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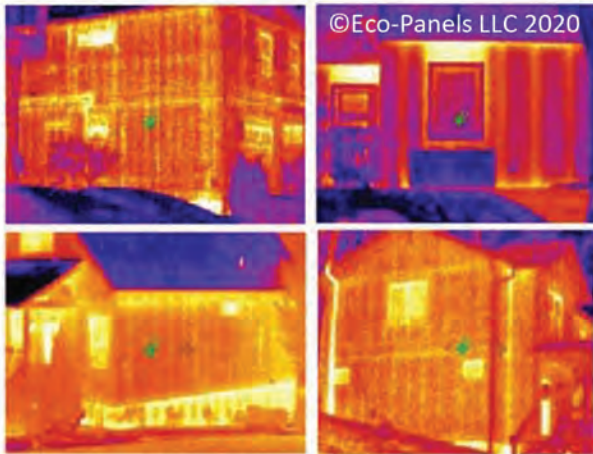


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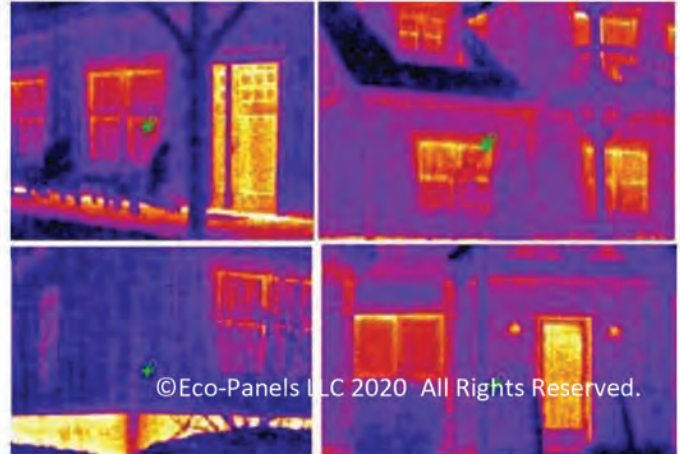


WHO BUILDS YOUR HOME IS NOT AS IMPORTANT AS HOW YOUR HOME IS BUILT

Recent 2x6 stud frame 'green-built' homes in Asheville, NC showing massive energy loss through stud framing



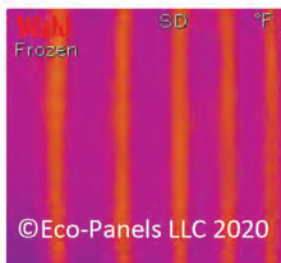
Homes built with Eco-Panels around Asheville, NC showing primary energy loss at windows and doors instead of through the wall system



Thermal imaging photos featuring both methods of construction taken over same two nights.

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This is an image of a LEED Compliant wall as viewed from the interior on a hot day in Asheville in 2019. Like an oven, the wall framing is literally heating the interior space, driving up energy usage & cost.

Eco-Panels applauds Asheville area builders like **Anderson-McNair General Contractors** for building **Stronger, Safer** and **Significantly More Energy Efficient** homes, with Eco-Panels.



Inside



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Regina Hunter and Nikita Norris play with their children, Kyree Norris and Kaleia Norris, outside their home in Asheville Area Habitat for Humanity's 21-home neighborhood in Arden. Their home and all of Asheville Habitat's other projects are certified through Green Built Alliance's Green Built Homes program.

MADDY ALEWINE PHOTO

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Dedication

This year's directory is dedicated to the memory of all the lives cut short this year by the viruses plaguing our communities.

As we mourn the heartbreaking losses of life sustained due to COVID-19, we also face a long overdue reckoning with our nation's most enduring disease of systemic racism.

We grieve with families who have lost loved ones during the pandemic, while we stand with the Black Lives Matter movement as it strives to eradicate white supremacy and build racial justice.

May we deepen our commitments to lovingly care for our neighbors, fiercely protect the wellbeing of each member of our communities, compassionately heal what plagues us, and tirelessly work together to create a more just, healthy and equitable world for us all.



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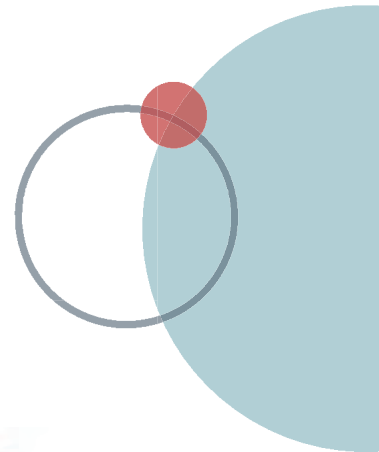
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Welcome to the Directory

The value of sustainable, equitable and affordable building is relevant now more than ever.

The importance of green building has never been more obvious than in this year where most of us are spending more of our time at home than ever before while vigilantly monitoring our own health, and while being called to step up, speak out and stand alongside our neighbors of color.

As we approach the 20th anniversary of our nonprofit's inception here at Green Built Alliance, we expected that 2020 would be an exciting start to the new decade, with plans for renewal and refocusing in several of our prominent community programs.

Of course, if recent months have reminded us of anything, it is that expectations do not always match reality. However, the recent curve balls thrown our way didn't stop us from marching forward in our work with adaptability and agility.

Our work today

In the first half of 2020, our Green Built Homes program completed and began the roll out of version 3.0 of its certification checklist, which has been updated and revised to stay current with changing building codes and increase simplicity for program participants. The new checklist places more emphasis on regenerative elements, including the addition of an innovative Net Zero Water Ready Certification and a pilot Regenerative Certification. Learn more about the leaner, greener version of our certification program in the story on page 44.

Meanwhile, following a Request for Proposals from the City of Asheville and Buncombe County, Green Built Alliance was selected to continue implementing the work of the Blue Horizons Project. With more than two years under its belt since launching its community-focused campaign, Blue Horizons Project is excited for the next phase in its evolution. As Green Built Al-

liance carries forward the clean-energy torch through this work, the program's founding entity, the Energy Innovation Task Force, is being dissolved and reborn as the Blue Horizons Project Community Council. Learn more about this collaborative approach and the next phases of Blue Horizons Project's work in the story on page 60.

In early 2020, Green Built Alliance also assumed management and operation of Energy Savers Network's efforts to offer energy-efficiency upgrades to low-income homes in Western North Carolina, with the intention of continuing to expand the grassroots program's impact and reach. Green Built Alliance had served for two years prior as the fiscal sponsor of Energy Savers Network, which has been operating under the umbrella of the broader Blue Horizons Project.

Last but not least, our nonprofit's Appalachian Offsets program is celebrating the long-awaited completion of fundraising for the Isaac Dickson Elementary School solar system. With more than 100 donors contributing to the \$428,000 system, Appalachian Offsets finished fundraising for the Isaac Dickson solar project in late 2019 and the 300 kW array is expected to be installed on the school's roof in September 2020. Learn more about the Isaac Dickson project and what's next for Appalachian Offsets in the story on page 54.

Our work continues

Needless to say, the world of green building has come a long way in the two decades since our nonprofit's formation, and we're proud and humbled to have been able to evolve and grow along with our industry.

While there has been a great deal of positive transformation worth celebrating in these past 20 years, we know that we still have a long way to go, especially as it pertains to racial equity. For all of our progress, the world of green building still seems primarily white, and

In the past year, Green Built Alliance has reached countless individuals through its work advancing sustainability in the built environment through its numerous programs that focus on community education, measurable standards and regional action. Here are a few highlights of the past year of work.

- 60 Builders Certifying Homes
- 124 Green Built Homes Certified
- 12 Net-Zero Energy Projects Certified
- 16 Clean-energy Presentations
- 1,277 Volunteer Hours
- 164 Homes Improved
- 1,807 LED Bulbs Installed
- 80 Contributions to Offset Carbon Footprint
- \$8,000 in Donations to Offset Carbon Footprint



Green Built Alliance is actively engaged in the work of changing that. We recognize that in order for green building to be truly sustainable for any of us, it must also be accessible to all of us.

Though our programs have made commitments toward equity and our staff has participated in numerous training sessions around diversity and inclusion in recent years, we have not done nearly enough. Good intentions are simply not adequate, and we are committed to increasing our efforts toward inclusion and equity by working tirelessly to build healthier homes for all of our neighbors.

Black lives matter. The healthiness, affordability and sustainability of black homes matters. No one says this better than the NAACP, which has launched an initiative on Centering Equity in the Sustainable Building Sector. Learn more about the NAACP's perspective and initiative on page 40, or read a local take on the ties between racial justice and the Asheville

building industry on page 66.

There are no right words in this watershed moment of such immense suffering and turmoil engulfing communities across our nation, but there are right actions we can begin to take together, one step at a time.

As an anti-racist organization, Green Built Alliance is committed to listening and learning. We are committed to remembering that there is much we do not know. We are committed to advancing sustainability for all people. We are committed to building a community of healthier homes for each of our neighbors.

As Green Built Alliance prepares to mark the milestone of 20 years since our inception in 2001, we invite you to join us in recommitting to this work of preserving our Earth, reevaluating the ways that we are protecting our neighbors, and renewing our resolve to cultivate true sustainability in the built environment.

Thank you for being part of the solution.

Connect with Us and Explore Our Online Resources:

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Green Building For All

Green Building is Key to Affordable Housing

BY SOPHIE MULLINAX

Green-built homes afford their residents countless benefits. Healthier indoor air quality, lower energy bills, and increased comfort top the list.

These benefits should be available to all people, especially our lower-income neighbors who are more likely to suffer from health problems like asthma and be energy burdened, meaning they pay a disproportionate share of their income on energy bills.

Smart design and the healthier materials utilized by green building yield results including better indoor air quality, reduced allergens, lower utility bills, and higher quality of residence — all of which are social determinants of health.

Concerns with code

Esteemed architect William McDonough is famously credited with saying, “The building code defines the worst house allowable by law.” When one thinks of affordable housing, an uninspired housing stock is more likely to come to mind than green building. More often than not, affordable housing is built to minimum building code standards; is constructed from cheap materials; has cookie-cutter designs; and falls into disrepair more quickly due to poor construction, design and deferred maintenance. These strategies keep costs low, ensuring maximum profitability for developers and homebuyers alike.

On the other hand, green-built construction utilizes materials that are durable and long lasting, sustainably sourced, and made of

healthier, non-toxic components. Energy- and water-saving appliances and fixtures are used. Designs are more innovative and exciting. These green-building features form the building blocks of homes and structures that will be comfortable, long lasting, less expensive over their lifetime, and likely to emit fewer greenhouse-gas emissions due to increased energy efficiency.

These benefits translate to healthier homes, as well as lower operating costs for residents. More than eight million American households pay more than 50 percent of their income on housing. It is a short-sighted disservice to our communities and planet to build code-built affordable housing. The traditional mindset of building to code overlooks the myriad long-term benefits of green building, and it has been demonstrated that green building saves money while increasing occupant health and comfort.

Saving green by going green

In 2016, Virginia Tech’s Virginia Center for Housing Research and Southface Institute collaborated on a study on the impact of green-certified affordable housing. The study found that when affordable housing is green-certified (whether through Green Built Homes, LEED, Energy Star, or another program), developers construct higher-quality housing at a lower cost while low-income residents save more energy and money.

Families residing in green developments saved an average of



Regina Hunter and Nikita Norris stand with their children, Kyree Norris and Kaleia Norris, outside their Arden residence, which was built by Asheville Area Habitat for Humanity and certified through Green Built Alliance’s Green Built Homes program. MADDY ALEWINE PHOTO

\$96 per year, and seniors saved more than \$122 per year more on energy costs when compared to non-green developments. Green developments saved nearly \$5,000 per year on owner-paid utility costs when compared to non-green developments, and total construction costs are nearly five percent less than their non-green counterparts. Soft construction cost savings (architectural, engineering, financing, and legal fees, and other pre- and post-construction expenses) were even greater, costing 13 percent less than non-green developments due to in-

creased coordination on the front end of design and planning.

The majority of developers surveyed in the study indicated that green buildings provide benefits in terms of quality of end product and achieving their firm’s objectives and mission. The study admits that green buildings can be more expensive on the front end than traditional construction projects, but cost-benefits are achieved on the operations side once people are living in and using these homes. Green spaces are frequently included as criteria for green-building certifications and

Mountain Housing Opportunities' LEED Gold development, Glen Rock Depot in Asheville's River Arts District. SITWORK STUDIOS PHOTO



"Habitat has made a commitment to green building and sustainable standards for all homes we construct around the country."

— Paul Reeves

have been shown to reduce tenant turnover and reduce crime in multifamily developments.

In the Northeast, where the winters can be long and cold, the New York State Energy Research and Development Authority helped finance energy improvements at nearly 100,000 apartments across the state, bringing both new construction and existing buildings up to the federal ENERGY STAR® standards and cutting their energy costs by a quarter on average. All of these apartments were tested on their actual utility expenses as part of the program, and savings were nearly \$400 per unit annually.

Commitments for the future

What does this mean for our beloved Western North Carolina mountain communities?

My work on the Blue Horizons Project focuses on energy efficiency for all residents and businesses of Buncombe County. Increasing the energy efficiency of

new construction of all types helps meet our region's shared goal of creating a cleaner energy future. The less energy used to operate a building, the less natural gas is burned at Duke Energy's Lake Julian power plant — a win for us and a win for the climate.

Incorporating green and energy-efficient building standards into affordable housing can help further many local municipalities' focus areas such as climate resilience, equity, and health. Green-built affordable housing checks many boxes. There are multiple financial incentives for green building and energy efficiency, including City of Asheville development application fee rebates, North Carolina Housing Finance Agency System Vision, and Duke Energy new construction rebates. Many other states offer points for affordable housing developments built to green standards, but unfortunately, North Carolina is not one of them.

Locally, Mountain Housing Opportunities and Asheville Area Habitat for Humanity stand out in their commitment to building green-built affordable housing developments.

Mountain Housing Opportunities' green vision statement is, "By educating our community and ourselves about green-building practices, we can build more efficient, well-located homes. In this way we conserve natural resources, protect the environment, and serve our primary mission, to build and improve homes, neigh-

borhoods, communities and lives." To date, Asheville Area Habitat for Humanity has certified 163 projects through the Green Built Homes system, more than any other home builder in the whole state of North Carolina.

"Habitat has made a commitment to green building and sustainable standards for all homes we construct around the country," Asheville Area Habitat Director of Construction Services Paul Reeves said.

I am heartened that affordable housing seems to be increasingly thoughtfully planned while incorporating green and sustainable features. Certified green-built and sustainably-built homes are what people want and deserve. I dream of the day when all of North Carolina's affordable housing is certified as green. Building green and sustainable affordable housing benefits everyone involved — landlords, developers, tenants, and neighbors — and it's the right thing to do for our community.

Sophie Mullinax manages the Blue Horizons Project, a community-wide campaign to help residents and businesses of Buncombe County adopt energy efficiency and renewable energy. Before moving home to Asheville in 2018, she spent nine years working in the nonprofit sector while living in Washington DC.

Connect with Sophie at bluehorizonsproject.com.



Affordable for the Long Haul

Habitat Tests New Style of Housing in Curry Court

BY ARIANE KJELLQUIST

On 2.7 acres in Candler, not far from shopping and services, is a thriving community of 12 certified Green Built Homes created by Asheville Area Habitat for Humanity.

Previously the site of five abandoned mobile homes, the parcel presented Asheville Habitat with an opportunity to build something other than its time-tested detached single-family arts-and-crafts-style homes. Dubbed Curry Court, the Candler community would be a small-scale test of a new housing product for Asheville Habitat: two-story townhomes.

Townhomes enabled the non-profit builder to serve 33 percent more families on the same parcel — an important consideration due to the rising cost and limited availability of buildable land, coupled with a growing need for affordable housing. Additionally, not every-

Project Team

Builder — Asheville Area Habitat For Humanity
HVAC Contractor — Gentry Heating Ventilation Equipment — Green R
HERS Rater — Vandemusser Design



At Curry Court and throughout Buncombe County, Asheville Habitat defies the misconception that green building is expensive and only accessible to the wealthy. ASHEVILLE AREA HABITAT FOR HUMANITY PHOTO



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one wants a single-family detached home and maximizing land use is an environmentally smart strategy.

At Curry Court and throughout Buncombe County, Asheville Habitat defies the misconception that green building is expensive and only accessible to the wealthy. In fact, Asheville Habitat has certified more Green Built Homes than any other builder in the state — 173 since 2008.

Affordable to buy and maintain

Through Habitat's affordable homeownership program, qualified families who earn 70 percent or less of area median income partner with Habitat to build and buy a certified Green Built Home. Future homebuyers participate in the building of their own home and the homes of their neighbors, take homeownership preparation classes, then purchase their home from Habitat and pay back an affordable mortgage over 30 years. The typical monthly mortgage payment for a three-bedroom, one-and-a-half-bath Habitat house is \$650.

In addition to being affordable to purchase, it's essential that Habitat homes are affordable to maintain. Advanced Energy predetermines the heating and cooling cost of the home using energy modeling and proper HVAC sizing. If the homebuyer properly maintains their HVAC system and thermostat setpoints and the costs exceed the predetermined amount (typically \$35 to 45 per month) during the first two years of ownership, Advanced Energy will pay for the additional fees and evaluate the cause of the energy surplus. For the new homeowner, that provides peace of mind as well as incentive to take good care of the systems.

To that end, Habitat works hard to ensure homebuyers understand the importance of changing out their return-air and heat-recovery-ventilator filters every three to six months, for example. An in-depth class about home-system maintenance is part of Habitat's Homeownership Education curriculum, and a short refresher is provided during the final walk-through on closing day.

A participant in the SystemVision program, Asheville Habitat homes include passive radon mitigation, a HRV unit, sealed crawl space, and much more.

"We keep close tabs on the crawlspace from the onset, con-

Video Tour

Watch a video tour of one of Asheville Habitat's Green Built Homes-certified projects at greenbuilt.org.

tinually monitoring the moisture levels throughout construction of the home and fully encapsulating the space as soon as it is feasible to do so," Construction Administrator Sumaya El-Attar said.

The houses also boast high-efficiency vinyl windows, high-efficiency heat pumps and water heaters, ENERGY STAR® appliances, R-18 spray foam insulation, R-15 wall insulation, and R-19 floor insulation. Habitat is proud of how tight their homes are, and homeowners are appreciative.

"The money I will be saving from having affordable heating, I can put into my savings account," said new Curry Court townhome owner Belinda Finley, who was paying nearly \$400 per month in heating costs during the winter as a renter. "That's going to mean a lot to me."

