

# What gets hot, for less



Rik Jesse, FLORIDA TODAY

**Getting hotter.** Senior research engineer Carlos Colon removes water from an integrated collector storage solar water heater to calibrate the system. The 40-gallon ICS system costs about \$3,500.

## Testing 7 systems, researchers see more efficiency in solar

**BY JIMWAYMER**  
FLORIDA TODAY

**COCOA** — In a 16-by-10-foot shed, researchers at the Florida Solar Energy Center run seven types of water heaters to find the cheapest and most efficient one.

With a \$150,000 federal grant, they're comparing how well the heaters work in hopes of saving energy and homeowners' money.

"We were trying to simulate a typical garage," said Subrato Chandra, project director for the energy center's Building America Industrialized Housing Partnership. "Our overall goal is research toward 'zero-energy' homes."

The researchers began their yearlong experiment this year in the new Hot Water Systems Labo-

ratory at the center's Cocoa campus. The systems include conventional and tankless electric water heaters, as well as natural gas and three different solar systems.

The solar systems are leading the pack in efficiency. The first-place model used about 39 kilowatt hours between Feb. 1 and Feb. 15, compared with 152 kilowatt hours used by the conventional electric water heater.

Solar water heaters cost more initially — they can be \$4,000 — but owners can hit a break-even point in 12 years or less, said Carlos Colon, a senior research engineer and task leader on the project. "The payback could be as early as seven years," he said. ■

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### Studying efficiency

The Florida Solar Energy



Center's staff has been testing types of water heaters to determine which are the most energy efficient and cost effective. Read more about the study's data on **3A**

# How 7 heaters stack up

**R**esearchers want to know how solar water heaters stack up on cold, cloudy days. The Florida Solar Energy Center compared the systems from midnight Feb. 1 to midnight Feb. 2. Temperatures averaged 55 degrees, with a low of 40 and a high of 69. The number associated with each system is not a rank.



Photos by Rik Jesse, FLORIDA TODAY

## 1 Standard water heater

■ **WHAT:** 50-gallon electric, which most Brevard County homes have  
 ■ **COST:** \$300 to \$500  
 ■ **ELECTRICITY USE:** 10.8 kilowatt hours  
 ■ **PROS:** Cheaper and easier to find  
 ■ **CONS:** Less efficient than solar and tankless heaters. Produces more carbon dioxide and other gases that contribute to global warming than other tanks. Lasts about 13 years, while solar heaters can last several years longer.

## 12 cents

Per kilowatt hour that residential customers pay for electricity, according to the Florida Solar Energy Center

## 2 Differential-controlled solar

■ **WHAT:** 40-square-foot collector and 80-gallon tank flat-plate direct solar water heating system with a differential controller. An electric pump circulates household water from the collector, into the tank and into the home. The differential controller turns the pump on and off to maximize solar heat gain with minimum energy use.  
 ■ **COST:** \$4,000 or more installed  
 ■ **ELECTRICITY USE:** 3.5 kilowatt hours  
 ■ **PROS:** Ranks best among the seven in energy use. Lasts 20 years or more.  
 ■ **CONS:** Higher initial cost. Needs a professional installer. Usually needs backup system for cloudy days and increased demand.



## 3 Integrated collector storage (ICS)

■ **WHAT:** 32-square-foot collector and 40-gallon ICS system with a standard 50-gallon electric tank for backup. ICS systems use one or more tanks or tubes in an insulated, glazed box. Cold water passes through the solar collector, which preheats the water. The water then flows to a conventional backup water heater, providing a reliable source of hot water.  
 ■ **COST:** \$3,500 installed  
 ■ **ELECTRICITY USE:** 6.6 kilowatt hours  
 ■ **PROS:** Ranked third of the seven in energy use. Increased storage capacity. More reliable. Not as many operating parts.  
 ■ **CONS:** Higher initial cost. Usually needs a backup system for cloudy days and increased demand.

## 4 Solar-pumped system

■ **WHAT:** 40-square-foot collector and 80-gallon tank, flat-plate direct heating system that uses solar power to circulate the water instead of an electric pump  
 ■ **COST:** \$3,500 to \$4,000 installed  
 ■ **ELECTRICITY USE:** 4.6 kilowatt hours  
 ■ **PROS:** Ranked second of the seven in energy use. Similar performance to electric differential-controlled solar system. Uses no energy to run the pump. Very reliable.  
 ■ **CONS:** Higher initial cost. Usually needs a backup system for cloudy days and increased demand.



## 7 Tankless electric

■ **WHAT:** Provides hot water only as needed  
 ■ **COST:** \$800 to \$1,100  
 ■ **ELECTRICITY USE:** 9.3 kilowatt hours  
 ■ **PROS:** Slightly more effi-

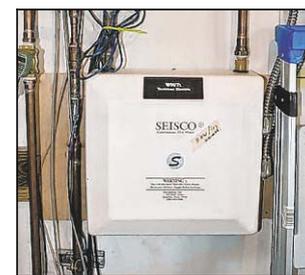


## 5 Natural gas

■ **WHAT:** 40-gallon conventional natural gas water heater  
 ■ **COST:** \$400 to \$500  
 ■ **ELECTRICITY USE:** 59.1 cubic feet of gas, 17.33 kilowatt hours  
 ■ **PROS:** Saves space and money up front, compared with standard water heaters. Results in three times less greenhouse gas than a conventional water heater.  
 ■ **CONS:** Least efficient among seven. Heat escapes because of the design — a flue in the center of the tank, with no way to insulate against resulting heat loss.

## \$20

Per thousand cubic feet, or 2 cents per cubic foot, that Floridians pay for natural gas, according to the Energy Information Administration



## 6 Tankless natural gas

■ **WHAT:** A small heating unit that heats water directly without the use of a storage tank. Provides hot water only as needed.  
 ■ **COST:** \$800 to \$1,100  
 ■ **ELECTRICITY USE:** 35.9 cubic feet of gas, or 10.53 kilowatt hours  
 ■ **PROS:** Saves space and money in the long term, compared with standard water heaters. Doesn't have standby energy losses associated with water heaters that store water. Three times fewer gases that contribute to global warming created than with a conventional electric water heater.  
 ■ **CONS:** The temperature rise is not as fast as conventional water heaters. Delayed hot water to the faucet. Slow flows may not ignite the burner, leaving water cold. More expensive to install and maintain than conventional electric water heaters. Can take up to 20 years or more to recoup those additional up-front costs.



cient than standard electric water heater. Doesn't have the standby energy losses associated with water heaters that store water, which can save you money.

■ **CONS:** Slower to heat than conventional electric water heaters, which encourages more water use