CDC Realty, Inc., of Tucson, Arizona, approached U.S. Department of Energy Building America partner Building Science Corporation (BSC) for guidance in building a community of compact, single-story homes aimed at first-time home buyers and retirees who could really benefit from the cost savings of energy-efficient homes.

The 1,500 ft\(^2\) homes are a simple, slab-on-grade design with a flat roof and 12-foot ceilings in the great room and kitchen and sloped 9-foot ceilings throughout the rest of the home. Cellulose is blown into the ceiling cavities above the 12-foot ceilings and held against the roof line with netting over the 9-foot ceilings, providing an R-38 insulation value and a conditioned space to house the air handler and the ductwork.

The walls are insulated to R-24 by filling the wall cavities with R-19 of blown cellulose then adding R-7.5 of rigid foam to the exterior of the walls. The rigid foam provides a continuous insulation layer to prevent thermal bridging which is the transfer of heat through the walls at the wood framing.

All of the homes are plumbed for solar thermal water heating. Five homeowners chose to install the integral collector storage solar water heater system, which the builder offered to homebuyers at a reduced cost during construction. All of the homes are equipped with an instantaneous electric hot water system.

“If you view the whole house as a system...it’s not only easier, you end up with a better product.”

Lee Rayburn, owner, CDC Realty

CDC Realty Inc. offered first-time home buyers in Tucson compact, affordable homes with an abundance of natural light and low utility bills.

(Photos top left) CDC Realty Inc. offered first-time home buyers in Tucson compact, affordable homes with an abundance of natural light and low utility bills.
Lessons Learned

• To further minimize energy losses, Building Science Corporation recommended reducing the window ratio from 18% to 12.2%. BSC also recommended adding overhangs to shade windows on the east, south, and west sides, and choosing higher performance double-pane, low-emissivity, vinyl-framed windows with a U-value of 0.38 and an SHGC of 0.30.

• The builder focused on a compact 1,500 ft² design and efficient storage to appeal to a target market of young singles and empty nesters. High ceilings added a sense of space.

• CDC Realty attracted buyers with a low energy bill guarantee offered through Tucson Electric Power.

• According to the builder, moving the ducts inside conditioned space was a design change that added nothing to the initial cost of construction, yet this one change was calculated to save homeowners $106 annually on their utility bills.

• Increasing attic insulation from R-22 to R-38 was expected to add $400 to the builder’s initial costs but the change was calculated to save the homeowners $139 annually in utility bills.

For more information, please visit: www.buildingamerica.gov