Trying something new

Asheville Habitat works with Vandemusser Design, a third-party Home Energy Rating System (HERS) rater that gathers efficiency information through a frame-and-insulation inspection and blower-door test and ensures SystemVision compliance. The Green Built Homes certification is presented by Green Built Alliance, the program administrator.

While townhomes were a welcome addition, the new model required new equipment and extensive training. Habitat staff had to learn new processes and teach hundreds of volunteers the new ropes — or in this case, the new scaffolding. The townhomes are two stories, a departure from Habitat's single-story detached homes. A new scaffolding system that encompasses the entire structure was purchased to ensure staff and volunteers could work safely at heights.

"Our volunteers are excited by new things, they love to be challenged," El-Attar said.

Eager to learn and be involved, they showed up in droves to a safety training that was required for staff, but optional for volunteers.

Also new to Habitat's construction crews were firewalls. Wide and

heavy, it took a minute for the staff to determine the best way to install the thick wall between two townhome units. Interior stairwells with half-walls upstairs and finishing caps were new too. The townhome layout and design also necessitated new types of lighting, such as wall sconces in the stairwell and pendant lights above the kitchen island. And the upstairs bedrooms include hypoallergenic and antimicrobial berber carpet.

It proved highly successful to use the small Curry Court community as an opportunity to learn the best way to build the new housing model. In Habitat's largest community to date, the 98-home New Heights neighborhood under construction off Old Haywood Road in West Asheville will include more two-story townhomes, the time-tested single-family homes, and a brand new housing type with single-level Aging in Place townhomes for adults age 55 and older.

A well-oiled machine

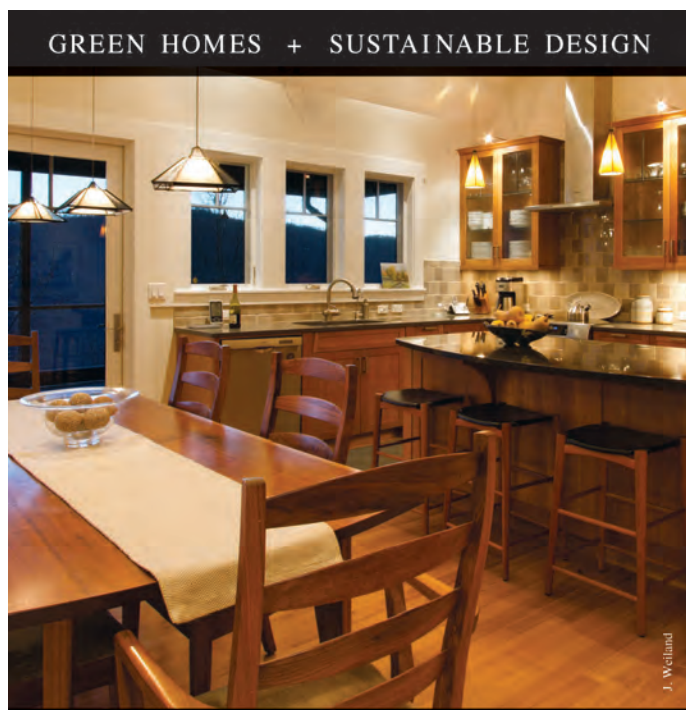
Green building has immediate and long-lasting positive impacts above and beyond the commonly cited environmental ones. In Habitat's case, there are financial ben-

efits for both the nonprofit and the homebuyer. A low HERS score means Habitat receives a rebate from Duke Energy of about \$2,500 per house, while a Green Built Homes certification generates a \$6,000-per-house grant from the North Carolina Housing Finance Agency, both of which make homes even more affordable to the homebuyer.

A low monthly mortgage is only part of what makes a Habitat home affordable. Low maintenance costs contribute significantly to the long-term affordability of a home, so Habitat works hard on the front end to build energy-efficient homes and educate homebuyers on how to properly maintain them.

"The goal is to build a home that runs like a well-oiled machine," said El-Attar.

Ariane Kjellquist is the communications director for Asheville Area Habitat for Humanity. She has worked since 2006 for the local nonprofit, which builds and repairs homes, operates two ReStores, and offers deconstruction services. Connect with Ariane at ashevillehabitat.org.

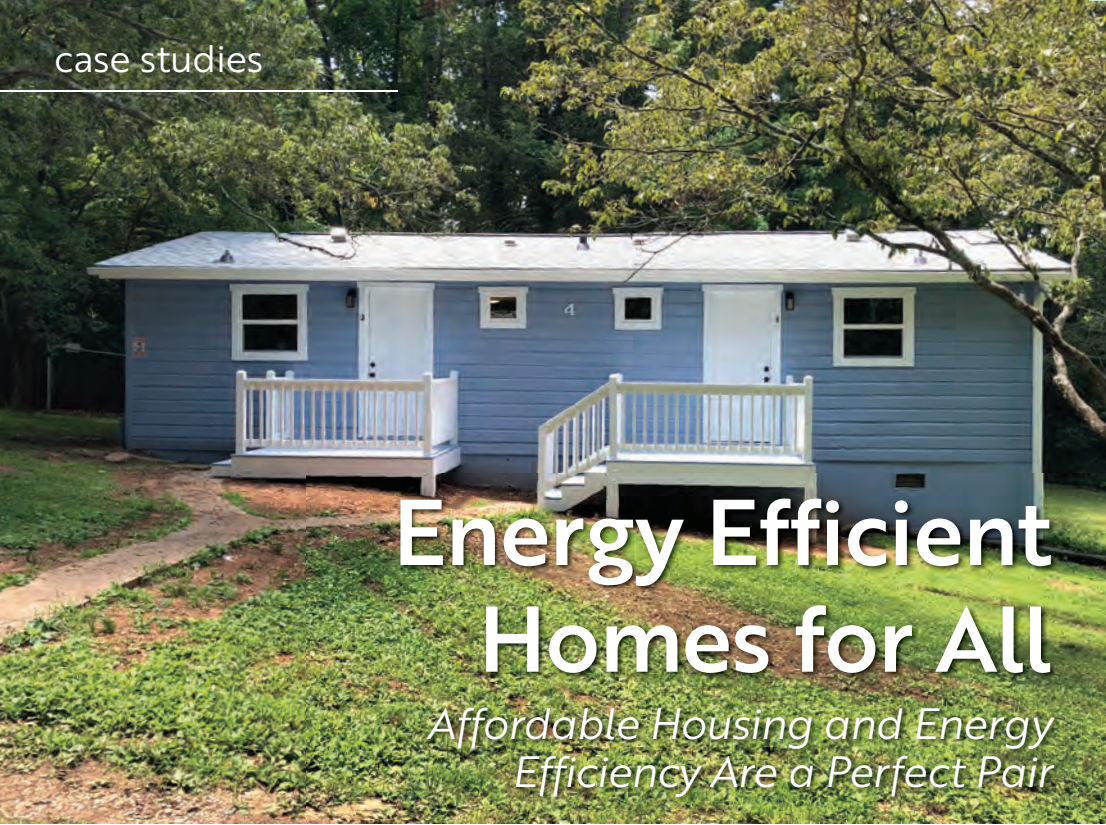


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Energy Efficient Homes for All

Affordable Housing and Energy Efficiency Are a Perfect Pair

Unit exterior renovation in progress at Key Commons. SANTIAGO CELY PHOTO

BY SANTIAGO CELY

At one point in time, only wealthy folks could afford cell phones. The same has happened with electric cars, computers, television sets and many other feats of technology. Over time, more and more people have access to these commodities because prices fall as supply grows and the cost of production gets reduced by economies of scale.

Though one could argue that most people can lead a safe and healthy life without many of the products mentioned, the same cannot be said of housing. Everyone needs a home in order to lead

a life with dignity, health and safety, regardless of income.

While populations in cities are growing, housing permits and unit production are not keeping up with the demand. This makes access to housing very expensive, if not unaffordable, for families perceived to be middle class, let alone for folks in the lower socioeconomic levels of society.

Dollars and sense

Besides the monthly cost of mortgage or rent payments, there are many other costs calculated into the housing cost such as electricity, water, natural gas, taxes, insurance, associations, mainte-

nance, transportation, cable, internet, sewer, garbage pickup, and the list goes on and on.

While it's true that some energy-efficient features in a home result in added expense to construction, the truth is that the vast majority of green features are standard fixtures which simply have improved their efficiency with time and technology. Just like cell phones and smart TVs, the prices of many green technologies have dropped to the point of being as affordable as non-efficient competition and in some cases even less expensive.

Moreover, some of these efficient fixtures are now required by

the building code. Some examples include low-flow plumbing faucets and shower heads; LED and CFL high-efficiency light fixtures; wall, roof and flooring insulation; energy-efficient appliances; and many others.

Additionally, these energy-efficient features result in a home that improves health for its occupants, contributes to the environment by using less energy, and lowers building operational costs.

All this is to say that by integrating relatively basic practices and materials by today's standards in the dwellings we build, we can provide healthier homes to the users, reduce energy and water consumption, and save money while we're at it. Who doesn't like that idea?

Key Commons

That is exactly what we at Homeward Bound intend to do. As we enter into the development of one-bedroom, one-bath dwelling units throughout Asheville and Buncombe County, it is our intention to apply most of these green features on rehabilitations and go for certification with new ones.

To that end, Homeward Bound acquired Key Commons, an 11-unit apartment complex at 296 Short Michigan Avenue in Asheville, in October 2019. After Homeward Bound's extensive renovations, there will be 11 of the one-bedroom, one-bathroom, 400-square-foot units, and two of the two-bedroom, two-bathroom,

Project Team

Developer — Homeward Bound of Western North Carolina
General Contractor — Corner Rock Building Co.

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Here is a list of potential savings that green features can bring into a building's operational costs in one year, according to the U.S. Department of Energy:

Recommended Action	Potential Savings (as percentage of utility bills)	Average Annual Savings in Dollars (actual savings vary)
Install exterior Low-E windows	12 to 33 percent annually on heating and cooling bills	\$100 to \$274
Seal uncontrolled leaks	10 to 20 percent on annual heating and cooling bills	\$83 to \$166
Plant shade trees	15 to 50 percent of annual air-conditioning costs	\$35 to \$119
Use a power strip for electronic equipment and turn it off when not in use	Up to 12 percent of electric bill per year	\$100
Replace an older toilet with a WaterSense-labeled model		\$100
Turn back your thermostat 7 to 10 degrees for eight hours a day	Up to 10 percent annually on heating and cooling bills	\$42 to \$83
Weatherstrip double hung windows	5 to 10 percent annually on heating and cooling bills	\$83
Replace your five most frequently used light fixtures or bulbs with models certified by ENERGY STAR®	9 percent on electricity bill annually	\$75
Lower water-heating temperature	4 to 22 percent annually on water-heating bill	\$12 to \$60
Insulate water heating tank	7 to 16 percent annually on water-heating bill	\$20 to \$45
Insulate hot water pipes	3 to 4 percent annually on water-heating bill	\$8 to \$12
Fix leaky faucets; one drip per second wastes 1,661 gallons of water per year		\$35
Use sleep mode feature on your computer	Up to 4 percent of annual electric bill	\$30
Total Potential Savings*		\$723 to \$1,182

* All actual savings will vary depending on home, climate, products and use.

SOURCE: energy.gov/energysaver/articles/how-much-can-you-really-save-energy-efficient-improvements

700-square-foot units.

Among the energy-efficient features being installed, the units will be getting cool roofs, R-30 attic insulation, R-19 floor insulation, beefed up wall insulation, new Low-E windows, low-flow plumbing fixtures, LED light fixtures, building-envelope sealant, as well as energy-efficient appliances and mechanical systems. All units are expected to be completed by the beginning of 2021.

Homeward Bound uses the Housing First approach to get people experiencing homelessness into housing. Referrals for housing services happen when people who are experiencing homelessness visit our AHOPE Day Center or through referrals from our community partners. Since 2006, Homeward Bound has moved more than 2,050 people off the streets and out of cars, camps and shelters into permanent homes.

Going green

For us, it is not really a question of whether we should go for these green practices; it is a must.

Most, if not all, of our clients rely on very low incomes to afford housing along with all their other expenses of life. By going green, we are ensuring that their utility and building-operation expenses are kept at a minimum. It also gives

us peace of mind that our buildings will last longer and their systems will run more efficiently. More often than not, the savings realized through the use of green features mean the difference between our clients being able to access a safe, high-performing and

healthier home versus a dwelling that is not.

Affordable housing should be synonymous with sustainable housing, and there's no better way of making a building sustainable than by implementing energy-efficient features.

As if all of this wasn't enough incentive, builders, developers, home buyers, owner builders, and pretty much anyone building or renovating a home can access discounted financing solutions as a result of including these green-building practices into their projects from federal institutions such as Fannie Mae, Freddie Mac and the Federal Housing Administration. These discounts can come in the form of interest-rate reductions, increased loan proceeds, rebates and more.

Both building users and building managers have a large responsibility to the greater community. By ensuring that the buildings and their systems are used in the way they are intended, we are further advancing the idea of affordable and sustainable living.

Don't forget to turn off the light when you leave the room!

Santiago Cely is the facilities and housing development director at Homeward Bound of Western North Carolina. Santiago is a strong advocate of affordable housing and has been developing it in South Florida for the past decade. He recently moved to North Carolina and joined Homeward Bound to help in the fight to end homelessness in the community. Connect with Santiago at homewardboundwnc.org.

Unit interior renovation at Key Commons.
HIGH LAKE MEDIA PHOTO





Designing for Density

Green Affordable Homes at East Haven Apartments

BY GEOFFREY BARTON

When designing any building, and particularly a green building, we traditionally start by considering the natural elements: sun, water, wind and earth.

What is the solar exposure? How can we harvest rainwater? What is the direction of the prevailing breezes? Can the earth itself be used as a building material, or its warmth for geothermal?

The answers to these questions often define green buildings. But as we expand our thinking about how to create green communities, we must think more holistically. Progressive municipalities across the country are endorsing the proposition that the greenest building material that we have at our disposal is not a natural resource, but an artificial one: density.

The defining green feature at East Haven Apartments — and there are several we are proud of

— is its density. In Swannanoa, with an official population of fewer than 5,000, we created one of the densest new apartment developments in Buncombe County. So how did this happen?

Settling in Swannanoa

It starts with place. Swannanoa has a rich tradition of innovation. In 1936, Charles D. Owen II moved Beacon Manufacturing to the Swannanoa Valley, creating what would become the largest mill in the world. Just a few years prior and up the road from the Beacon Mill, a group of experimental artists led by John Andrew Rice formed Black Mountain College, which became an enclave for exiled Bauhaus artists chased out of Germany by the Nazis. And a few years prior to that, EW Grove, who made millions off of his wildly popular Tasteless Chill Tonic, moved to Asheville, attracted by the healthy mountain air. Grove used his fortune to build the Grove

Park Inn, the Grove Arcade, and the planned community of Grove-mont in Swannanoa.

All of these things — global industry, experimental arts education, a town planning experiment — happened in the context of the rural community of Swannanoa. When it comes to innovation, Swannanoa proves that “rural” is far from synonymous with “small.”

In 2013, we started evaluating the potential for building affordable apartments east of Asheville. For many reasons, we felt that Swannanoa made a lot of sense. Despite the area’s growing employment centers — particularly the Veterans Administration Medical Center, Ingles Markets’ warehouse, and Buncombe County Schools — no new affordable rental development had been built east of Asheville in quite some time. The French Broad River Metropolitan Planning Organization’s 2007 US-70 Corridor Study also painted a future vision for this

East Haven Apartments contains a mix of one, two and three-bedroom apartments in two four-story L-shaped buildings that enclose a large courtyard. MOUNTAIN HOUSING OPPORTUNITIES PHOTOS

Project Team

- Developer** — Mountain Housing Opportunities
- Architect** — Housing Studio, PA
- Civil Engineer** — Civil Design Concepts
- Landscape Architect** — Sitework Studios
- Structural Engineer** — Structural Consulting Group
- M/E/P Engineer** — VP Engineering
- General Contractor** — WeaverCooke Construction
- Solar PV System Contractor** — Renewable Design Associates
- Energy Testing and Verification** — Performance Point

stretch of US-70 transitioning from strip commercial to mixed-use.

Policy and planning

In the early stages of planning East Haven Apartments, we held a community-planning charrette,

Video Tour

Watch a video tour of East Haven Apartments at greenbuilt.org.

consulted with the Friends and Neighbors of Swannanoa group, and developed a plan to build what seemed like reasonable density for a small commercial parcel of 3.18 acres in a rural part of the county. With Buncombe County's support, we were able to secure approval to exceed the underlying zoning (12 units per acre) and create a plan for 60 units (18.9 units per acre) of affordable housing.

Housing Tax Credits are the financial tool that enables us to build attractive apartments with rents well below market rate, and the process for obtaining them is highly competitive and can often turn into a multi-year exercise in patience. Our application for East Haven proved no different. Every year, the number of projects that apply for Housing Tax Credit funding in North Carolina exceeds the amount of available tax credits by about a three-to-one margin. We applied for tax-credit funding unsuccessfully in three consecutive years before winning an allocation on our fourth attempt in 2017.

The delays, however, ended up working in our favor. In 2016, the Buncombe County Planning Department developed an innovative density bonus called Community-Oriented Development. When Buncombe County adopted Community-Oriented Development, we were first in line and secured approval to build 95 apartments, a 250 percent density bonus (29.9 units per acre).

Buncombe County's Community-Oriented Development policy is an innovative approach to incentivizing denser development in certain well-located areas, particularly those served by transit. The policy awards points for including sustainable features such as rainwater capture, renewable energy, and open space and wetland conservation. The policy's largest bonus is awarded to developments that include affordable housing, in alignment with Buncombe County's high need and the County Commission's recognition of affordable housing as one of its six strategic priorities. By definition, the policy incentivizes moderately dense green affordable housing.

Green features

In addition to its density, East Haven has several green features including a 46-panel, 17.94-kW photovoltaic solar array, ENERGY STAR® appliances, WaterSense low-flow plumbing fixtures, and ceiling fans and large operable windows to help reduce energy consumption by extending the season for natural ventilation. The buildings were constructed using prefabricated wood frame wall panels to eliminate construction waste and reduce on-site erection time.

East Haven Apartments contains a mix of one, two and three-bedroom apartments in two four-story L-shaped buildings that enclose a large courtyard. The 95 apartments at East Haven have monthly rents ranging from \$250 to \$700. We have committed to maintaining the affordability of the apartments for at least 50 years, and we have reserved 10 of the apartments for veterans. Onsite amenities include a playground, laundry facility, fitness center, and picnic area with grills. The primary cladding materials are fiber cement siding and brick.

