



Project Summary

The partnership between Appalachian State, the Yancey Economic Development Commission and Mitchell-Yancey Habitat for Humanity aims to provide affordable access housing options to permanent residents in Burnsville. The partnership is working to establish the **NEW House** project, a **Net-zero Energy** house for the diverse lower and middle income **Workforce** in the mountain counties of northwestern North Carolina.

A scaffolding of prefabricated design solutions are being developed to ensure peak performance of the **NEW House** regardless of where it is found. To assist design development, six client stories present the socio-economic demography of the community and the potential challenges facing candidates for this affordable access housing initiative.

Design Strategy

Integrated teams from Appalachian State's Building Science program are comprised of members from its three discipline concentrations: Architectural Technology & Design, Construction Management, and Sustainable Building Systems. Building Integration Group (BIG) teams receive the mentorship of three program faculty and consult with a strong group of industry partners. The purpose is to learn about, engage, and practice the integrated design process.

Student teams are developing and expanding a catalog of modular spaces and prefabricated assemblies to include in design proposals. The organizing objective is to create a flexible yet functional system of design configured to meet the combined needs of the client and the challenges of the site.

Project Data

Location	Burnsville, North Carolina, USA
Climate zone	5a
Lots	6 sub-divided infill parcels > 4,000 sf
Building size	1,200 sf - 1,500 sf
Program	3/2 bed, 2 bath accessible living
Target HERS Score	< 45
Targeted energy utility costs	\$025 per month including fees
Targeted construction cost	\$125 per sf

Technical Specifications

R-Values	22 CLT Wall, 22 ICF, 28 CLT Roof
Window U-value and SHGC	< 0.22 and < 0.3 unless passive solar
Doors	Specify capability of air-tight seal
HVAC	18 kBtuh ductless mini split; dedicated ventilation HRV and dehumidification technology designed to minimize ducting runs and terminate at high sidewall registers
On-site PV	Contingent on site constraints
Community PV	Identify PV cooperatives that can host panels to achieve net zero energy

Project Highlights

Architecture

Design innovation is connected to the flexibility of form and functional cores within the building. The result will be a catalog of comprehensive design solutions that facilitate site specific solutions for the **NEW House** regardless of its location.

Engineering

Taking advantage of the mild summer climate, BIGapp targeted a space conditioning strategy that does not need active cooling. The team aims to specify an option for an air-to-water heat pump thoughtfully coupled with dehumidifying and ventilation technology.

Market Analysis

By working with Yancey EDC and Mitchell-Yancey Habitat, BIGapp will help extend the value of a dollar for potential buyers of the affordable housing offerings. With a goal of \$125/sf, the team expects homes to come in between \$150k - \$200k.

Durability and Resilience

Teams consider moisture and natural disaster risks. Hygrothermal analysis via WUFI helped teams evaluate building assemblies and important connection points.

Embodied Environmental Impact

A study of the life-cycle impacts of major building assembly options was a focal point for internal design teams. Carbon and ecological considerations were considered on par with life-cycle cost analysis in determining which assemblies are most appropriate.

Integrated Performance

BIGapp has brought together nearly 50 students spanning three degree concentrations to practice integration. Small integrated teams evaluated how to make use of passive strategies and practical systems layout within their building designs.

Occupant Experience

The **NEW House** is focused on occupant health and experience. Material selection helps minimize pollutant loading and prioritize durability. Thoughtful selection of appliances enables efficiency and open doors to a more connected world.

Comfort and Environmental Quality

Intentional design for comfort and environment help ensure that the building will offer positive experience no matter the stage of life. Balanced ventilation and dedicated dehumidification will maintain air quality. Diffuse light multiple directions will make for a soothing space.

Energy Performance

The **NEW House** is designed based on thorough simulation analysis. By setting aside dedicated space for battery storage, the house will be ready to accommodate a battery storage and load management option to assist with grid stability.



Solution scaffolding



Low-load living



Affordable access



Minding gaps



Nature matters



Innovating practice



Living simply



Setting atmosphere



Data-driven design



The NEW Story matters