

Heirloom Design Build

Euclid Avenue
Atlanta, GA



BUILDER PROFILE

Heirloom Design Build, Atlanta, GA
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Rater: GreenHome Georgia
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FEATURED HOME/DEVELOPMENT:

Project Data:

- Name: Euclid Avenue
- Location: Atlanta, GA
- Layout: 5 bedrooms, 6 baths, 2 floors, finished basement
- Conditioned Space: 4,840 ft²
- Climate Zone: IECC 3A, mixed-humid
- Completion: 2013
- Category: Custom

Modeled Performance Data:

- HERS Index: without PV 50
- Projected Annual Utility Costs: without PV \$2,595
- Projected Annual Energy Cost Savings (compared to a home built to the 2009 IECC): \$1,714
- Builder's Added Cost Over 2009 IECC: without PV \$40,000
- Annual Energy Savings: without PV 15,893 kWh

When residents of Atlanta's Inman Park neighborhood stopped construction of a highway through their historic community, they were left with a long, narrow corridor of open space that they turned into a park, plus 24 cleared lots. Those lots created a unique opportunity for innovative builders like David Radlmann, founder of Heirloom Design Build, who snatched up two lots with the goal of building homes that were both architecturally appropriate to the neighborhood and exceptionally energy efficient. When deciding how to make the first home energy efficient, Radlmann chose to build to the criteria of the U.S. Department of Energy's Zero Energy Ready Home program.

"The goal of this project is to create an architecturally accurate home that fits into the neighborhood while striving to achieve high-performance certifications to create community awareness of high-performance design and construction. By studying what works in brand new homes, I can learn how to apply these techniques in old homes, the worst offenders for energy performance. I can take what I learn and apply it in other projects in an economically sustainable way," said Radlmann. "I think DOE is on the same page, trying to establish what works and what doesn't in terms of high performance and cost effectiveness."

The Inman Park neighborhood includes homes built in the 1800s in the Victorian, Neoclassical, Shaker, Georgian, and other period styles. "This was Atlanta's very first suburb and, from an urban development perspective, it's a very sustainable neighborhood. It's close to downtown, and you can walk everywhere—to retail, grocery, the post office; there is a trail right through the neighborhood that takes you to the train," said Radlmann. The neighborhood is now a historical district so, to build or renovate, builders must meet with the neighborhood association and the City of Atlanta Urban Design Commission to get design approval.



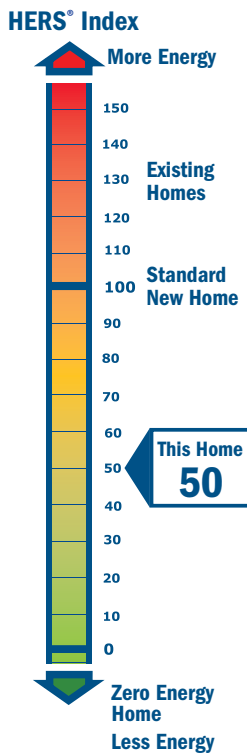
The U.S. Department of Energy invites home builders across the country to meet the extraordinary levels of excellence and quality specified in DOE's Zero Energy Ready Home program (formerly known as Challenge Home). Every DOE Zero Energy Ready Home starts with ENERGY STAR Certified Homes Version 3.0 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.

Heirloom Design Build constructed this two-story home in Atlanta's historic Inman Park neighborhood to the criteria of the U.S. Department of Energy's Zero Energy Ready Home program. The home is equipped with ultra-efficient LED-based lighting and ENERGY STAR appliances.



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.



Radlmann started doing energy-efficient construction in 2003 and was soon managing and developing green and New Urbanism projects totaling in excess of \$350 million. He was in the middle of several LEED industrial projects and a large-scale mixed-use urban renewal project in Atlanta when the economy tanked in 2008. Looking for opportunities in the chaos, he decided to put his talents to use helping people with home renovation projects.

This was Radlmann's first house built to the DOE Zero Energy Ready Home program criteria. The DOE Zero Energy Ready Home program requires homes to meet all of the requirements of ENERGY STAR Certified Homes Version 3.0 and the U.S. Environmental Protection Agency's Indoor airPLUS, as well as 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 it.

Construction of the two-story plus basement, 4,840-ft² home began with construction of the basement, which is 8 feet below grade. Radlmann installed 1 inch (R-5) of closed-cell rigid foam under the slab. After the concrete foundation walls were poured, 2x4 walls were framed on the interior with a 1-inch gap between the framing and the concrete. This gap and the wall cavities were filled with 3 inches (R-13) of closed-cell spray foam.

Radlmann used advanced framing techniques on the 2x6 above-grade walls including California (3-stud, open) corners, ladder blocking, insulated headers, and single top plates although he spaced the studs at 16 inches on center rather than 24 inches on center because of concerns about Georgia's occasional tornados. According to Radlmann, he spent days caulking all of the top and bottom plates, all of the stud joints, and every stud to the sheathing. After all of this prep work was done, his crews filled the wall cavities with R-19 spray foam insulation. To ensure that the air sealing was done properly, Radlmann had his energy rater do two blower door tests—one prior to sheet rocking and one prior to siding. "The first test gives us a chance to seal holes before sheet rock encloses the walls," said Radlmann. The walls were sheathed with OSB, then covered with house wrap, then sided with fiber cement plank siding.

