

## DP Construction

Pebble Creek  
Prattville, AL



### BUILDER PROFILE

DP Construction, Prattville, AL  
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Rater: Newport Builders, LLC  
Marshall Newport  
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### FEATURED HOME/DEVELOPMENT:

#### Project Data:

- Name: Pebble Creek
- Location: Prattville, AL
- Layout: 4 bdrm, 2.5 bath, 2 fl, 3,021 ft<sup>2</sup>
- Climate Zone: IECC 3A, hot-humid
- Completion: November 2015
- Category: custom spec

#### Modeled Performance Data:

- HERS Index: without PV 45
- Projected Annual Energy Costs: without PV \$1,124
- Projected Annual Energy Cost Savings (vs home built to 2009 IECC): without PV \$910
- Projected Annual Energy Savings: without PV 12,912 kWh
- Added Construction Cost: \$1.60/SF

Builder Dow Perry's goal was to build a home that costs the same and looks the same as nearby homes in Prattville, Alabama, but far outperforms them. By all accounts, the high-performance custom spec home he built at the Pebble Creek development was successful. "We were able to sell a home that performs better than any home in the neighborhood for less per square foot than what a lot of other new homes in our area sell for, and we still had enough profit for it to make good sense," said Perry, who estimated the home cost \$1.60/ft<sup>2</sup> more than typical local homes, an added cost he says he did not pass on to the consumer. This was Perry's first home built to the criteria of the U.S. Department of Energy Zero Energy Ready Home program and the home was selected as a 2016 DOE Housing Innovation Award winner. The home achieved a Home Energy Rating System (HERS) score of 45. A typical new home built to code would score a HERS 80 to 100. The efficient home should cut energy bills nearly in half for its home owners, with expected yearly energy bills of \$1,124, or less than \$100 per month. Not bad for a 3,021-ft<sup>2</sup> home.

The home also has the distinction of being the first home in Alabama to be certified as a DOE Zero Energy Ready home. Every home certified to the program criteria must meet ENERGY STAR Certified Homes Version 3.0 and the U.S. Environmental Protection Agency's Indoor airPLUS program. Each home must meet the hot water distribution requirements of the EPA's WaterSense program and the insulation requirements of the 2012 International Energy Conservation Code. In addition, homes are required to have solar electric panels installed or have the conduit and electrical panel space in place for future installation of solar panels.



The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program (formerly known as Challenge Home). Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0 for an energy-efficient home built on a solid foundation of building science research. Advanced technologies are designed in to give you superior construction, durability, and comfort; healthy indoor air; high-performance HVAC, lighting, and appliances; and solar-ready components for low or no utility bills in a quality home that will last for generations to come.

DP Construction built this 3,021-ft<sup>2</sup> home in Prattville, Alabama, to the performance criteria of the DOE Zero Energy Ready Home (ZERH) program. High-efficiency windows, lighting, and ceiling fans add to energy savings. Low- and no-VOC paints and finishes helped the home achieve the EPA's Indoor airPLUS certification.



## What makes a home a DOE ZERO ENERGY READY HOME?

**1 BASELINE**  
ENERGY STAR  
Certified Homes  
Version 3.0

**2 ENVELOPE**  
meets or exceeds  
2012 IECC levels

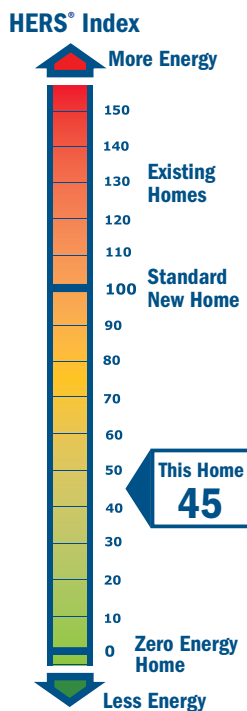
**3 DUCT SYSTEM**  
located within the  
home's thermal  
boundary