Accommodating multi-modal transportation options can be a bit of a challenge outside of denser urban areas, but we aimed to make East Haven part of a transition to multi-modal transportation. We provided a right-sized parking ratio (0.7 parking spaces per bedroom) to try to limit the size of our parking areas. Buncombe County installed a new bus shelter on ART's 170 bus line in front of East Haven, which will provide our residents with access to jobs and services without relying on a car.

Through the assistance of a recent grant, we will also be helping Buncombe County and the North Carolina Department of Transportation develop pedestrian-safety improvements in collaboration with Friends and Neighbors of Swannanoa. East Haven is also located near the planned route for the Swannanoa River Greenway that aspires to connect Asheville's greenway network with Black Mountain.

Sensible rural density

A four-story building built along a five-lane regional thoroughfare will rarely feel out of scale, and demonstrates that even rural communities have commercial areas that can handle sensitively developed density.

Despite the imperative to accommodate a growing population



East Haven has several green features including a 46-panel, 17.94-kW photovoltaic solar array.

while protecting ridgelines from development, proposals to exceed the underlying zoning in a rural community by 250 percent would rarely get off the ground without innovative green development tools like Buncombe County's Community-Oriented Development policy.

A sensible model for rural density, East Haven Apartments provides an optimistic vision for the future: affordable homes in green buildings situated in green communities.

Geoffrey Barton is the director of real estate development at Mountain Housing Opportunities, a nonprofit community-development organization founded in 1988 with the mission of building and improving homes, neighborhoods, communities and lives. A licensed architect, Geoffrey works to plan and construct green affordable apartment communities in Western North Carolina. Connect with Geoffrey at mtnhousing.org.



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Macro Heart, Micro Home

BeLoved Village Building Sustainable, Affordable Housing

BY SUSANNA SHETLEY

After a close friend of the community froze to death in 2016 while sleeping along the banks of the French Broad River, the BeLoved Asheville team mobilized to make a dent in the housing and security crisis.

With the realization that transitional housing and existing affordable housing were failing, the BeLoved team zeroed in on a long-term solution. The nonprofit's vision is coming to fruition this year in the construction of BeLoved Village, a community of affordable, sustainable and long-term micro homes.

The local housing problem

BeLoved Asheville is a nonprofit dedicated to helping those who live on the fringes of society. Its core mission is to empower individuals and end homelessness, poverty and racism. The board works closely with donors, people on the streets and volunteers to help those in need. The nonprofit has learned that a lack of housing can impact every other facet of a person's life.

"A lot of people we work with have stories about their inability

to find housing," said the Rev. Amy Cantrell, co-director of BeLoved Asheville. "We dug into why that was and found the kind of housing currently offered here is unhealthy in a lot of ways. What people really want is a 'home,' something with dignity."

Cantrell says much of the affordable housing offered in this region is unhealthy or transitional in nature. The options are limited, and often not very sustainable. Much of the affordable housing stock in this area can be found in overcrowded apartments, trailers located many miles from a bus stop, or older buildings that contain mold and unhealthy toxins.

Additionally, research shows Asheville rent ranks highest in North Carolina, that Asheville is the second most gentrified city in the nation, and that 62 percent of area renters are cost-burdened.

Older adults on a fixed income, individuals living on the streets, veterans, and workers employed in minimum-wage jobs are among the groups most often in need of affordable housing. From representatives of these groups, the BeLoved board garnered information about the types of housing



"Our goal is to create an environment where people feel a sense of pride, put down roots and get to know their neighbors."

— Rev. Amy Cantrell, co-director of BeLoved Asheville

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people desire. The board learned that these individuals not only need housing that is affordable, but they also crave trees and land, a sense of community, and sustainability.

The BeLoved board took a full year to consider these needs and study the housing crisis in Western North Carolina and across the country. At that time, they created the initial concept for BeLoved Village.

In 2017, the team posted a video on Facebook, introducing their idea and asking for help. The response was immediate. A local church offered an acre of land in East Asheville. This plot is now the construction site for the envisioned micro-home village.

The sustainable housing solution

BeLoved Village's model involves four components: deeply affordable, community oriented, sustainable and equity producing.

There will be 12 micro homes in BeLoved Village, and each is built to be accessible to people making 30 percent of the median income, or \$750 to \$1,000 per month.

Residents will pay one monthly rate. A percentage of this payment will be directed into an equity fund for each resident. Another percentage will be put toward a "pay-it-forward" fund supporting the next village project. The remaining amount will support ongoing maintenance and upkeep of the village.

"The people who need this type of housing are working really hard and not getting anywhere," Cantrell said. "It was important that we put an equity component into the project. Equity helps people move forward and mitigate crises. It helps them go back to



The model micro home for the future BeLoved Village in East Asheville.

school or start a business. We truly believe this model is a transformative agent on many levels."

Each cottage will be roughly 440 square feet with a loft above as well as a porch. The goal is to build an infrastructure that fosters a sense of community. The first home was expected to be completed in the summer of 2020.

The plan is for this village to serve as a model for future villages in the region and beyond. Cantrell says if they can show it works to aid in the housing crisis, they plan to coach other groups to replicate the model.

A Sustainability Action Plan was developed to guide decision-making as it pertains to the use of green and sustainable building materials, practices and methods.

Building supplies used in the project will be sourced through donations and recycled materials. There will be green space for residents to plant gardens and use for recreation. Further, local artists are creating pieces and Warren Wilson College pottery students are making dishes for each cottage. Volunteers and youth are painting recycled wood to be used throughout the property.

"Our goal is to create an environment where people feel a sense of pride, put down roots and get to know their neighbors," Cantrell said. "The feeling of home goes into this very deep place inside all of us and it's traumatic to not have one. We hope BeLoved Village offers this basic human need to its residents."

BeLoved Asheville: Sustainability Action Plan

The Sustainability Action Plan is being developed in cooperation with the University of North Carolina Asheville's McCullough Fellowship. At the core of this plan are the LEED standards for Neighborhood Development and Residential Construction, as well as the local Green Built Homes certification standards.

Though the decision to pursue green certifications is still under consideration, the organization is using the associated checklists and guidelines as roadmaps to inform decisions. The Sustainability Action Plan also includes guidelines such as the EPA's Energy Star and Water Safe standards, as well as individual recommendations for materials, construction methods and other factors.

Aside from the formal action plan, BeLoved Asheville plans to use donated construction materials whenever possible. Instead of clear cutting the existing bamboo and hardwood forest and flattening the parcel prior to construction, the team will use volunteer labor to hand-clear only as much vegetation as necessary. Similarly, a low-impact grade will be implemented to remove only the required amount of soil to move forward with construction. The combination of these practices significantly reduces potential for land erosion and leaves much of the original topology and soil structure intact.

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The Gray Rock Inn was built by Morris Meyers in 1911 as a boarding house. It has been a short-term rental ever since, with weekly rents and shared facilities.

KEVIN SPARGO PHOTOS

Gray Rock Inn

The Evolution From Historic Boarding House to Affordable Housing

BY JOHN SENECHAL

In 2001, I took on a rehab project that featured energy retrofits, historic restoration, and affordable housing. At the time, the building at 100 Biltmore Ave. was falling apart and needed a lot of TLC.

Built 90 years prior as a travelers inn, it had declined over time to be a low-end rooming house. I did a complete restoration, preserving the character of the building while upgrading the tenancy.

Two decades later, it remains affordable today with half occupancy as full time and the other half as a return to the original use as an inn.

The history of the property

The Gray Rock Inn was built by Morris Meyers in 1911 as a boarding house. It has been a short-term rental ever since, with weekly rents

and shared facilities.

It started out sparkly and swank, but the Great Depression took the wind out of the sails for all of Asheville in 1929. After that, well, the years took their toll. By 2001 when I got involved, it needed a serious overhaul. It was an opportunity to restore, recycle, and reuse an older building, and at the same time, practice green: non-toxic, solar, and affordable building.

It was a pretty piece of real estate on the southern edge of downtown Asheville. The rent was very low. The neighborhood was about to change. From the outside, the brick and rockwork looked solid. The metal shingle roof was original. There was some rust. Six spruce trees graced the front sitting porches. Inside, the place showed significant damage with termites and falling plaster. It needed a lot of work.

As a historic building, it had several features that you will not find in newer construction. The exterior walls were 18-inch thick masonry. The heating was a natural gas boiler with original radiators. The windows were large for lighting and ventilation.

There were 18 rooms for residents on a weekly budget. The bathrooms and kitchen were shared, making it private shared housing. Private means everyone has a separate room with a door that locks. Also, the ownership is private, not a big company or government. Shared means there are common facilities that everyone uses. Tenants are from all kinds of backgrounds with all sorts of interests. In the downtown area, a car is not required. Facilities and landscaping are taken care of professionally. Public spaces are cleared and cleaned daily.

The vision for the rehab

In the 1990s, I started to craft an idea.

What if an apartment building were acquired and rehabbed with solar and green-building technologies? What would that be like? Could advanced energy alternatives like solar and wind be incorporated into a housing development?

It was early in the development of green-building initiatives. The

Project Team

- Builder and Electrical** — Bald Mountain Homes
- Contractor** — Building for Life
- Architect** — Glazer Architecture
- Sprinkler System** — Diboco Sprinklers
- Solar Hot Water** — Solar Dynamics



The Gray Rock Inn is unsubsidized shared housing; even at market rates, rooms are affordable in the range 60 to 80 percent AMI. All the rooms are private and small, with shared bathrooms.

WNC Green Building Council (which later became Green Built Alliance) was formed in 2001, the same year I took on the Gray Rock Inn rehab project. Across the world, green initiatives have moved the direction of the entire building industry toward sustainability.

Affordability was a high priority. How could I make this building shine and still be affordable?

Nationally, buildings account for 40 percent of energy consumed. A lot of older buildings are energy hogs, using a greater portion of that energy for heating and cooling. New codes since the 1970s require insulation and conservation methods. Older buildings are still allowed to continue under the grandfather loophole. Owners and developers take advantage of that loophole to leave wasteful facilities in place. Insulation and conservation pay back their costs after

only a few years, so persistence beyond the payback window pays off.

There were more questions: Can sustainable housing supply solar for people who would never be able to afford those benefits on their own? Could I find community-minded people who are willing to share resources? Could I make it attractive and fun? Could I make money and keep the affordability?

The background on shared housing

People have always shared homes. Privately held housing for friends and family has always been the most affordable option. The market-rate rent for shared housing is lower than for apartments, multiplex or single-family housing. Yet, shared housing is seldom talked about in the con-

text of affordable housing. Shared housing seems to be invisible. The Department of Housing and Urban Development tracks affordability data for this area, but the smallest unit covered is an efficiency studio apartment. Shared housing is not on the list. It may be too hard to measure, so it is simply ignored.

Government and nonprofits help as much as they can but depend on subsidies to lower market-rate pricing. Qualifiers for rent assistance are often rated by Area Median Income (AMI) and placed according to their percentage of AMI.

The Gray Rock Inn is unsubsidized shared housing; even at market rates, rooms are affordable in the range 60 to 80 percent AMI. All the rooms are private and small. Bathrooms are public and shared.

In Asheville and around the world, shared housing is the most affordable housing option for friends, family and travelers. It has always been that way.

The long-term lessons

As affordable housing, the Gray Rock Inn is positioned to serve the community with style and flair. It has been cleaned up. The facilities have been brought up to code for the new century. The sustainability improvements are substantial and ongoing, with more work scheduled. The tenant mix has changed; the neighborhood has changed. With the new coronavirus at hand, so has the whole world.

Heating, plumbing, wiring and fire protection have all been upgraded. Insulation was added, windows were replaced, solar hot wa-

ter was installed. Environmentally responsible finishes were used for better air quality. Recycled materials were scrounged, collected and installed. The kitchen and bathrooms were upgraded. It is still affordable housing, and it is also green.

What lessons were learned?

- Shared housing is not for everybody.
- Fair-market rental rates are at the lower end of market-rate rentals, lower even than for apartments.
- Green building can be a real benefit to older buildings. It does not have to be done all at once. Changes can be made in stages.
- Parking is an issue and always will be, as long as there are cars. Car-free living is possible when things like food and jobs are available nearby.
- Sophisticated systems require upkeep. Professional maintenance is necessary.
- Affordability is always in demand, even in an economic downturn.
- Screening new tenants is vital to maintaining sanity as a landlord.
- Travel through life lighter. Waste less. Help each other. Keep spirit alive. We have the tech, the finance, the will. Reinvest in the community. We know what to do, and how to do it.

John Senechal is a green builder and founding member of the WNC Green Building Council, now known as Green Built Alliance. His special interests are solar, community and real estate. General interests are gardening, dancing and peace. Connect with John at baldmtnhomes.com.



Historic postcard featuring the Gray Rock Inn.



The 60-foot-long south side of the house is full of windows with high solar heat gain coefficient glass. MOUNTAIN SUN BUILDING & DESIGN PHOTOS

Net-Zero House, Below Zero HERS

Recent Project Sets New Green Built Homes Record



The kitchen and dining nook windows look south towards distant mountain views.

BY EMILY BOYD

Becky Wood and Carol Kemp came to us several years ago with the goal of relocating from Seattle to build a new net-zero house in the Asheville area that would support electric vehicles, have privacy and space for gardening, and allow them to age in place.

We took time to find an affordable piece of property within 30 minutes of Asheville so they could save as much of their budget as possible for the house and systems. When a 4.5-acre site with southern exposure near Marshall came on the market at a great price, they jumped on it.

The site was overgrown with brambles on top of rubbish at the time, but would clearly be a great spot for a passive and active solar home. About half of the site is a

southeast-facing hill with unobstructed solar access and distant views of Mount Pisgah, while the northern half of the lot is wooded.

We brought the driveway in along an upper contour at the west side of the property. We designed a detached carport with several enclosed storage areas and connected it to the mud room of the main house by a pergola. The house itself sits with the long axis

Project Team

Design-Build — Mountain Sun Building & Design

Framing Contractor — Lonesome Mountain

HVAC and Solar Installer — Sundance Power System

HERS Rater — Vandemusser Design

running west to east to maximize potential solar gain. The length of the house is perpendicular to the hill to allow for a walkout lower level. The overall footprint is 26 feet wide by 60 feet long, not including the 10-foot-deep porches on the east end.

The 60-foot-long south side of the house is full of windows with high solar heat gain coefficient glass. We placed the stairwell to the lower level along the south window wall to act as a heat collection area. A board-formed concrete interior (trombe) wall at the stairwell acts as thermal mass to store the heat from the sun on winter days and release it into the home at night.

To bring life into the home, we formed a trough in the top of the concrete wall, waterproofed the inside, and added a drain to the basement so Becky and Carol could plant directly in the wall and plants can hang down into the light-filled stairwell.

Additional thermal mass for the solar gain is provided by the concrete floors on both the basement level and the main floor. To counter potential overheating when heat gain is not needed, we were careful to properly size the overhangs on the main level. We also built a pergola along the entire south side between the floors to shade the lower-level windows when needed and provide a place for plants to grow on the exterior face of the building. In addition to the windows on the south wall, we added smaller windows throughout to catch cross breezes for cooling. Becky and Carol have commented that if there is any breeze at all, the house catches it.

The main open living, dining and cooking space at the east end of the home feels perched up in the trees that are visible through the windows on the north side. The kitchen and dining nook windows look south towards distant mountain views. Large doors open to a screened porch at the east end of the house. The owners' bedroom suite is tucked away in the northwest corner of the house and the walkout lower level contains a sunny south-facing guest suite with covered porch. The lower level also contains a conditioned storage area and a large mechanical room for the HVAC systems.

Since we were already installing concrete floors for thermal mass, Becky and Carol decided to spring

for radiant floors too. A project goal was to be truly net zero so we could not use a gas boiler for the radiant floors. We began looking for a radiant floor system that could operate solely on electricity that was more affordable than a geothermal system. Our solar contractor had never installed such a system but they were willing to research and install one.

We ended up using an ANK heat pump system that could also supply the domestic hot water for the house and chilled water for wall-mounted mini-split AC units. Since Becky and Carol didn't want ducted air conditioning anyway, this turned out to be a great system for them.

There was a learning curve for all involved in the install of the system, but our solar contractor did a great job troubleshooting it and making sure it was operating correctly in all seasons. We are really excited to now be able to install radiant floors without burning gas and supporting the fracking industry or paying for a geothermal system, and we are thankful that our solar contractor was willing to try it out.

A 9.86-kW photovoltaic system on the south-facing roof provides enough energy for the HVAC system, the rest of the 1,900-square-foot home's electrical needs and extra for electric-vehicle charging.

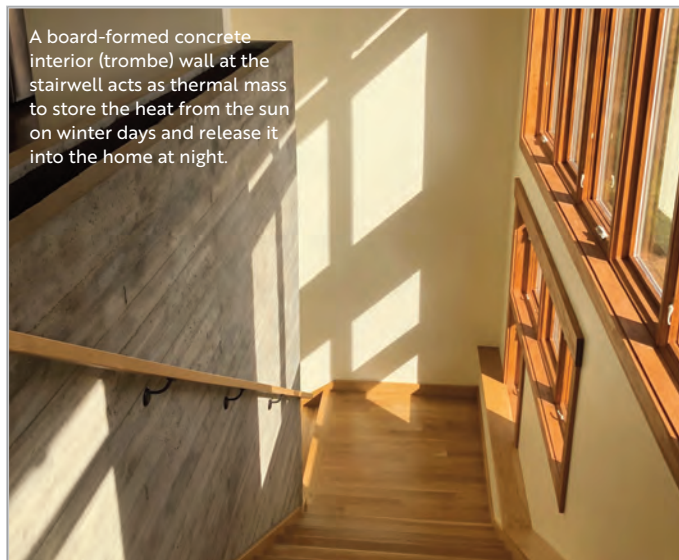
The final Home Energy Rating System (HERS) Score was calculated to be -22, setting a new record for the Green Built Homes program through which the project was certified. Becky and Carol made eco-conscious choices for finishes throughout (such as recycled paper and resin counters), and the home ended up certified as Green Built Homes Platinum with a score of 307 points.

It was a pleasure to work with clients who prioritized building an environmentally friendly home at every step of the building process and we look forward to seeing them settle into the house and land in the coming years.

Emily Boyd is co-founder of Mountain Sun Building & Design, a design-build firm building net-zero and green-certified homes. A Certified Professional Building Designer and Certified Permaculture Designer, she is passionate about creating light-filled homes that connect occupants to nature. Connect with Emily at mountainsunbuilding.com.



