Mountain Laurel Home

Research project for DOE Race to Zero competition

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Project Summary

Our design process started with an exciting partnership with Dan Ryan Homes, a national production homebuilder with regional headquarters in Raleigh. We wanted to design a single family residence that would not only be sustainable and zero energy ready, but livable and marketable as well. Our goal was to find a balance between these three directions.

We want to inspire a progressive direction in production built homes. Using integrated design techniques we were able to unite students across disciplines and enhance the academic environment of Appalachian State University. Starting with currently marketed residential designs we were able to create a starting point that would merit feasibility in readiness of design for production residential application.

The Mountain Laurel Home exceeds LEED Platinum certification by 7 ½ points, meets ENERGYSTAR v.3, DOE Zero Energy Ready Home National Program Requirements, EPA Indoor Air Quality Plus, and Water Sense standards, Passive House standards, and has a HERS score of 41 before Photovoltaics are added. Advanced framing techniques along with an efficient layout reduce the material requirements while increasing our mechanical systems' efficiencies. The Mountain Laurel design creates flexible and adaptable spaces within the home that grow and develop with its owner. The home is adaptable to many different climate zones without modification, and to more northern zones (6 and 7) with relatively minor changes to the HVAC.

The team presented our research at the National Renewable Energy Lab this spring and was selected as finalist in the DOE Race to Zero competition. In the final phase of our work on this project we have developed a set of recommendations for our industry partner to incorporate into their production homes to increase energy efficiency.

Project Data

- Mebane, NC
- Climate Zone 4
- 2, 278 square feet
- 5 bedrooms, 2 ½ Bathrooms, 1 ½ Stories
- HERS Scores: 41 (Before PV), -3 (After PV)

Technical Specifications

- Foundation- Slab on grade, R-15 perimeter insulation
- Wall- Blown Cellulose cavity insulation, R-10 exterior foam insulation, total assembly R-37
- Roof Insulation- Blown Cellulose with 2” spray foam, total assembly R-52
- Window Performance- U-Factor= 0.27, SHGC= 0.2
- HVAC- Air Source Heat Pump, 16 SEER, 10 HSPF