**4 WATER  
EFFICIENCY**  
meets or  
exceeds the EPA  
WaterSense  
Section 3.3 specs

**5 LIGHTING AND  
APPLIANCES**  
ENERGY STAR  
qualified

**6 INDOOR AIR QUALITY**  
meets or exceeds the EPA Indoor  
airPLUS Verification Checklist

**7 RENEWABLE READY**  
meets EPA Renewable Energy-  
Ready Home.



While packed with high-performance features, the home does look like most homes in the neighborhood with the same tan brick siding and traditional accents. Perry said the only difference people might notice is that the walls are thicker. Perry's DP Construction company built the wood-framed walls with 2x6 studs rather than the 2x4 framing typical of local construction. They employed several advanced framing techniques to reduce the amount of lumber used and to make more room in the walls for insulation. In standard construction, the space at the corners, where interior walls meet exterior walls and over doors and windows is often constructed in such a way that the framing lumber boxes off uninsulated empty space or the space is filled with solid framing that is costly and leaves no room for insulation. DP Construction installed California corners, which are three-stud corners with one stud turned to allow space for insulation all the way into the corner and ladder blocking where interior walls intercept exterior walls, which allows space for insulation. Over windows and doors, rather than installing three solid 2x8s or 2x10s, they installed one set flush with the outside edge of the wall, which provides adequate structural strength while still leaving 3.5 inches of room for insulation.

The 5.5-inch wall cavities were filled with open-cell spray foam for an R-20 cavity insulation value. The walls were sheathed with  $\frac{1}{8}$ -inch OSB. Then another 1.5 inches of closed-cell soy-based spray foam was sprayed over this to provide an additional R-11 of insulation. A  $\frac{3}{4}$ -inch air gap separated the foam from the brick veneer. This closed-cell foam layer "creates a shell that truly protects the home from water, vapor, air, and thermal loss and gains while also adding some structural strength," noted Perry.

The home's unvented attic is also insulated with spray foam, with 11 inches (R-42) of open-cell spray foam filling the 2x6 rafter bays and completely covering the rafters to prevent any thermal bridging. The vaulted ceiling in the bonus room is filled with 5.5 inches (R-41) of soy-based closed-cell spray foam. The roof is sheathed with  $\frac{1}{8}$ -inch OSB, topped with roofing felt and fiberglass shingles.

The home is built on a raised slab-on-grade foundation. The slab was poured over a 6-mil vapor barrier laid over compacted soil and is uninsulated as slab insulation is not required by code.

Double-pane, vinyl-framed high-efficiency windows with heat-blocking low-emissivity coatings complete the thermal envelope of the home.



The advanced-framed walls of this home are filled with 5.5 inches of open-cell spray foam while an additional 1.5 inches of closed-cell spray foam covers the plywood sheathing providing a complete air and thermal barrier with a total wall insulation value of R-32. Brick veneer will complete the wall assembly.

Like all DOE Zero Energy Ready certified homes, the home was tested by an energy rater for whole-house air leakage. Spray foaming the structure helped the builder achieve a whole-house air leakage rate of only 1.4 air changes per hour at 50 Pascals, well below the 3 ACH 50 permitted by the 2015 International Energy Conservation Code in climate zone 3. The home has code-compliant ventilation provided by ENERGY STAR-rated exhaust fans that are activated by humidity sensors in the bathrooms.

The builder specified high-performance ductless mini-split heat pumps for heating and cooling because of the efficient home's low heating and cooling loads. His DOE Zero Energy Ready home has a heating load of 36,000 Btu/h and a cooling load of 32,000 Btu/h. Most standard central furnaces and cooling systems have one-speed motors that are on or off, resulting in high temperature swings between cycles. Because mini-split heat pumps have variable-speed compressors and fans, they can better match low cooling or heating load conditions, thus increasing their efficiency. "These mini-split systems are ideal for the low heating and cooling loads of very energy-efficient homes," said Perry. The system has one exterior unit and four interior units which are mounted on walls in the master bedroom, above the front door, at the top of the stairs, and above the window in the bonus room. The system provides cooling with a seasonal energy efficiency rating (SEER) of 18.4 and a heating season performance factor (HSPF) of 8.7, above the SEER 14 and HSPF 8.2 required by the 2015 federal standards. The ductless units are individually controlled to provide zoned heating and cooling.