The clients prioritized building an environmentally friendly home at every step of the building process.



A board-formed concrete interior (trombe) wall at the stairwell acts as thermal mass to store the heat from the sun on winter days and release it into the home at night.



The lower level contains a conditioned storage area and a large mechanical room for the HVAC systems.



Six large cedar posts were mounted on top of two large boulders to carry the welcoming entry gable, creating the effect of the house coming right out of the rocks. RS MOTLEY CONSTRUCTION PHOTOS

Slope Hope

Building A Green Home on a Unique Site

BY ROB MOTLEY

When I first met Kate Zubko and Jeff Konz at their property on Elk Mountain Scenic Highway two summers ago for an initial site visit, I left the meeting with two distinct impressions: that Kate and Jeff seemed like really nice people and that I had no idea at all how to approach building a house on their tricky lot.

Building on challenging lots is common practice in the mountains of Western North Carolina, and most builders who've been around for a while have cut their teeth on plenty of difficult sites. My previous experiences with difficult lots were limited to really steep sites and a few lots with poor soil conditions. What we encountered at Kate and Jeff's lot was a different variety of difficult: a property with compound slopes and angles.

The primary topographic feature of Kate and Jeff's property was a prominent spine sloping down from left to right and folding off to both the front and rear of the property. Rainwater was shedding off in multiple directions. Nestled into this were several prominent boulder outcroppings and two magnificent oaks.

"Paying attention to the land from the start led to the uniqueness of the design," Jeff said.

For the design work, Kate and Jeff engaged Steve Farrell of SSF Ar-

chitecture and a concept was born.

"We saw the slope of the lot and we asked Steve to hug the land in his design," Kate said. "We knew it would have to be multi-level. We were really interested in keeping the rocks exposed and hugging the house around them and up the slope."

In order to accomplish his design, Steve used specific elevation data to design a home that steps up the lot from right to left, allowing for preservation of the rock outcroppings and mature oaks. What I found to be unique about his approach was that it didn't include a traditional basement, which would have been my natural inclination as a starting point. Instead, Kate and Jeff will enter the home through a garage on the right and step up into a mudroom on the lower level, which also includes two bedrooms and a bathroom. From there, a flight of stairs takes them to the main level of the home. There are two separate sealed and conditioned crawl spaces — one behind the garage and below the lower level, and another adjacent to the garage and below approximately half of the main level. At the far left end of

Project Team

Builder — RS Motley Construction
Architect — SSF Architecture

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the main level, the elevation changes once more to a raised sitting area, screened porch and open deck.

By a stroke of good luck, the house was built on a direct east-west axis with full southern exposure at the front of the property, giving the public areas of the house a sun-tempered effect. This also informed the design.

"We paid attention to the light in terms of time of day and the seasons and then created pockets to dwell in throughout the day," Kate said.

For Kate and Jeff, this means a sunny start to the day on the east end of the house where the meditation room and kitchen are located, and afternoon light at the end of the day in the raised sitting area and on the porch and deck. The open design of the public part of the house allows for light to enter from all four directions and minimizes the need for artificial lighting.

Another unique feature of this home is the flagstone entry porch through which guests enter the house. To complement the existing rock outcroppings, additional boulders were carefully selected and brought in early in the project to create a natural-looking form to surround the patio. Six large cedar posts were mounted on top of two large boulders to carry the welcoming entry gable, creating the effect of the house coming right out of the rocks. Guests ascend a gentle slope of large stone slabs on their way to the front door, making for a pleasing journey.

For all framing members, we used southern yellow pine that was grown and milled in North Carolina. Local sourcing of wood is really important and not discussed frequently enough in the green-building industry. When building my first home 14 years ago, I recall being shocked to see that the spruce I had ordered for wall studs had come from Austria and Slovakia. I think that's way too far for wood to travel.

Framer Series lumber from Weyerhaeuser that's used in this area is normally farm-raised and milled in eastern North Carolina, or at the very least in a neighboring southern state. By contrast, spruce frequently comes from Canada and usually requires a fair amount of culling. Better-quality spruce is often sourced from Central and Northern Europe, indicating they are drawing from older-growth forests, which is also



The design used specific elevation data to design a home that steps up the lot from right to left, allowing for preservation of the rock outcroppings and mature oaks.

problematic. Regionally sourced lumber is better in my opinion and certainly makes for a greener finished product.

We also used 1.5-inch insulated ZIP sheathing for the wall covering, which started us off at an R value of 6.6. In addition, R-19 batts in the 24-inch o.c. stud cavities give us a total R value of 25.6 in the walls. Foam insulation was used in the roof and the band joists. The HVAC system features an 18-SEER (Seasonal Energy Efficiency Ratio) heat pump from Bosch, as the home is all electric and has no natural gas or propane. A heat pump water heater, highly efficient windows from Sierra Pacific, fresh-air exchange via a heat-recovery ventilation system (HRV), LED lighting, ENERGY STAR® appliances, and no-mow fescue grasses are among the home's additional green features.

The home's HERS rating score is currently estimated to be 54, or 46 percent better than code, and we are certifying through both Green Built Homes and ENERGY STAR®.

This has been a really enjoyable project for me. Good customers and a unique design always help with the satisfaction level. Most good architecture is site specific to some degree, but I feel like the design of this house was a really precise response on a micro level to a variety of unique features and challenges. I'm proud of this home and hope that it gives Kate and Jeff many happy, comfortable years.

Rob Motley graduated from Appalachian State University in 1997 with a degree in third world studies and a minor in sustainable development. Following graduation, he took a meandering path with

interesting stops along the way en route to a career in building.

He received his general contractor's license in 2007 and has been building ever since.

Connect with Rob at robmotleybuilder.com.



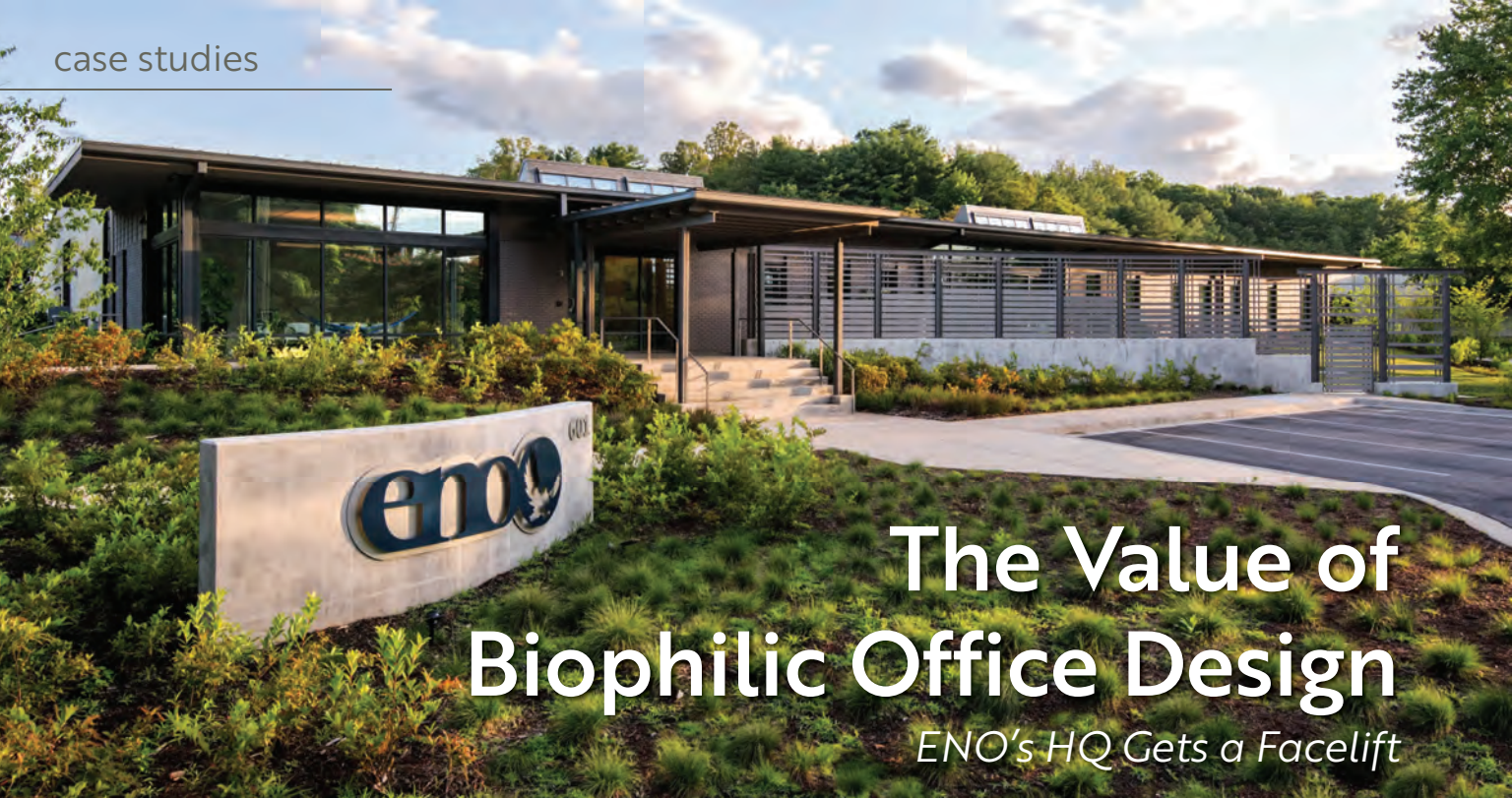
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The Value of Biophilic Office Design

ENO's HQ Gets a Facelift

Eagles Nest Outfitters, an Asheville-based outdoor company, had outgrown their downtown Asheville location and approached Samsel Architects to design a modern office renovation. TODD CRAWFORD PHOTOS

BY MARGARET CHANDLER

The opportunities for biophilic architecture in an industrial office park are not as limited as they might seem.

Eagles Nest Outfitters, an Asheville-based outdoor company also known as ENO, had outgrown their downtown Asheville location and approached our studio to design a modern office renovation. While the building provided them with the warehouse space they needed, the attached office was a dark, water-damaged maze of outdated cubicles. Their new space needed to enhance creativity, collaboration and productivity while conveying a strong connection to the outdoors.

Our design solution focused on a connection to nature through daylight, views to the outdoors, and natural materials. Two twenty-foot-long north-facing modular skylights were added in the open offices, bringing daylight deep into the building. New floor-to-ceiling

storefront walls allow views of the improved landscape. Large indoor planters take advantage of the interior daylight, help improve indoor air quality, and bring nature into the building.

The renovation also needed to meet the logistical and pragmatic demands of a modern office. The program itself includes a mix of private offices, open workspaces, and varying styles and scales of meeting areas. Providing a range of open and closed spaces helps encourage collaboration while also allowing for acoustic privacy and areas for work that require focused concentration. The space design also allows for hiring additional staff, as the company continues to grow.

A large-format tree bark accent wall greets visitors upon entry. This bark panel wall from Bark House of Spruce Pine consists of three 3-foot-by-10-foot Cradle-to-Cradle Platinum-Level Certified reclaimed poplar bark panels. The

bark panels, considered a waste product of the logging industry, bring the materials and textures of nature into the office.

ENO requested a new outdoor "Zen Patio" to allow employees to work and socialize outside, but the heavily paved industrial park necessitated some creativity to provide a calm and welcoming space. The Zen Patio is screened from the parking lot by a curved wooden-slat wall, which allows a breeze to pass through while providing a visual barrier. Our design team removed eight parking spaces in front of the building for additional green space, which serves as a natural buffer from the adjacent parking lots and helps alleviate the heat-island effect in that area. The densely planted, predominately native-species garden features plenty of hanging opportunities for ENO's flagship hammocks, as well as additional outdoor space for employees to meet and retreat. The value of outdoor meeting spaces like this has been further reinforced by recent pandemic concerns. An established maple tree provides shade and serves as an anchor for the improved outdoor areas.

A future phase two of the outdoor-space renovation is designed to include the conversion of up to

Project Team

Architect — Samsel Architects
Builder — Heritage Restoration & Construction
Interior Designer — Alchemy Design Studio
Landscape Architect — Drake Fowler, RLA
Bark Panel Wall — Bark House

72 more parking spaces around the building into additional green space, with a proposed walking trail winding through existing established evergreen trees. This expanded, ambitious replacement of pavement with green space will further the biophilic goals of the design, and provide building occupants and neighbors with an oasis of natural space in the middle of the office park.

Renovation projects such as this are an inherently environmentally preferable means of development. Even buildings or sites that don't necessarily have high historical or cultural significance can be renovated to the benefit of the project, the building owner and the environment. Renovations take advantage of existing building sites; reuse infrastructure such as parking, roads and utilities; and are

Biophilic architecture

The practice of using nature to influence the built environment. Methods include incorporating natural elements such as daylight, plants and water into the design; spatial connection to the outdoors; and using patterns from nature in the design.



ENO requested a new outdoor Zen Patio, which is screened from the parking lot by a curved wooden-slat wall.

Video Tour

Watch a video tour of Samsel Architects' design of the new ENO office at greenbuilt.org.

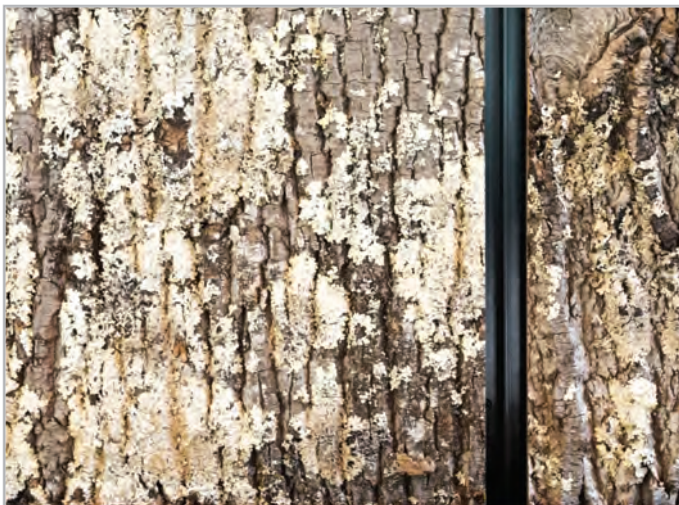
often more environmentally responsible than developing virgin land and perpetuating sprawl.

In addition to curtailing sprawl through redevelopment, renovating existing buildings serves to mitigate the high carbon footprint of new construction. Steel, concrete and brick all require large amounts of carbon in their production. Maintaining or reusing these materials instead of demolishing and replacing them keeps this embodied carbon from going to waste. In this project, our design team stripped the existing office

building back to its structural bones, and used the principles of biophilic design to enhance the environment of a high-functioning modern office.

"This design approach has improved the work experience for all staff as well as the efficiency and quality of the work for our business," ENO General Manager Lane Nakaji said.

Margaret Chandler is an architect with Samsel Architects. She has worked in sustainable design since earning her degrees at Clemson University, and briefly lived in a treehouse off the grid in Austin, TX. Margaret has spent years serving on the AIA Asheville Executive Committee in a variety of roles. Connect with Margaret at samselarchitects.com.



A large-format tree bark accent wall greets visitors upon entry.

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Sweet Spot

Custom Home Balances Comfort and Environmental Responsibility

BY DOUGLAS AGER

Mike Herrick loves Western North Carolina for the area's temperate year-round climate, and his wife Ellen wanted to live closer to their grandchildren on the east coast. But their shared goal when building their new custom house was to find the sweet spot between creating a comfortable home while being mindful and respectful of the resources they consume to provide that lifestyle.

So when the couple began designing their dream home in Hendersonville, they saw an opportunity to invest in renewable energy as a way to infuse their environmental values into their everyday lives. The Herricks both work from home for a software development company, which is another reason they prioritized energy reliability and efficiency.

Sugar Hollow Solar installed a 8.4-kW rooftop solar photovoltaic system with two Tesla Powerwalls integrated for battery backup. The Herricks' solar-panel system works through net metering, a billing system that allows owners to receive credits on their monthly utility bills that are equal to the power they produce.

"We had the unfortunate experience of being without power for two weeks after Hurricane Sandy, which was especially painful since we had well water, so we knew that we wanted some sort of

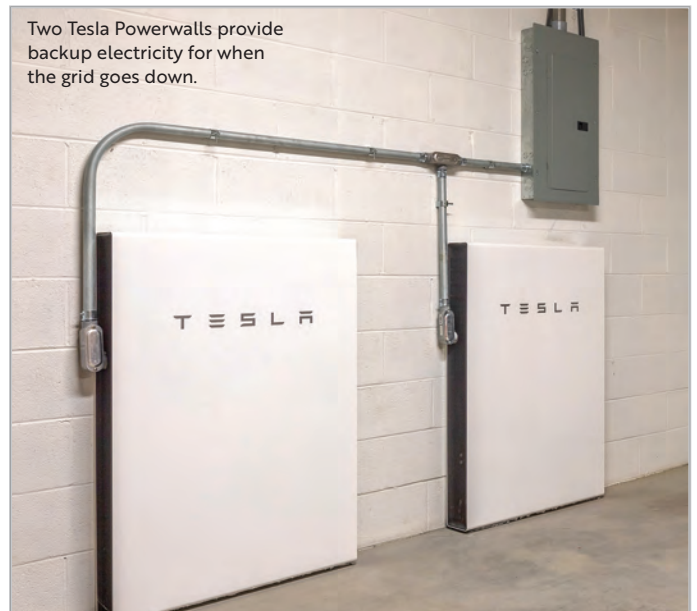
When designing their dream home in Hendersonville, the Herricks saw an opportunity to invest in renewable energy as a way to infuse their environmental values into their everyday lives. Sugar Hollow Solar installed a 8.4-kW rooftop solar photovoltaic system on their home.

GABE SWINNEY PHOTOS

Project Team

Builder — Kilpatrick and Company
Solar Installer — Sugar Hollow Solar

Two Tesla Powerwalls provide backup electricity for when the grid goes down.





The single largest consumer of the solar power their home produces is their electric car — a Tesla Model 3 that they charge through a Tesla wall charger in their garage.

The System

Type: Net-metered solar photovoltaics with battery backup

Panels: 28 Mission solar panel

Inverter: Solar Edge

Battery Backup: Two Tesla Powerwalls

Installed: February 2019

backup electric source and thought that a Tesla Powerwall would be much nicer than a conventional gas generator," Mike said.

Sunshine powers their solar system, which earns the Herricks credits to use at night or on cloudy days. Additionally, their two Tesla Powerwalls provide backup electricity for when the grid goes down, as well as decrease the Herricks' dependence on the utility grid by storing a power supply to pull from when sunshine isn't directly available.