Radlmann also used spray foam in the attic. The attic is insulated on the underside of the roof deck with R-28 open-cell spray foam to provide a sealed



The home is certified to the U.S. Environmental Protection Agency's WaterSense criteria and has EPA WaterSense-labeled plumbing fixtures for water and energy savings.

conditioned space for HVAC ducts and for storage. Over the plywood decking, Radlmann installed ice and water shield as an underlayment over the entire roof. He then covered the roof with ENERGY STAR-rated asphalt roofing shingles.

The home is equipped with a central air-to-air heat pump ducted for four zones. The heat pump has a heating efficiency of 12.5 HSPF and a cooling efficiency of 22.8 SEER, far exceeding the federal minimum of 7.7 HSPF and 13 SEER. The heat pump has a MERV 16 filter and UV filtration for hospital quality indoor air.

Radlmann also installed a UV filtration system for the water. He actually installed two systems so that it would not reduce the water pressure. He installed them on the line coming into the home, which is split into two lines, each coming in at 14 gallons per minute. There are four intermediate steps with filters that are changed every 6 months then a big container with a filter that is changed every 2 years. "A lot of people have asthma and a lot of people who have asthma also have eczema, so I felt, if we could filter out contaminants in the city water, it would provide an all-around better health experience." The added cost for the water filtration system was under \$2,000.

For ventilation, Radlmann installed an energy recovery ventilator (ERV). ERVs pull stale air from a home while bringing in an equal amount of fresh air from separate ducts. The ERV supplies fresh air that is distributed by the central air handler while returns on each floor and in the basement continually exhaust stale air from the home.

The home also met all of the EPA Indoor airPLUS criteria including no- and low-VOC paints, stains, and finishes, woods, and carpets.

The home is equipped with a conventional electric hot water heater with an 85-gallon tank and 0.92 efficiency factor.

All of the home's lighting is ultra-efficient LED-based lighting and the home's refrigerator, clothes washer, and dishwasher are ENERGY STAR rated.

In addition to meeting the DOE Zero Energy Ready Home criteria, the home was also constructed to the DOE Zero Energy Ready Home Quality Management Guidelines. The home also met the National Association of Home Builders' National Green Building Standard, gold level.

HOME CERTIFICATIONS

DOE Zero Energy Ready Home Program, 100% commitment

ENERGY STAR Certified Homes Version 3.0

EPA Indoor airPLUS

EPA WaterSense

NAHB National Green Building Standards, gold level



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.



The home's wall framing is extensively air sealed, then the walls and attic roof are filled with open-cell spray foam for a quiet, thermal blanket.

For Radlmann, one of the rewards is how well the home blends into the 1890s neighborhood. "People walk by this house and say 'I love that old house.' Nobody knows it's a brand new high-performance house. It doesn't look like a "green" house. The interior was designed to look like an old house that has been renovated. There is a one-story bump-out that looks like an addition; we even changed some trim and flooring details inside and outside to imply a transition. It has 11-foot ceilings throughout, so people feel like they are in an old, traditional Atlanta home. I did some things like secret doors that might have been in an older home. I have architects that come in and they have no idea it is new. They guess 1920s neoclassical," said Radlmann. The home has even fooled the camera; it has been used in several period films shot in Atlanta.

Radlmann was so pleased with the results of the home that he bought it himself. He now uses it as a model home that he can bring clients to, so they can experience a green DOE Zero Energy Ready home first-hand.

Radlmann shared some important benefits to the home from a home owner's perspective. "Since moving into the Zero Energy Ready Home, we have found a vast improvement in indoor air quality. One of the occupants suffers from asthma. The symptoms have been dramatically reduced, enough to where daily medication has been eliminated. Our previous house was an 1893 Victorian bungalow that was about 1,800 ft² compared to this home, which is 4,840 ft². Our electric bill is about the same while our water bill is about one-third of the previous bill."

Photos courtesy of Heirloom Design Build

Radlmann worked with his architect, Cooper Pierce of Jones Pierce Architects, to design a carriage house with a living unit above the garage. Radlmann noted that as the neighborhood has evolved, several big homes that had been multifamily were converted back to single-family. By adding a living unit on top of the garage, he increased the population density and provided a potential income source for the home owners. This unit was also built to the DOE efficiency criteria. It has a 27 SEER ductless heat pump and an ERV.

Southface Energy awarded the home the EarthCraft House Project of the Year award for 2014. The NAHB's Greater Atlanta Homebuilders Association awarded the home two 2014 OBIE awards: for Best EarthCraft House—2000-ft²+ and for Best Home—2000-ft²+

KEY FEATURES

- **DOE Zero Energy Ready Home Path:** Performance.
- **Walls:** Advanced framing; 2x6; 16" on center; California corners; ladder blocking; insulated headers; single top plates; caulk every stud; OSB sheathing; house wrap; fiber cement siding.
- **Roof:** ENERGY STAR-rated asphalt shingles; ice and water shield.
- **Attic:** Unvented; insulated on underside of roof deck; open-cell spray foam (R-28).
- **Foundation:** Basement walls; 2x4 walls; closed-cell spray foam (R-13); R-5 rigid foam under slab.
- **Windows:** Double-pane; wood-framed; low-e; U=0.35; SHGC=0.30.
- **Air Sealing:** 1.9 ACH 50
- **Ventilation:** ERV; MERV 16 filter.
- **HVAC:** Heat pump; 22.8 SEER; 12.5 HSPF.
- **Hot Water:** Electric water heater.
- **Lighting:** 100% LED.
- **Appliances:** ENERGY STAR-rated refrigerator, clothes washer, and dishwasher.
- **Solar:** None.
- **Water Conservation:** EPA WaterSense certified; no irrigation.
- **Other:** low-/no-VOC paints, stains, and finishes. Electronic energy monitoring system.