottage through the upper vent. Cool air inside falls toward the floor and is pulled back into the cell where it is heated and re-circulated. As long as the sun is shining, this simple system is adequate to comfortably heat the building.

SOLAR THERMAL WALL DESIGN AND FUNCTION



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