"Solar gives us the peace of mind that we're doing our part," Mike said. "We wanted to take advantage of solar electricity as much as possible, so everything except our hot water heater is electric. At the suggestion of Sugar Hollow, we installed a geothermal heat pump to further reduce our environmental impact."

Installing a solar-panel system in their new home helped the Herricks build a life in line with their values, and has also translated into lower energy bills. Since the home is new, there were no pre-solar bills to compare against, but they re-

port paying about \$200 total for electricity usage in the last 12 months. On six of their recent bills, they have only owed the \$15 connection fee to their utility.

"We were able to take advantage of federal tax credits for the solar installation as well as an incentive from Duke Energy, which Sugar Hollow was instrumental in procuring," Mike said. "Later, when we installed a battery, we were also able to get a federal tax credit to offset some of the cost. In our particular case, we felt confident that this was the right way to go for the long term so the incentives were secondary but it does certainly speed up the payback period."

Interestingly, the single largest consumer of the solar power their home produces is their electric car — a Tesla Model 3 that they charge through a Tesla wall charger in their garage — so this also represents money that they'd otherwise be paying at the pump.

The Herricks are also now able to set their thermostat to a comfortable temperature, where previously they'd tried to save energy by keeping it set on the brink of discomfort.

Ultimately, the couple said they enjoy being "solar pioneers" in their area and they often welcome curious neighbors who want to see how solar works.

"Solar just makes sense," Mike said. "Why mine fossil fuels thousands of miles away, transport them to factories where carbon is released, then transport the electricity to your house, when sunshine is delivered most days di-

rectly to your house for free?"

Douglas Ager is a lifelong resident of Buncombe County, growing up at Hickory Nut Gap Farm and graduating from both Warren Wilson College and Western Carolina University. After spending years working with his

hands as a farrier and carpenter, he co-founded Sugar Hollow Solar in 2012 with a mission to improve how business is done while seeking local solutions to the climate crisis. Connect with

Douglas at sugarhollowsolar.com.

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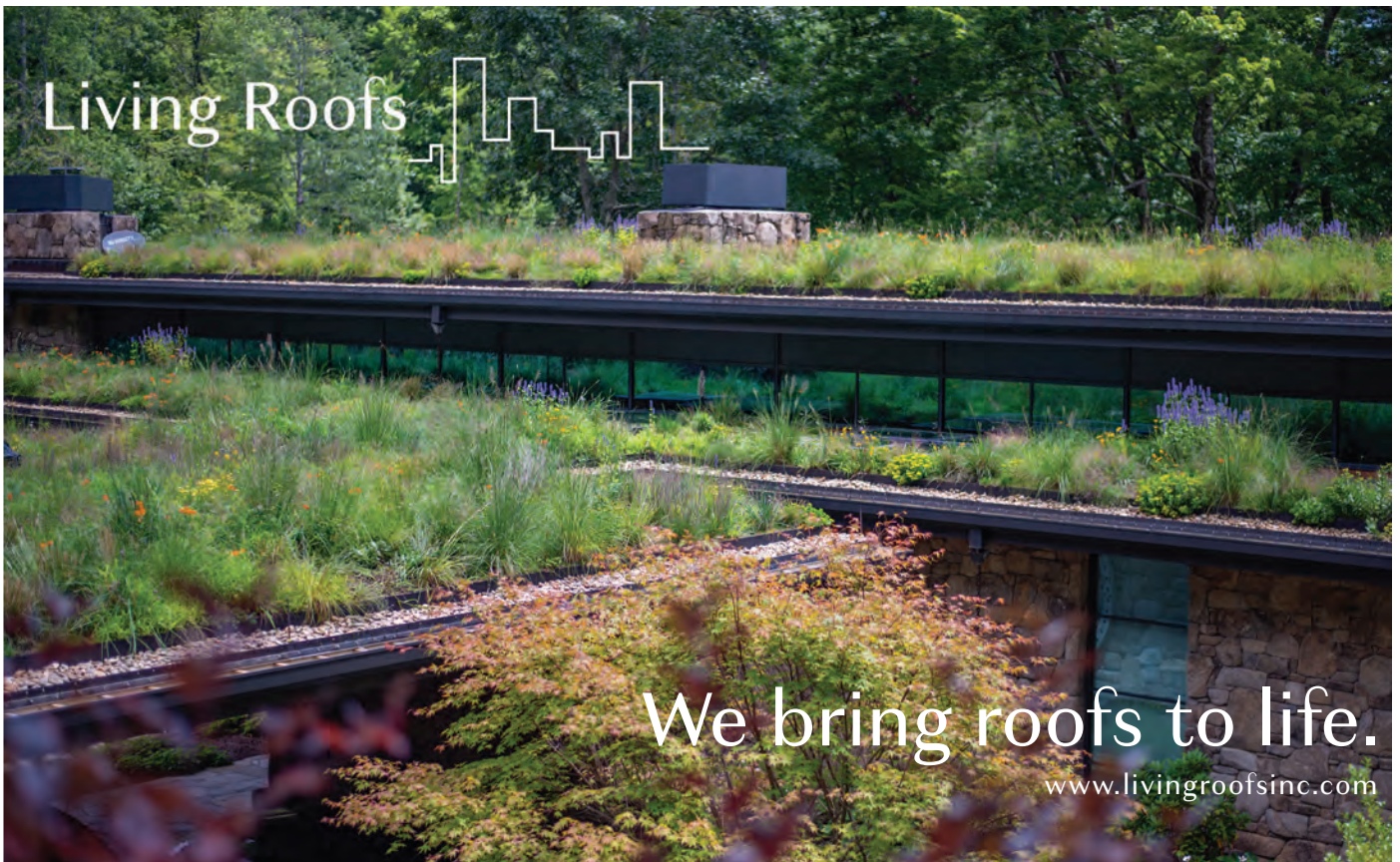
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Blue Sky, Green Roof

Reimagining Asheville's Rooftops

BY EMILIO ANCAYA

Nestled on Lexington Avenue in the heart of downtown Asheville is an apartment building that offers a unique and distinguishable feature. Situated on top of the building is a beautiful 8,200-square-foot green roof that can be seen and enjoyed by surrounding buildings, guests at a neighboring

hotel pool deck, and people walking the city's hilly streets.

The roof is a meadow and supports a diverse plant community focused on pollinator habitat and food sources. It seems only appropriate since Asheville was the first city in the United States to be certified as a Bee City USA.

Native plant species with high pollinator value, such as *Asclepias*

tuberosa, *Eryngium yuccifolium*, *Pycnanthemum muticum*, and *Rudbeckia fulgida*, were selected to promote biodiversity and a thriving urban habitat for pollinators such as bees, moths, butterflies and birds.

Beginning in the spring and continuing through fall, the roof teems with different species of pollinators doing their important

work. During the winter, seed heads and old flower stalks provide food and habitat for our permanent bird residents.

Installed in tandem with the building's construction in 2017, the green roof system begins above the roof membrane. It includes a roof protection layer (a fleece fabric made from recycled materials), a drainage layer, filter fabric, and

The green roof on an apartment building in Asheville. LIVING ROOFS INC. PHOTOS



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green-roof growing media. The growing media is composed of a blend of expanded slate, compost, and fines (such as sand). The growing media depth is 6 inches to support a diversity of plant species.

The building was new construction and designed to support the green roof. Toward the end of the building's construction process, a crane lifted the materials to the roof for the crew to install. Once the growing media was prepared, an irrigation system was installed. Then the plants were arranged according to the planting plan, planted, and watered in. The roof continues to be maintained with monthly visits during the growing season.

In addition to providing breathtaking views and access to nature in an atypical locale, this green roof also provides an array of other benefits. Asheville faces climate challenges related to increasing temperatures associated with the urban heat-island effect and a documented reduction in the city's urban tree canopy over the last several years. This green roof helps to serve as an important counterweight to rising temperatures in downtown Asheville by keeping the apartment's rooftop temperature cooler during the hottest months.

The green roof also serves as an extraordinary stormwater management tool. A stormwater analysis for this green roof modeled the total stormwater retained and detained at peak flow levels using rainfall data. The study found that this green roof retains all rainfall up to one inch of rain and annually prevents over 100,000 gallons of stormwater from entering public storm drains. Rainwater is absorbed by the plants, then released into the atmosphere through evapotranspiration.

Even for a 10-year storm and a 25-year storm, this green roof reduces total runoff volume by 69 percent and 59 percent, respectively. This can have a major effect in reducing the amount of water rushing into our stormwater system during historical weather events, thereby reducing the potential for damaging flooding and overburdening our stormwater infrastructure.

Green roofs like this one on Lexington Avenue can have a dramatic effect on preventing pollutants and sediments from rushing into storm drains and making their way to our area's creeks, streams and rivers. Because of their ability



Bee Balm and Mountain Mint support a wide variety of native pollinators.

to retain and detain stormwater, green roofs can serve as a useful tool for meeting municipal stormwater requirements. They also can afford more flexibility to designers who may no longer need an underground cistern or retention pond to meet city stormwater management requirements.

In addition to the environmental benefits of promoting biodiversity, combating rising downtown temperatures, improving air quality, and helping reduce stormwater runoff, the roof also provides some compelling economic benefits. Green roofs extend the lifespan of a traditional roof by at least three times. This can significantly reduce the life-cycle costs of maintaining a roof over time. By helping to control rooftop temperatures during the city's hotter months, the green roof also serves to reduce costs for cooling the apartment building.

So next time you are walking the streets of Asheville, keep an eye to the sky. As Asheville property owners continue to adopt green-roof technology and create a thriving network of green roofs like the one on Lexington Avenue, we can envision a future where the city's rooftops provide crucial habitat with newly created biological corridors. And, we can imagine a day when green roofs can help Asheville become a more resilient city in facing emerging climate challenges.

Emilio Ancaya, GRP (Green Roof Professional), is the cofounder of Living Roofs Inc., a green-roof company based in Asheville. He has extensive experience with all types of

green roofs, having designed, supervised and installed projects throughout the southeast, northeast and western states. Connect with Emilio at livingroofsinc.com.



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Centering Equity in Sustainable Buildings

Why Green Buildings are a Civil-Rights Issue

Sustainable buildings promote the health and wellbeing of building occupants while minimizing climate change and pollution, but not everyone has equal access. ISTOCKPHOTO/ NNPA

BY JACQUI PATTERSON
AND MANDY LEE

Voting rights. Segregation. Criminal-justice reform. For more than a century, the civil-rights movement has taken on the inequities that divide and disfigure American society. Now the green-building sector has joined the fronts of struggle for access and equity.

Why?

The green-building sector is transforming the places in which we live, work, and gather. Sustainable buildings, defined by certification programs like LEED, promote the health and wellbeing of building occupants while minimizing climate change and pollution. For some people.

This wave of better building practices has yet to fully reach the people suffering the most from buildings that are unsafe, unhealthy, unaffordable and unsustainable. African Americans and other people of color disproportionately feel the burden of unsustainable buildings: energy insecurity in their homes, health problems like asthma from poor indoor air quality, and damage from worsening disasters fueled by climate change. These are enduring legacies of discriminatory practices, disinvestment and barriers to building wealth over the generations.

What's worse, the sustainable-building sector is an insider's club with a serious diversity problem. Whether it's as policy makers, advocates, architects, contractors, or even in the construction workforce, the most impacted communities are underrepresented in the

design and construction of sustainable buildings. For example, according to the National Organization of Minority Architects, less than two percent of registered architects are African Americans, and less than 0.4 percent are African American women. Green building is a huge growth industry, but communities of color are not yet positioned to fully benefit from it.

When we decided to establish our new headquarters as a living building and began to explore what it takes to do so, we saw the problem firsthand at meetings of green-building organizations. We were struck by just how homogeneous some of those spaces were in terms of race, with a significant dearth of people of color engaged in these discussions. We juxtaposed this against what we knew to be true: Communities of color and low-income communities are more likely to be in sick buildings, whether it's mold, lead, asbestos, or radon. We are more likely to be in the least energy-efficient buildings, and that is reflected in the fact that we pay the highest proportion of our income for electricity. And we are more likely to be in the least disaster-resilient buildings, with homes in floodplains or without reinforcement.

That's why the NAACP recently launched the Centering Equity in the Sustainable Building Sector (CESBS) Initiative, pushing forward civil rights in this critical (if unexpected) new sphere. The NAACP will define and articulate an agenda for an equitable green-building sector, using its Baltimore headquarters as a living laboratory for this concept. Through this effort,

the NAACP will develop a replicable model for centering equity in all aspects of sustainable, healthy, safe and regenerative buildings.

So, what would an equitable green building sector look like? It would advance community-wide transition, not just a few green buildings in isolation. Sustainability would be seen as a basic necessity — not a luxury item — in any building project. Low-income communities, communities of color, and women would be at the heart of a better building industry, supported by more inclusive education and professional development pathways. Sustainability investments would prioritize the most impacted communities. And underrepresented communities would be deeply engaged in planning and design, because “shaping the environment is best done by the people who live in it,” according to Professor Dale Glenwood Green of Morgan State University.

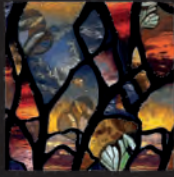
Some communities and organizations are getting it right and helping us imagine what is possible. For example, the Mental Health Center of Denver planned to build a new, green campus in the predominantly African American and low-income Northeast Park Hill community. The center sought input from neighbors to shape the design and function of the four-acre property. As a result, the Dahlia Campus for Health and Well-Being now offers a comprehensive array of services in addition to mental health care: a preschool that is inclusive of students regardless of ability; a pediatric dental clinic; an urban farm, teaching kitchen, and farmers market;

and a variety of indoor and outdoor community spaces. The campus' sustainability and equity approaches were verified through LEED Gold certification and a tool called the SEED Evaluator.

Another model is the Green Communities Criteria (GCC) program, a framework and certification developed by Enterprise Community Partners to bring the benefits of sustainable construction practices to low-income families and affordable housing. While this program is still in development, it has already produced 127,000 certified affordable homes through \$3.9 billion in investment. Thanks to the leadership of standards like GCC, a total of 32 states have incentivized green-building certification programs for affordable housing developments receiving support from the federal Low-Income Housing Tax Credit program.

Fundamentally, sustainability without equity will merely sustain inequity. The civil rights movement has a critical role to play in creating a sustainable building sector that is both green and just — for the benefit of our families, our communities, the economy and the planet.

This article is adapted from two reports released in February 2020 from the NAACP's Centering Equity in the Sustainable Building Sector (CESBS) Initiative. Jacqui Patterson is the senior director of the NAACP Environmental and Climate Justice Program, and Mandy Lee is the program manager for the CESBS Initiative at the NAACP. Connect with them at NAACP.org.



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Bang For Your Buck

7 Ways to Use Your Stimulus Check for Energy-Efficiency Improvements



Weatherstripping is installed on the front door of a local home. ENERGY SAVERS NETWORK PHOTO

back in a very short amount of time.

As energy-efficiency professionals, we analyze these types of improvements with energy modeling every day. Here is our summary of the ones that usually make the most sense for homeowners to do on their own existing homes, specifically focusing on DIY (do-it-yourself) items, fast-payback items, and behavior-based items.

1. Replace all incandescent and halogen bulbs with LED replacement bulbs: Don't wait until they burn out — replace these right now. Some people have trouble telling halogen and LED bulbs apart. If you turn the light on for five minutes and the bulb gets too hot to touch, it's inefficient. Replace it with an LED. LED bulbs are usually \$1 to \$2 each, very easy to replace yourself, and pay back in less than a year.

2. Low-flow plumbing fixtures: Reducing your water usage saves you money in two ways: with the actual water saved and with the reduction in hot water usage. Changing fixtures and/or aerators is a really easy thing to do yourself and can pay back very quickly. People sometimes worry that low-flow fixtures won't rinse things as well, but they often do a better job because the water comes out with more pressure. A low-flow showerhead is the fastest payback

BY AMY MUSSER AND MATTHEW VANDE

So you received your economic impact payment from the federal government and you're not sure how to

spend it. Maybe you're fortunate enough that you don't need to use it right now for food or rent, but you'd really like to spend it in a way that will pay you back over time.

Well how about investing it in your home? There are a ton of energy-efficiency improvements you can make that not only don't cost a lot, but are also potentially easy to do yourself and will pay you

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and biggest bang-for-your-buck efficiency upgrade we've ever analyzed. The flow rates to look for are:

- Showerheads: 1.5 to 1.8 gpm
- Aerators for bathroom faucets: 1.0 to 1.5 gpm
- Toilet replacement: 1.28 gpf (single flush) or 0.8 to 1.1/1.6 gpf (dual flush)

3. Install an efficient water heater: If you have an electric water heater, you want to replace it with a heat pump water heater. Not cheap (\$1,000 to \$1,700 depending on size), but they typically have a very quick three-to-five-year payback period. These use about a third as much energy as a regular electric water heater and they dehumidify the area where they're located.

If you have a gas tank water heater, switching to a tankless model can give good savings while also being less likely to backdraft and cause carbon monoxide problems in your home.

Since water heaters are often located in a basement or garage, this is something you can have someone work on while still maintaining social distancing.

4. Air seal or add insulation to your house: Air sealing can encompass the entire envelope of your home, from weatherstripping drafty doors and windows to sealing electrical and plumbing holes in walls, between floors and even with lighting fixtures and wiring in your attic. Air sealing of floors and ceilings or roofs makes the most impact on energy efficiency.

You can definitely educate yourself and DIY this for a couple hundred dollars or less. Or for the amount of your economic impact payment, you can hire an experienced weatherization or insulation contractor to do the work. These jobs are labor intensive, so you'd also be using your stimulus money to keep someone in our community employed. And since a lot of this work takes place in crawl spaces, basements, and attics, it's social distancing friendly.

5. Energy-efficient appliances: If you have an older appliance that's about to go, this might be a good time to replace it. Clothes washers tend to offer the fastest payback in this group. Get an ENERGY STAR®-rated clothes washer, ideally a front loader with good efficiency ratings. This will go a long way to improving your efficiency, but you can make an even bigger impact if you install a clothesline and commit to us-

ing it. Even if you commit to drying half your clothes outside, it really helps.

Refrigerators and freezers are another big opportunity. These have gotten much more efficient over the years, so any unit more than 20 years old would benefit from replacement. To the extent that you can consolidate these and not have too many of them, that also helps. One refrigerator can use 5 percent of a new home's total energy, so it's easy to see how having that extra refrigerator for special occasions can really add to your carbon footprint.