The home's hot water is provided by a 50-gallon heat pump water heater. The ENERGY STAR qualified unit has an efficiency rating of 2.40. To reduce hot water demand in the home, the plumbing system is equipped with a recirculating pump that is push-button activated at the kitchen and master bathroom sinks to speed hot water to the faucets.

To further reduce energy demand, the home is equipped with energy-efficient CFL and LED lighting. ENERGY STAR-qualified appliances include the dishwasher and refrigerator.

In keeping with the requirements of the DOE Zero Energy Ready Home program, the home is pre-wired for solar photovoltaic panel installation. Perry selected a lot in the established neighborhood that allowed the long side of the house to face south. The home has more than enough south-facing roof area to house a solar PV system that can reduce the annual power bill to \$0.

## HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program

ENERGY STAR Certified Homes  
Version 3.0

EPA Indoor airPLUS

Alabama Power Company's Superior  
Solutions, platinum



Every DOE Zero Energy Ready Home combines a building science baseline specified by ENERGY STAR Certified Homes with advanced technologies and practices from DOE's Building America research program.



A high-efficiency ductless, mini-split heat pump system consisting of one outside unit and four inside air handlers provides highly efficient heating and cooling.

slightly familiar with different things we did in the home. I provided them with all the information about what makes this home different and how it performs. I printed materials from ENERGY STAR and the DOE Zero Energy Ready Home program websites for them and I participated in the realtor open house,” said Perry. Perry did some of his own marketing, creating a Facebook page for the home to provide accurate, detailed information about the home’s high-performance features.

He noted that the power company was very enthusiastic about the home and offered to do an open house, but the house sold before they had an opportunity to hold the event. The house participated in the Alabama Power Company’s Superior Solutions program, earning a platinum-level certification. In addition, the home was certified to the DOE Zero Energy Ready Home program, ENERGY STAR Certified Homes, and the EPA’s Indoor airPLUS program.

Perry said he appreciates the marketing support and consumer information provided by the DOE program. He also appreciates how the DOE program is trying to help change standard practice.

The greatest reward for this builder is the long-term results. “The goal we set out for ourselves was to build a house that looks the same and costs the same as other homes in the neighborhood, but far outperforms them. This home has been constructed with exceptional attention to details that will continually pay off. With no additional upfront cost for the home owner, they are able to move in and instantly reap the benefits of owning such an efficient and sustainable home; and they will continue to do so for years to come,” said Perry.

*Photos courtesy of DP Construction*

This was the first home built on spec for Perry who has been in business in Alabama since 2010 constructing 3 to 5 custom presold homes per year. The home took a little longer to sell than he anticipated, and Perry determined the main reason was the wall-mounted mini-splits. “People just aren’t used to them yet. Most people don’t like change and are scared to invest in what they don’t know much about,” said Perry.

Perry has put quite a bit of effort into educating real estate agents, as well as potential home buyers, on the energy-efficient features of the home.

“I met with real estate agents, and only a couple of them were only

## KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** 2x6, 24” o.c., advanced-framed, 5.5” open-cell foam in cavity, 7/16” R-21 OSB sheathing, 1.5” soy open-cell spray foam over sheathing, brick veneer.
- **Roof:** 7/16” OSB decking, roofing felt, fiberglass shingles.
- **Attic:** Unvented attic with 11” R-42 soy open-cell spray foam on underside of roof deck, 5.5” in vaulted ceilings, 7/16” OSB, roofing felt, fiberglass shingles.
- **Foundation:** Uninsulated slab on grade.
- **Windows:** Double-pane, vinyl-framed, low-e, U=0.33, SHGC=0.26.
- **Air Sealing:** 1.4 ACH 50.
- **Ventilation:** Moisture-activated bath exhaust fans.
- **HVAC:** 4 wall-mounted mini-split ductless heat pumps, 18.4 SEER, 8.7 HSPF.
- **Hot Water:** 50-gallon heat pump water heater, 2.40 EF.
- **Lighting:** 90% CFL, 10% LED.
- **Appliances:** ENERGY STAR dishwasher, refrigerator.
- **Solar:** Pre-wired for solar.
- **Water Conservation:** Button-operated on-demand hot water pump.
- **Energy Management System:** None.
- **Other:** Low-VOC paint and carpet.