6. Duct sealing: Sealing your HVAC ductwork is a big energy saver because, on average, 15 to 30 percent of the air that moves through duct systems is lost due to leaks, kinks or loose connections. In practice, what we find is that some homes do better than this, but a few homes are much worse. If you have ducts outside the conditioned space of your home (for example, those in a garage, vented crawl space, or vented attic), air sealing your ducts can be very worthwhile.

This is also something you can learn to DIY using UL-rated tape and mastic, but it's also a great task to outsource to a professional. It's another labor-intensive job that can be done in an unoccupied part of your home.

7. Solar: Your economic impact payment probably isn't going to pay for your entire photovoltaic system, but it can definitely take a meaningful bite out of the cost. And, you guessed it — solar is installed outside and doesn't require workers to come inside your house!

Now is a great time to make your home better. We're spending more time there, and many of these fixes can also contribute to improved comfort and indoor air quality. It's an opportunity to invest that stimulus check on something that will pay you back over time while employing someone in our community. And best of all, it helps put the planet on a better track for our kids and grandkids.

Amy Musser and Matthew Vande are the owners of VandeMusser Design, PLLC. They provide Home Energy Rating System (HERS) services, green-design consultation, and home-energy audits to homeowners in Western North Carolina. Amy is a licensed mechanical engineer and Matt is a licensed architect.

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Leaner and Greener

Green Built Homes Rolls Out Updated Checklist, New Certifications



This Platinum Net Zero Energy Certified home was built by Familia Enterprises on an infill location in a walkable neighborhood. The home includes native and edible landscaping, and a variety of green finishes. FAMILIA ENTERPRISES PHOTO

Green Built Homes Committee

Special thanks to our dedicated committee members, whose expertise and perspective helped inform our revisions to the newest version of the Green Built Homes certification checklist.

- Jessica Arrowood, Vandemusser Design
- Chrissy Burton, Fisher Architects
- Leigha Dickens, Deltec Homes
- Sam Ruark-Eastes, Green Built Alliance
- Jamie Shelton, Blue Ridge Energy Systems
- Stephens Smith-Farrell, Haizlip Studio
- Raymond Thompson, Sure Foot Builders

BY MAGGIE LESLIE

As codes have changed and technologies have advanced in the 16 years since the program's inception in 2004, Green Built Homes has continually evolved to encourage positive changes in the building industry and highlight new opportunities to make projects more sustainable.

Green Built Alliance is thrilled to announce the release of Green Built Homes Version 3.0, which has been updated to stay current with changing building codes and increase simplicity for program participants. All homes registered after January 1, 2021 will be required to use the new checklist.

Many items that are now standard construction practices have

been removed from our checklist, while we have added opportunities to gain points for new technologies. The sections have been overhauled to be more streamlined and organized. The point system and levels have been adjusted to reflect the changes.

New elements

Two new prerequisites are now

required for all homes.

First, all baths with showers must be tested to exhaust 50 CFM intermittent or 20 CFM continuous. Previously, fans were required to be rated at these levels and we provided points for passing the diagnostic testing, but now the exhaust fans must prove to function as designed in order to achieve certification.



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Second, consistent with code, CFL or LED light bulbs must be installed in 75 percent of lamps in permanent lighting fixtures.

For Platinum Level Certification, a balanced ventilation system is also now required.

The Net Zero Energy Ready Certification has been updated to allow installation of combi meters in lieu of installing a chase and conduit for future solar. In addition, a home that does not meet all prescriptive requirements — including having a maximum Home Energy Rating System (HERS) Score of 55, adequate south-facing roof area within 45 degrees east or west of solar south, and a minimum of 110 square feet of roof area per 2,000 square feet of conditioned area — may provide an estimate and system design by a licensed installer that will achieve a HERS Score of 15 with 6 kWh or less. Designs may include future ground-mounted systems. The idea is to encourage homeowners to go solar by making it as easy as possible.

Green Built Homes Version 3.0 introduces the newly available HERSH20. The Residential Energy Services Network (RESNET) that developed and oversees the HERS Index has created a tool for estimating and rating the water use of the home as designed.

"HERSH20 is a system for rating whole-house water efficiency that includes both indoor and outdoor uses," according to RESNET. "With the average family spending more than \$1,000 annually on water costs, HERSH20 provides a simple, easy to compare rating on a scale from 0 to 100+; where lower numbers mean less water use. The HERSH20 Index was developed as part of a partnership between RESNET and the International Code Council."

There are also more credits available for non-toxic, healthy and environmentally preferable products. There is also more information on wildlife protection, bear prevention and biophilic design strategies that attempt to create connections between humans and nature within the built environment.

"The Green Built Homes checklist is a robust tool and guide that provides the best metric to differentiate between greenwashing and the real deal when a home goes through the full inspection process for the certification," said Sure Foot Builders owner Raymond Thompson, who was one of seven people on the Green Built Homes Version 3.0

"The Green Built Homes checklist is a guide that provides the best metric to differentiate between greenwashing and the real deal."

— Sure Foot Builders owner
Raymond Thompson

Get Involved

There is an opportunity for builders to be among the first to complete a project under the new Regenerative or Net-Zero Water Ready certifications.

Email Program Director Maggie Leslie at maggie@greenbuilt.org if you are interested in the distinction of being a leader in these new certification levels available for the first time in Western North Carolina by participating in our pilot.

committee that provided guidance and feedback through the process of developing the new checklist. "That said, the dynamic nature of the checklist and its continual reiterations still allow a place for a basic Green Built home, which is an improvement on the standard code-built home, as well as a Net-Zero or Regenerative home, which would be pushing the leading edge of the green-building movement."

New certifications

Thanks to funding from the Kendeda Foundation, the Green Built Homes program now places more emphasis on regenerative elements, including the addition of a Net Zero Water Ready Certification and a pilot Regenerative Certification.

Regenerative buildings are designed and built so that they are integrated to have a net-positive impact on the natural environment around them. The regenerative items encourage the certification system to evolve beyond the previous approach of rewarding features that make homes "less bad" for homeowners and the environment, to begin encouraging elements that actually improve the world around them.

All items considered regenera-

tive are highlighted in green across the checklist to encourage use and highlight their importance.

The Net Zero Water Ready Certification will require the HERSH20 as well as a calculation of outdoor water use using the WaterSense budget tool. The site will need to be designed to manage 100 percent of its stormwater onsite, and the home will need to capture the total demand of its water through rainwater after first reducing it as much as possible through a combination of strategies. The rainwater system will then need to be plumbed for non-potable use (at a minimum).

For those ready for even more of a challenge, a separate checklist of prerequisites has been created for Regenerative Certification. A Regenerative Certified Home will be Green Built Homes Certified to the levels of Net Zero Energy and Net Zero Water Ready, as well as meet the qualifications of ENERGY STAR® and Indoor airPLUS. In addition, there are requirements for the site location, food production, material use and recycling, to name a few.

The new Regenerative Certification is being introduced as a pi-

lot program so Green Built Homes can work with builders to gain feedback on various requirements. The program is challenging with a goal of inspiring what is possible through the use of thoughtful design and attention to detail, resulting in a home that is truly better for you and the environment.

"LEED and Green Built Homes slowed the speed with which we were hurtling towards the abyss of environmental destruction and degradation from that of a speeding train to a slow jog. Good but not good enough," said Stephens Smith Farrell of Haizlip Studio, who served on the committee overseeing the checklist revisions. "Green Built Homes Regenerative (and other regenerative visions of the built environment) will have us turn around and begin the critical work of making the world ever so slightly better, more sustainable, more equitable with every step, however small and seemingly insignificant. We are making this imperative turn today. Come along."

Maggie Leslie is program director for Green Built Alliance. Connect with Maggie at Maggie@greenbuilt.org.

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Protecting Our Places

Economic and Environmental Benefits of Conservation Subdivisions

BY RJ TAYLOR

Western North Carolina is feeling a growth spurt. Many people around the country have become aware of our secret, that Asheville and the surrounding communities are a wonderful place to live and play.

The downside result of that to our local environment and water resources is that many people are moving here and the population is rapidly growing. People need a place to live, so the development boom is leading to many new subdivisions being constructed in areas that are either environmentally sensitive, on lands bordering our waterways, or on the steeper areas of our mountainous environment.

Most of these new subdivisions are being built in the way developers have always done it. Conventionally designed residential subdivisions are characterized by the division of the entire tract of land into houselots and streets with limited common space. The common space is usually limited to the minimum areas required for the avoidance of wetlands, streams, steep slopes, floodplains and stormwater-management areas. These subdivisions have limited areas to walk or recreate because most of the land has been cut up and parceled out to the individual landowners for their pri-



At Olivette Riverside Community and Farm agrihood, woodlands border the French Broad River in a protected corridor. RJ TAYLOR PHOTO

vate lots. The result is that most of the land becomes paved over, built upon or converted into lawns. Much of the landscape is also planted with lawn grasses and nonnative trees and shrubs.

Both Buncombe and Henderson counties have recognized the value of a more environmentally friendly development design in their reviews of subdivision proposals. In Buncombe County, a Conservation Development is a subdivision option which allows for the preservation of conserved open spaces and farmland within the footprint of the subdivision. These Conservation Developments limit the disturbed areas within the developed landscape and tend to prioritize the protection of ridgetops, woodlands,

floodplain and wetland areas, landslide hazard areas, active agriculture lands, open space and other environmentally sensitive areas. For proposed subdivisions of a size at least 15 acres, various permitting benefits are provided to the developer if 50 percent of the overall tract can be preserved in an open space form. Agricultural lands that remain active to agricultural production count double in this calculation.

Subdivisions being developed in the more suburban areas of Western North Carolina can take advantage of these county benefits and provide their residents with that natural setting adjacent to their residential homesites.

Agrihoods such as the Olivette Riverside Community and Farm in

Woodfin have already included active farmlands into their subdivision design. Residents of that community will get the pastoral setting of rural agriculture production and also take advantage of the community supported agriculture (CSA) shares that allow them to purchase subscriptions to the farm's locally grown seasonal produce. That is in addition to the enjoyment that a serene farm setting provides to their neighborhood as opposed to looking into someone else's backyard.

Subdivisions such as High Hickory in Swannanoa and Couch Mountain in Arden are designed to avoid development on the more visible mountaintop areas, and have set aside those portions of the land for nature preserves



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and natural surface trail systems.

There are distinct economic advantages to utilizing a conservation design for the development of residential subdivisions. These include:

Review periods often proceed more smoothly since the designers have usually taken into account many of the concerns that the city or county planning departments would be working to resolve, therefore avoiding many of the disputes and conflicts over design.

An opportunity to reduce the infrastructure engineering and construction costs for single-family lots and multifamily units. The layout is clustered and more compact, often more like a village layout. There are often fewer waterway and wetland crossings, there are fewer linear feet of roadways and less pavement, the costs of stormwater-management facilities are lessened, and shorter electrical and water-utility lines are needed due to the more compact layouts.

Subdivision areas with a natural feel and environmentally smart designs are very desirable and therefore very marketable.

An opportunity to market this sort of development for an environmentally oriented community. The presence of woodlands, stream and wetland-preserve areas, wildlife meadows and active farmland are all amenities that can be promoted in the marketing of the subdivision. Also, greenways and walkable corridors in the subdivision are desirable amenities on open spaces in these subdivisions; especially if there are connections into greenway corridors in the larger community and neighboring cities.

Conservation subdivisions have been documented to appreciate in value faster than their counterparts in conventional residential developments.

The presence of natural and recreational areas within these conservation subdivisions help to reduce the demand for public open spaces, parklands, recreational areas and other areas for the local governments' requirements. This will also be an attractive factor to local plan reviewing bodies at the

city and county levels.

In addition to these advantages, there are numerous environmental and ecological benefits being provided through the protection of undeveloped and open space lands within a residential development. Sensitive ecological areas such as streams, wetlands, mature forests, native meadows, and wildlife corridors are being avoided in a good conservation development design. These subdivisions tend to shed less stormwater than the conventional subdivision design and the natural landscape provides a buffer to filter runoff before it reaches rivers and streams. The naturally vegetated buffer zones absorb stormwater, and the overhanging forest cover provides shade and maintains cooler temperatures for aquatic areas in the summer.

Protection of the waterway corridors, sensitive habitats and vistas in a Conservation Development fits nicely with the green-certified homes in our communities. The clustering of the homesites in the buildable environment is often paired with stormwater management, low-impact development and use of native plantings. Subdivision areas with a natural feel and environmentally smart designs are very desirable and therefore very marketable to residents of Western North Carolina. The Planning and Zoning departments with Buncombe County and Henderson County can provide more details about these development options for developers.

Land trusts like RiverLink are working with a number of private development companies on some of these Conservation Subdivisions around the Asheville area. By accepting conservation easements on open space and natural areas within these Conservation Developments, land trusts are helping to make the built environment of our new residential communities more enjoyable. The conservation easements also protect the integrity of our adjacent waterways which receive the runoff from these developed areas where we live.

RJ Taylor is the land resources manager for the nonprofit RiverLink. He has collaborated with numerous conservation developments to protect the natural features within these innovative subdivisions, and is actually a founding resident of one such community in Swannanoa. Connect with RJ at riverlink.org.



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Tiny Home Havens

Tiny Home Communities Develop in Western North Carolina

The Wedge style home at The Village of Flat Rock, which offers a variety of tiny home design styles. SIMPLE LIFE PHOTOS

BY SUSANNA SHETLEY

Tiny-home living has been growing in popularity over the past decade, and the advent of the coronavirus crisis may intensify that surge.

With modern society craving more time outdoors and more money for travel and leisure, tiny homes offer a lot of advantages.

“Designing my tiny home was really fun,” said Jacki Yates, a resident of Acony Bell Tiny Home Community, which is nestled in a wooded 60 acres in Mills River. “The design depends on the type of storage you need and how you’ll use your space the most.”

Yates, a longtime road biker and Ironman triathlete, works from home and needed space to store bikes. During her design phase, she factored in these two important components. In the summer of 2020, Yates married her husband, Sam, an avid mountain biker, and her tiny home’s bike storage became even more useful.

Yates says living in her tiny-home community is like being at

camp all the time. She and her husband are good friends with the other residents and often enjoy potluck dinners, campfires, board games and community gardening.

Acony Bell

Acony Bell co-founders Mark Brooks and John Monroe developed the village specifically for tiny houses on wheels and outdoor enthusiasts. On site, residents enjoy mountain biking trails, fishing, hiking and edible gardens. There are even hop vines strategically planted around electrical units to beautify each site.

Acony Bell is a blend of permanent residents and vacation rentals. Since each demographic has different needs and desires, the two sections are separated on the property.

“When we acquired this plot of land, we were originally thinking of an RV park,” said Brooks, a civil engineer and president of Brooks Engineering. “That was around the time tiny homes were getting popular. We went to a few tiny-home

shows and thought they were really cool, so we decided to go the tiny-home route.”

All of the structures at Acony Bell are tiny homes on wheels, also known as a THOW. The goal for Brooks and Monroe was to have an eclectic blend of homes designed by a realm of builders throughout the region.

“We don’t want to sell you a house,” said Monroe, property manager at Acony Bell. “We can help you design the home, but we want our residents to have control of the details. Also, we want to support local and regional tiny home builders and put money back in the economy. With that being said, each tiny-home owner chooses their builder so they get what they want.”

The Village

Down the road from Acony Bell is The Village at Flat Rock, another tiny-home community which operates under a different paradigm but with a similar comprehensive goal.

“More and more people are reevaluating what’s important to them,” said Coles Carangian, marketing director for The Village at Flat Rock. “They’re realizing all that living space they’re trying to maintain may not be worth it.”

The Village at Flat Rock is one of several small cottage home villages managed by the umbrella company Simple Life. Company founders, The Resource Group, have been in land development and homebuilding for two decades. They realized there was a need for affordable, low-maintenance housing for a particular demographic – homeowners who wanted nice home features and amenity-rich living. This realization combined with the tiny-home movement was the impetus for Simple Life.

Currently, Simple Life operates two sites, one in Flat Rock and one in Central Florida. They recently broke ground on a second community in Henderson County. At The Village, residents select from a handful of designs. They own

their home and lease the land. Additionally, the community offers amenities such as a swimming pool, clubhouse, social events and an all-inclusive service cost with landscaping, cable, water and trash pick-up.

Sustainability and ordinances

Acony Bell and The Village at Flat Rock both strive to embrace sustainability. All homes in The Village at Flat Rock are manufactured indoors then brought on-site. This decreases construction waste and improves the air quality of the dwelling. Many of the Acony Bell residents select builders known for their green-building prowess. Tiny homes are known for producing a relatively small carbon footprint and using less energy due to reduced space to heat and cool.

Ordinances can be tricky when it comes to tiny-home living. Depending on location, zoning restrictions may inhibit tiny-home goals. A tiny home with a foundation is more likely to be approved for residential use, unless a piece of land is leased like those offered at Acony Bell, which fully welcomes homes on wheels. A THOW may not qualify as a house because there's no structural foundation. Further, some places require a minimal square footage, which challenges the basic concept of a tiny home.

Another choice to consider is an accessory dwelling unit (ADU), which is a tiny home on the same property as a standard-sized residence. Homeowners routinely use these for guest houses or rentals.

An ADU is often preferred over a tiny home serving as a primary residence. When the tiny home is the only dwelling on a piece of property, it can lower the tax value of the land. Further, neighbors often frown upon a single tiny house among larger homes due to aesthetics or an anticipated decrease in value in their own home.

Some states are more amenable to tiny-home living than others. Architect Magazine ranked the top five states for tiny homes as California, Oregon, Texas, North Carolina and Florida. This assessment was based on a multitude of factors, including zoning laws, ordinances, access to information, number of tiny-home communities and the prevalence of builders focusing on tiny homes and ADUs.

The tiny-home industry is growing and evolving, but ordinances, zoning laws and human resistance to change can make that movement slow going. Nonetheless, for folks like Yates and her husband, a tiny home is exactly what they need.

"I like how living in a small space forces a person outdoors," Yates said. "We absolutely love the area and Acony Bell. We plan on sticking around for quite a while."



"More and more people are reevaluating what's important to them. They're realizing all that living space they're trying to maintain may not be worth it."

— Coles Carangian, marketing director for The Village at Flat Rock



(Left) Homeowners get creative with the limited space inside a tiny home. (Right) A favorite among the tiny home vacation rentals at Acony Bell.

Solar for Schools

Appalachian Offsets Completes Fundraising for Isaac Dickson System



Isaac Dickson Elementary School. KLOESEL ENGINEERING PHOTO

BY CARI BARCAS

Green Built Alliance's Appalachian Offsets program is celebrating the successful completion of its fundraising campaign to install a solar system at Isaac Dickson Elementary School in Asheville.

Appalachian Offsets funds renewable-energy projects and energy-efficiency upgrades in Western North Carolina schools, nonprofits and low-income housing by pooling money contributed by local businesses and individuals through its voluntary carbon-offset program.

Appalachian Offsets finished

fundraising for the Isaac Dickson solar project — its largest undertaking to date — in late 2019 and the system is expected to be installed on the school's roof in September 2020.

"Over two years, more than 100 donors contributed directly to make this project happen," Green Built Alliance Executive Director Sam Ruark-Eastes said. "This was a collective effort and we couldn't have done it without the support of our many donors and the large contribution of an anonymous donor who reached deep into their pockets to fund this effort. We are so grateful to live in a place that

values clean energy for schools."

Isaac Dickson was designed as one of the state's first Net Zero Energy schools and has been awaiting the solar system to help it move toward that vision since it was built in 2016.

The school will receive a 300 kW photovoltaic array on several roofs with a total price tag of \$428,000. Appalachian Offsets coordinated the fundraising efforts, collecting \$55,000 through community contributions, while an anonymous donor generously committed \$250,000. The project is also being made possible through a \$75,000 rebate from

The solar array will be a net-metered system, resulting in the school's electric bill being lowered by more than \$30,000 per year with a 30-year savings of more than \$1.3 million.



Members of the Isaac Dickson community have been outspoken advocates for sustainability practices at the school, including at this 2015 protest against a Duke Energy proposal to put a new energy substation 300 feet away from their new building. Duke ultimately decided not to pursue construction on that site based on community concerns. PAT BARCAS PHOTO

Duke Energy as well as Asheville City Schools' allocation of \$48,000 in energy-efficiency rebates it received for Isaac Dickson.

The solar array will be a net-metered system, resulting in the school's electric bill being lowered by more than \$30,000 per year with a 30-year savings of more than \$1.3 million, according to Sundance Power Systems, with which Asheville City Schools has contracted to install the system. Through an agreement with Buncombe County, the money saved on Isaac Dickson's electric bills will go back into school operations.

"The Isaac Dickson project is an expression of the dedication and

commitment of this community for taking action against climate change and to leverage this technology to benefit our school system for years to come," Sundance Power Systems President Dave Hollister said. "With the leadership of the Green Built Alliance and its Appalachian Offsets program, teachers and concerned citizens were able to raise the money for the project. This is community solar at its best."

In addition to reducing the school's energy bills, Isaac Dickson will leverage the asset as a teaching resource by weaving information about photovoltaics and data from the on-site solar system into

curriculum for students.

"Installing a rooftop solar system will fulfill the architects' vision of using the school building itself as learning tool that can be used to facilitate discussions about our environment and conservation, as well as the impacts of fossil fuel consumption not just on our climate but also on our air and water quality," said Isaac Dickson parent Matt Menne, who played an integral role in fundraising efforts during his time as co-president of the school's PTO. "What better way to help than by reducing the carbon footprint of our schools, which provides the added benefit of saving money on energy costs for the district in the long run."

With the Isaac Dickson system coming to fruition, Green Built Alliance is inviting fellow nonprofits and local schools to apply for financial support on future clean-energy projects through Appalachian Offsets.


There is a rolling application submission window to be considered for funding support as one of Appalachian Offsets' future projects. Appalachian Offsets has historically completed a variety of energy-efficiency and renewable-

energy projects over its 15-year history in Western North Carolina, but the program is also open to considering applicants with carbon-sequestration plans. To receive funding, the project must be under the umbrella of a nonprofit, school or coop.

Individuals or businesses interested in supporting the work of Appalachian Offsets can visit cutmycarbon.org to calculate their carbon footprint and offset emissions by paying into the community fund that supports these projects in local nonprofits, schools and low-income housing.


Organizations interested in applying for this funding and those with additional questions can email Green Built Alliance Executive Director Sam Ruark-Eastes at sam@greenbuilt.org.

Cari Barcas is community engagement director at Green Built Alliance. She has more than a decade of experience in communications and nonprofit management, including time reporting on the green building scene in Chicago as a journalist covering residential and commercial real estate. Connect with Cari at Cari@greenbuilt.org.



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Sustainable Building is Resilient Building

Designing Spaces that Last

BY LEIGHA DICKENS

In a world with a changing climate, how we design our homes matters.

Reduced environmental impact has long been a huge focus of green building. Yet our homes are also critical in protecting us from the environment when that environment turns harsh.

As it turns out, some of the most basic principles in sustainable building also greatly improve resilience to changing and strengthening natural disasters, both on the level of our individual shelters and of entire communities. Resilience, in turn, tends to decrease a building's environmental footprint. After all, a home that is constantly rebuilt is far from environmentally responsible.

Here are four basic principles from the world of sustainable building that also improve resiliency.

1. Insulate and seal the building envelope

This is the single most important strategy advocated by build-

ing scientists and green-building experts to reduce a home's energy use. A home with high levels of insulation and good windows, and one that is extraordinarily air tight, can have half the heating and cooling costs of the same home with average features.

Since heating and cooling is the largest energy expenditure of most homes, since insulation and air-sealing are very cost-effective, and since the energy consumed by residences contributes 20 percent of equivalent national carbon emissions according to the U.S. Energy Information Agency, it makes sense that this strategy would rise to the top of the list of priorities for a sustainable home.

Yet a super-insulated and airtight home is also a more resilient home. Such a home doesn't need as large of a heating-and-cooling system, and that system doesn't need to use as much energy to keep the home at a comfortable temperature.

These homes warm up or cool off more slowly on their own, with less need for energy input. This

means that during periods of extended power outages, these homes can keep their humans better sheltered from extreme outdoor temperatures.

2. Use sun tempering and natural comfort principles

The shape and orientation of a home also plays a role in how well it can maintain safe and comfortable indoor temperatures.

Passive solar design principles combine with super-insulation to do this to great effect: orienting the largest portion of a home's window glass toward the sun (and limiting glass on all other sides), using thermal storage materials in the sunny space to hold on to heat gained through the windows while shading or screening devices work to keep that heat out in summer.

The more that passive solar principles are followed, the lower the heating load of the home, yet even modest attention to these design principles can improve a home's comfort.

In the northern hemisphere,

Use of awnings (left) on south-facing windows in colder climates, when designed with the area's latitude, can allow heat from the sun into the home in winter, but keep it out in summer.

DELTEC HOMES PHOTO

Diligent air-sealing (right) during construction can result in a home five times more air tight than a typical new home.

LEIGHA DICKENS PHOTO

overhangs or awnings should shade most south-facing windows, large north-facing windows should be limited, and designers should avoid placing small rooms with large windows on the south or west to avoid acute overheating.

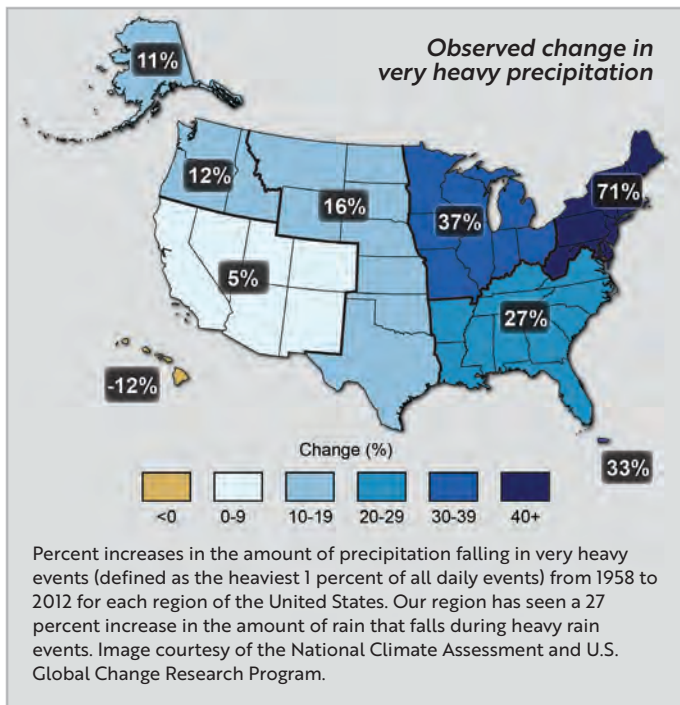
3. Design for drying

Water destroys homes, and it can strike in ways both dramatic and subtle.

Though storm surge, wind-driven rain, and widespread flooding are certainly familiar concerns for those building in hurricane zones, simple and robust practices against water and moisture intrusion should be a high priority in every home design.

According to climatologists, most regions of the U.S. are seeing dramatic increases in "big rain" events: intense, heavy downpours that dump an increasing proportion of the region's annual rainfall all at one time, often overwhelming natural and man-made stormwater infrastructure.

In the face of these deluges, design principles for moisture con-



trol become more important than ever. Deep overhangs act like an umbrella for the home, directing rainwater away from the walls below. Gutters, downspouts and continuous foundation drains around the perimeter of a home further collect water and direct it away from the home. The layers of materials that go into any exterior wall, roof, foundation or floor should be considered for how they work together to keep water out while also allowing any moisture that does get in anyway to dry back out again. The ENERGY STAR® for Homes Water Management Checklist offers good practical guidance for building moisture out of the structure.

Meanwhile, site and community stormwater management features should be built for the rain that might be seen in historic events, not just commonplace ones. The Green Built Homes Version 3.0 checklist offers great suggestions, including the use of permeable surfaces rather than nonporous ones, and natural stormwater features such as retention ponds, swales, or rain gardens.

4. Incorporate regenerative strategies, or plan for their future integration

Regenerative buildings are defined as those that “produce all of their own energy, capture and treat all water, and are also designed and operated to have a

Some of the most basic principles in sustainable building also greatly improve resilience to changing and strengthening natural disasters

net-positive impact on the environment, including repairing surrounding ecosystems.”

While this might be more aspirational than currently feasible for some systems in our homes, some bridge regenerative practices can be nonetheless incorporated into homes today. Meanwhile, other future possibilities can still be affected by how new homes are planned today.

One example would be an all-electric home, with planned-in space for future solar generation and future battery storage. Going all-electric capitalizes on the fact that the largest energy-using systems in a home — heating and cooling, water heating, cooking, clothes drying, and increasingly transportation — have all-electric options that are considerably more energy efficient than alter-

natives that burn a fossil fuel. (For example, heat pumps and heat pump water heaters are more than 100 percent efficient, while electric induction ranges offer a cooking experience like gas but consume much less energy than gas while also offering better indoor air quality.)

A home’s electricity use, in turn, is increasingly able to be offset by affordable on-site or neighborhood-level solar generation. Meanwhile, the electric grid overall is getting greener: supplying more and more of our electricity from cleaner-burning or renewable energy sources.

The gradual decrease in the cost of batteries will soon make storing energy on site more affordable, providing easier backup in the case of a natural disaster. Yet gains in energy monitoring and load-management technology could even make highly resilient community-level scenarios possible in the future, such as solar microgrids that store excess energy in heat pump water heaters and electric cars batteries, allowing the community to draw on that stored energy in times of need.

This year’s launch of the new and improved Green Built Homes

certification will even include a new regenerative designation, recognizing homes that incorporate the best available regenerative elements and technologies — both those that are simple, and those that are more aspirational but nonetheless beneficial. I’m excited to see what new building innovation this spurs in our community, and I hope you are too.

One of my favorite definitions of the term “sustainability” is a simple one: “the ability to exist constantly.” While in the context of green building and environmentalism this often refers to the ability of our ecosystems, our economies, and our very planet to do so, it’s clear that many of these same practices help us sustain ourselves into the future too.

Leigha Dickens is in her tenth year as the green building and sustainability manager with Deltec Homes, a company which specializes in hurricane-resistant homes. She is a member of Green Built Alliance’s Board of Directors, RESNET HERS Rater, and University of North Carolina Asheville alumna of the physics and environmental studies programs. Connect with Leigha at deltechomes.com.



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Green Built Alliance has been working to advance sustainability in the built environment, and we would not have been able to make such an impact without the support of the many individuals who energize our mission by engaging with our programs. Thanks to all those who have supported our work by building green homes, offsetting their carbon footprints, and donating to improve the homes of our neighbors in need in the past year.



Builders who have certified projects through Green Built Homes

Altitude Builders, Inc.
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Habitat for Humanity
Balsam Homes, LLC
Beach Hensley Homes
Benchmark Custom Homes, Inc.
BH Wicker, LLC
Brown Wulff Homes
Corner Rock Building Company
Craig Payne
Crazy Hair Construction
D.A. Fiore Construction Services
DeBord Enterprises, LLC
Duinkerken Homes, Inc.
Earthtone Builders
Evergreen Construct, Inc.
Green Leaf Builders, LLC
Green Light Home Builders
Greencraft, Inc.

GreenSource Construction Company
Gulf Equities, LLC
Habitat Re-Imagined
HomeSource Real Estate & Construction
Housing Assistance Corporation
Ironwood Studios
J&A CM, LLC
JAG and Associates Construction, Inc.
Judd Builders
Kaizen Homes
Kogi Group, LLC
Living Stone Design + Build
LMT Homes
Mchugh Designs
McMaster Construction Company
Meinch Construction, Inc.
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Solid Rock Builders
Steel Root Builders, LLC
Sure Foot Builders
Union-Anson County Habitat for Humanity
V&V Land Management
Virant Design
William & Beth Ellis
WSM Craft



Individuals and businesses who offset their carbon footprint and support clean-energy projects in local schools and nonprofits through Appalachian Offsets

Chrissy Burton
Sarah Alice Wyndham
Todd Hoke
William Lowrey & Alice Petersen
Shannon Capezzali
Jane Laping
Daniel Walton
Ada Lea Birnie
Joyce Young

Jon Phillip Pertee
Elaine Robbins
Robin Cape
Robert Lackey
Sunita Patterson
Sam Ruark-Eastes
Dana Barrager
Robert Reynolds
Jamie and Rachel Shelton

Joe Stelpflug
Victoria Smll
Nicholas Ladd
Dane Barrager
Amanda & Jeffrey Clayton
LaZoom
Southwings



Individuals and businesses who donated to support home-efficiency improvements for neighbors in need through Energy Savers Network

Amy Musser
Bruce Michael
Lew Gelfond
Kim Cobb
Catherine Rosfjord
Steve Anderson
Boone Guyton
Debbie Odum

Brian Smith
Dale Stratford
Wendy Livornese
Joe Wombell
Joanne Lazar
Frances Stewart
Jane Laping
Sam Speciale

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Energy Savers Network volunteer Lew Gelfond and cofounder Alice Wyndham enjoy a workday with a client whose home received a variety of energy-efficiency upgrades. BLUE HORIZONS PROJECT PHOTOS

Blue Horizons Project

The Blue Horizons Project's new guiding body is intended to convene by fall 2020 with a diverse nine-member panel representing the fields listed below. Those interested in being considered for a seat on the community council can email sophie@bluehorizonsproject.com.

- Residential Developer
- Affordable Housing Provider/Developer
- Commercial Developer
- Utility (local, technical, policy, program)
- Government (staff, political leadership, citizen advisory board)
- Public Sector; leaders beyond City and County (schools, AB Tech, Airport, MSD, other municipalities)
- Large Employers
- Business (large users, mid-size users, business associates, entrepreneurs)
- Large utility Users (plus rooftop owners)
- Non-Profit/ Advocacy Organizations (LMI, Seniors, environmental, policy)
- BIPOC Voices
- Renewable energy installer, industry representative
- Energy Efficiency Professional (energy rater, HVAC expert)
- Alternative fuel transportation

Renewed Commitment

Future Looking Bright for Blue Horizons Project

BY CARI BARCAS

With more than two years of success in meeting the goals outlined for its community-focused campaign, Blue Horizons Project is excited for the next phase in its evolution and an expanded involvement in the region's efforts to transition to 100 percent renewable energy in the next two decades.

Following a joint Request for Proposals from the city and county, Green Built Alliance was selected in the summer of 2020 to continue implementing the work of the Blue Horizons Project.

"We are thrilled at the opportunity to continue and build upon the first two years of the Blue Horizons Project, and are looking forward to a broader scope of work and new opportunities to deepen our relationships within the community to work together for clean energy," Blue Horizons Project Coordinator Sophie Mullinax said. "We're grateful for the trust the

City of Asheville and Buncombe County have placed in us."

After years of planning under the leadership of the Energy Innovation Task Force, Blue Horizons Project was launched in March of 2018 to make a clean-energy future a reality in Buncombe County by improving access to and engagement in the wide variety of programs and resources available to local residents and businesses.

Through a suite of strategic energy-efficiency and demand-response solutions, Blue Horizons Project has positioned itself over the past two years as a comprehensive hub of programs to empower community members to save money and reduce the area's peak energy demand.

In one pivotal early success, Blue Horizons Project was credited with playing a key role in influencing Duke Energy's decision to take off the table plans to build a natural gas peaker plant—one of the core concerns that prompted the

formation of the Energy Innovation Task Force in early 2016.

As Green Built Alliance carries forward the clean-energy torch through this work, many of the Blue Horizons Project's efforts will stay consistent. As it did in its first two years, Blue Horizons Project will continue providing resources for residents and businesses to reduce energy demand and consumption, as well as adopt renewable energy.

Also remaining steady is the involvement of Energy Savers Network (ESN) in completing weatherization and energy-efficiency upgrades in low-income homes. One new layer within that is a partnership between ESN and Green Opportunities and United Community Development, which will both serve as subcontractors on the work in low-income homes.

"We are excited to partner with these minority-led organizations embedded in communities we seek to serve," Mullinax said.

In an exciting new development, Blue Horizons Project plans to launch a solarize campaign in Buncombe County in partnership with Solar CrowdSource, a platform that facilitates residential and commercial solar installations, often at below market-rate pricing. Blue Horizons Project will host public events and connect with neighborhood associations to inspire and inform residents to go solar, and select local solar installers to participate by offering free site evaluations and quotes for homes and businesses.

Homeowners will benefit from lower pricing for solar installations; access to vetted contractors; and a streamlined process. Local solar installers will benefit from reduced customer recruitment costs, as well as improved and increased community relationships.

It is difficult to determine exactly how much photovoltaic capacity could be installed via these efforts, but the program's goal is 1 MW in 2020, 2 MW in 2021, and 4



Members of the Energy Innovation Task Force, Blue Horizons Project staff and other clean-energy advocates gather in Pritchard Park to celebrate the announcement of Duke Energy's decision to take off the table plans to build a natural gas peaker plant.

MW in 2022.

The solarize campaign is one of several strategies being adopted to ensure Buncombe County's

progress toward its goal of reaching 100 percent renewable energy for the community by 2042. With increasing focus in year two of the

three-year contract, Blue Horizons Project will be engaged in creating a strategic plan for achieving 100 percent renewable energy.

"It will start with a foundation of energy efficiency to ensure we're using the energy we need wisely and to reduce our consumption before installing renewable energy on our homes and businesses," Mullinax said.

The program's founding entity, the Energy Innovation Task Force, held its final meeting in March 2020, with plans for it to be reborn as the Blue Horizons Project Community Council later in 2020.

The council will come together to address the current climate crisis by leading the region in achieving its community-wide renewable energy goal of transitioning to 100 percent renewable energy by 2042 through community engagement and collaboration with Buncombe County, the City of Asheville and Duke Energy.

Cari Barcas is community engagement director at Green Built Alliance. She has more than a decade of experience in communications and nonprofit management, including time reporting on the green building scene in Chicago as a journalist covering residential and commercial real estate. Connect with Cari at Cari@greenbuilt.org.

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Asheville's Urban Forest

Solutions for a Sustainable City



A creatively designed home built around an existing tree.
PATRICK WONG PHOTOGRAPHY

BY AMY SMITH

Asheville is treasured by residents and visitors alike for the natural beauty surrounding the city. Our region is covered with forests, teeming with wildlife, and saturated with mountain views. Like all growing cities, Asheville faces the issue of preserving nature while promoting smart growth that propels our economy and serves our citizens.

Saving existing tree canopy and planting new trees within the city provides numerous benefits for both the natural environment and the humans who live and visit here. Unfortunately, Asheville has seen a decline in tree canopy cover of more than 6 percent since 2008, with some neighborhoods experiencing more than 30 percent canopy cover decline.

Despite the losses, it is not too late to preserve our urban forest. Builders and developers are in a unique position to lead the way on tree preservation and augmentation. Implementing smart-growth principles in the development and building process has benefits for both the economic bottom line as well as the health and well-being of the environment and residents.

Benefits of Urban Trees

Urban forests provide a multitude of social, economic and environmental benefits, including offering urban cooling, reducing air pollution, lowering stress, improving biodiversity, managing stormwater, combating obesity, increasing property values, and mitigating climate change through carbon sequestration.

Studies have shown that even a view of nature can reduce stress and increase productivity for work-

ers. The presence of trees increases the utility of public outdoor spaces by providing shade and reducing flooding.

These benefits can be calculated in terms of monetary value to the city. In 2008, Asheville's urban tree canopy coverage provided \$82,348,000 worth of carbon sequestration. The 6 percent canopy loss in the next 10 years resulted in a loss of \$7 million worth of carbon-capture benefits. Stormwater mitigation is another example of how the loss of tree canopy cover cost Asheville millions of dollars.

From 2008 to 2018, the increase in stormwater runoff as a result of reduction of tree canopy cover cost the city \$1.6 million and totaled approximately 18 million gallons of water. This is equivalent to 27 Olympic-sized swimming pools. Conserving mature tree canopy cover in addition to planting new trees provides incredible economic benefits to the city.

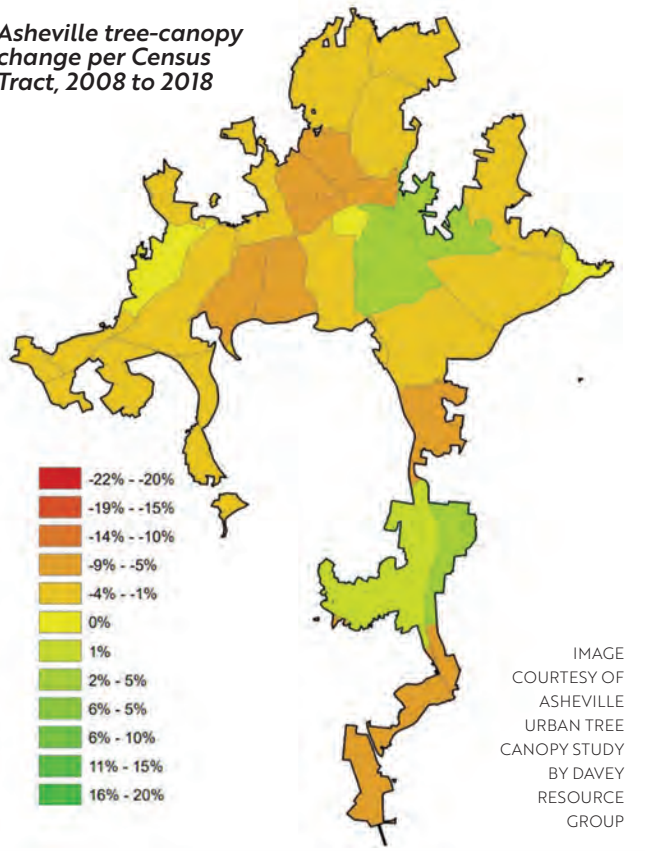
Shade provided by trees, particularly in the summer, can reduce the urban heat-island effect, or the increase in temperatures experienced in cities due to vegetation loss combined with heat capture from the built environment. Hot summer temperatures in the city can lead to health issues, particularly for the elderly and those people in poverty who are less likely able to escape the heat through air conditioning.

A 2019 study in the city of Asheville conducted by the NASA DEVELOP team found that census tracts with high vulnerability (high poverty and/or high rate of elderly residents) were often also those with low tree canopy. Restoring the tree canopy in historically un-



A 130-year-old oak tree cut down for construction of a new house in West Asheville.
SOPHIE MULLINAX PHOTO

Asheville tree-canopy change per Census Tract, 2008 to 2018



deserved neighborhoods will help ensure that trees are distributed more equitably in Asheville. Addressing this inequality of tree cover can improve living conditions for all city residents.

The presence of trees is also known to increase property values. Preserving mature trees at the time of building is the easiest way to promote canopy cover with new construction and site redesign projects. Trees reduce the energy used by buildings and provide natural beauty, and consumers value mature landscaping in both residential and commercial properties. Proper pre-planning and site design for building projects can reduce job costs associated with landscaping and tree removal, in addition to increasing post-construction values.

Asheville Tree Canopy Study

A recent Tree Canopy Study of Asheville performed by the Davey Resource Group examined data from 2008 to 2018, and noted an overall decline in tree canopy. The modest decline of 6.4 percent loss does not account for canopy that was removed prior to 2008 when the city experi-

enced rapid development.

The study concluded that around 44 percent of Asheville's land is covered by tree canopy. While this amount is encouraging, it is less than other southern cities and less than the 50 percent benchmark proposed by local tree groups such as the city's Urban Forestry Commission and the Tree Protection Task Force. While city ordinances are designed to preserve and protect tree canopy cover on public property, more needs to be done to stop tree loss and encourage tree planting in the city, including on private property.

Not surprisingly, the loss of tree canopy in Asheville was greatest in areas with the most development and building, including West Asheville and the area around the Asheville Outlet Mall toward Bent Creek.

While building and development are necessary for the growth of the city, some of the tree loss can be avoided. Reducing the amount of mature canopy removed from building sites can also lessen the impacts of flooding and stormwater runoff, prevent destructive landslides due to erosion, minimize pollution caused by increases in vehicular traffic, and in-

crease shade to prevent deaths and worsened health conditions from the urban heat-island effect.

How to Promote A Healthy Tree Canopy

Builders, developers, and private-property owners can be a part of the solution to canopy loss in Asheville.

Sustainable development practices including pre-planning and site design can avoid unnecessary tree loss. Creating a tree-protection plan as part of the construction-planning process and ensuring that all parties follow that plan will save trees. Understanding how trees live and how construction impacts trees, even without direct contact to the tree itself, is essential to proper tree protection. Conserving existing trees increases the benefits of trees on the site, reduces planting costs, avoids possible fines, and boosts property values.

Through its Green Built Homes program, Green Built Alliance provides guidelines for tree protection on residential development projects, including the creation of a tree-protection plan, installing tree fencing at the drip line, conserving greater than 25 percent of existing

trees and natural vegetation on the site, and planting new trees.

Potential buyers and customers in Asheville are becoming more aware of environmental issues within the city and demanding that businesses and developers follow these best practices. A green portfolio and well-planned building site can help a future business or property for sale stand out to an increasingly environmentally minded consumer base.

Mindful planning and tree-canopy conservation should be used to promote environmental equality and justice in the city, and to reduce issues such as the urban heat-island effect on vulnerable populations.

Amy Smith is a professor of science at Purdue University Global and a REALTOR® with Coldwell Banker King in Asheville. She is LEED AP accredited and holds a Master of Science in Forest Ecology and Management, as well as a Master of Science in Environmental Policy. Amy serves as the vice chair of the Asheville Urban Forestry Commission and is a volunteer member of the Asheville Tree Protection Taskforce.

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Anti-Racism and the Building Industry

Our Role in Building Racial Equity



The community gathers in Asheville's Pack Square at a candlelight vigil in memory of black lives lost to police violence on Saturday, June 6, 2020. PAT BARCAS PHOTO

BY STUART ZITIN

We watched for almost nine horrifying minutes as a Minneapolis police officer suffocated George Floyd with a knee on his neck in May of 2020. Across the U.S. and the world, in cities and towns large and small, people took to the streets. We have again risen up in numbers to protest racial discrimination.

It's not just about police brutality, even though this is only the latest of numerous brutal incidents. America's original sin of slavery and lynching has evolved into systemic racism that has marginalized the African American community.

Racism in our industry and town

There is a long history of racism in our construction and real-estate industries. Redlining, white flight, discriminatory lending, and many other injustices were prevalent throughout post-World War II America. The G.I. Bill helped many whites to purchase homes, while

few black families benefited. Later, we built multi-story, urban public housing, which failed memorably and miserably to provide a safe, healthy environment.

When desegregation happened in Asheville, black citizens here were adversely affected. Their segregated Stephens-Lee High School was closed, and they were sent to the all-white Asheville High. Little attempt was made to welcome them to the new school. None of their trophies and other memorabilia was taken for display in their new school. The discrimination they bravely faced was formidable.

Most black businesses in the Block eventually went under, and white-owned discount stores were opened to people of color. Gentrification has dramatically changed many neighborhoods, including Montford, the South Slope, and West Asheville. Many black residents have had to relocate due to increasing property taxes.

When I moved here in 1981, those urban areas were very affordable. Asheville was literally a

sleepy mountain town, with little happening downtown after 5. Now that tourists have discovered us, some have understandably moved here, pressuring the housing market, and substantially boosting the construction industry. Of course, all that reasonably-priced housing stock is gone. In its place are overpriced fixer-uppers, tract homes, and green-built residences for more than \$400,000.

With 11 million tourists visiting each year, Asheville has decided to foster a hotel explosion. Nevertheless, our city government has long promoted the idea of affordable housing. Locally, Asheville Area Habitat for Humanity and Mountain Housing Opportunities have greatly increased availability. In 2016 an overwhelming majority of Asheville voted for a \$24 million housing trust fund. The City of Asheville has been disbursing that while the problem gets worse.

The context is a highly profit-driven, reactionary construction industry loath to change. While building science has improved our potential to be safe and comfort-

Resources

RECOMMENDED READING:

- "How to be an Antiracist" by Ibram X. Kendi
- "White Fragility: Why It's So Hard for White People to Talk About Racism" by Robin DiAngelo

RACIAL JUSTICE:

- Building Bridges of Asheville, bbavL.org
- Racial Justice Coalition, facebook.com/RJC.Asheville
- Racial Equity Institute, racialequityinstitute.com

BLACK-OWNED BUSINESSES IN ASHEVILLE:

- hoodhuggers.com/social-enterprise/the-green-book
- colorofasheville.net
- theavlvie.com
- avltoday.6amcity.com/black-owned-businesses-asheville-nc

OTHER TRUSTED SOURCES:

- Green Opportunities, greenopportunities.org
- State of Black Asheville, stateofblackasheville.com
- Darin Waters, darinwaters.com
- Deborah Miles, diversityed.unca.edu

able in our homes, poor folks of color are still in inadequate housing, often in environmentally compromised neighborhoods, with higher numbers of life-threatening diseases like diabetes, hypertension, and asthma.

Particularly here in Asheville, racial inequality is rampant and public housing is woefully inadequate. The socioeconomic, health, and educational disparities between whites and blacks are deeply disturbing. As a long-time resident, I've observed with distress numerous unsuccessful attempts to rectify them. I participated in Building Bridges of Asheville since it began in 1993 — first as an attendee, then as a facilitator, board member and board chair.

Our nation's racial divide is also its most intractable and pressing problem to resolve, and it is a white problem.

The path forward

What do we want Asheville to look like?

Sustainability has become quite the buzzword, but what's sustainable about a sprawling green home on a ridgetop for one retired couple?

Healthy, affordable and available housing is at the heart of a society whose moral arc bends toward justice. Thoughtful builders can find house plans that are small and efficient, while still achieving certification through Green Built Homes and ENERGY STAR®. Infill building is creating more density, which is appropriate in the city.

Yes, people often move here with money, which seems to go further in this right-to-work state. Maybe we builders want to make a bundle, retire early, and meet this demographic where it's at. I get it. We work really hard, often long hours, frequently in unfavorable weather. We deserve the rewards.

The thing is — no justice, no

peace. That's true the entire world over, throughout history. If we want healthy children, safe neighborhoods, and good jobs in a sustainable economy, we have to greatly reduce inequality and eliminate racism.

Words matter. Stand up and speak out when you hear bigoted talk or racist language. Now there's anti-Latinx talk here as more Latin Americans enter construction, maybe with a stronger work ethic than many American workers. Many whites are threatened by people of color entering our industry and putting them out of jobs.

We're in trouble, folks. What can we do?

If you're the boss, seek to hire more people of color. There are numerous black-owned businesses and skilled black workers in Asheville. Green Opportunities trains disadvantaged youth for jobs in both the construction and culinary industries. Consider enrolling in the next nine-week Building Bridges session to learn more about the history of the local black community, and joining the Racial Justice Coalition or the Racial Equity Institute.

Consult local experts. Read the

results of retired professor Dwight Mullen's State of Black Asheville project from University of North Carolina Asheville. Professor Darrin Waters has researched the history of black folks in our mountains, including the enslavement of several hundred. For years, Deborah Miles has diligently run The Center for Diversity Education at UNC Asheville as well. (Find links to these resources in the box accompanying this article.)

If you want to change things, you've got to understand how and why they are. There's plenty of information out there. Get informed; talk with friends, family, coworkers, suppliers and subcontractors; and make plans to get involved if that is your desire. If not, take responsibility for your little world. Interrupt racist talk and behavior. Understand and utilize your white privilege to override racist systems.

Time for change

Racism and other forms of prejudice are characterized by tunnel vision — narrow thinking and fear. Our nation has a history of both welcoming and reviling immigrants, as we struggle with that is-

sue too. Unrest has lingered and erupted, and we're pitted against one another.

That old ruling-class ploy counts on the fight to stay off the bottom rung of the socioeconomic ladder, but the "pulling yourself up by the bootstraps" ideal and the Horatio Alger "rags to riches" myth have lost favor. Many hard-working citizens still can't get ahead, as opportunities are lacking. Black people in particular have suffered under this oppressive narrative far too long.

Change is long overdue, and it begins with you and me.

Stuart Zitin owns Building for Life, LLC, as a North Carolina Licensed General Contractor since 1995. He has built new

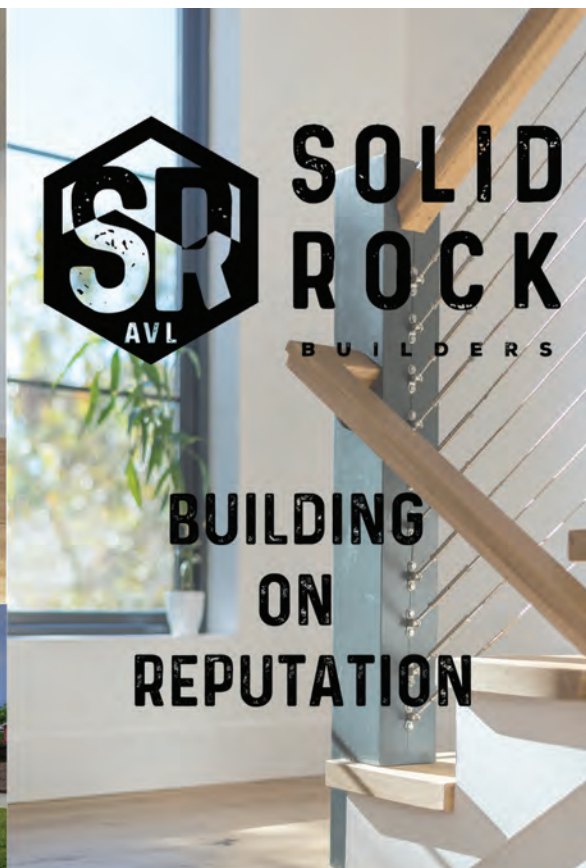
homes and completed additions, remodels, and renovations, as well as

commercial trim projects for

more than 45 years. He is currently developing four acres in Asheville with 18 homes —

some affordable, some workforce housing — planned to be certified through Green Built Homes and ENERGY STAR®.

Connect with Stuart at buildingforlifeasheville.com.



Hot Water Recirculating Loops

A Tricky Green Feature To Get Right

BY AMY MUSSER
AND MATTHEW VANDE

Hot water recirculating loops are having a moment.

They're popular with plumbers because they reduce callbacks from homeowners who don't want to run their taps and wait for hot water.

Recirculating loops are a water-saving feature, especially if coupled with low-flow plumbing fixtures on showerheads, toilets and faucets. But if not properly done, they can waste a lot of energy.

What are the ways a house can be plumbed for hot-water distribution?

■ A typical "trunk and branch" hot water system has piping that comes from the water heater in a "tree" configuration, with a main trunk and smaller branches that go to each fixture. When you turn on the hot water tap, you have to wait for the cool water to flush out of the piping before you get hot water. These can be made more efficient by locating the water heater close to the fixtures so that the piping isn't very long — this arrangement is often referred to as a "compact" plumbing system.

■ "Manifold" systems have a "home run" of pipe to each hot water fixture. These home runs can be smaller and more direct, so it doesn't take as long to flush the cool water out of the pipe.

■ A recirculating system is piped differently, using a loop that travels throughout the house and gets close to all of the fixtures that use hot water. There are very short branch pipes that connect each fixture to the loop. A pump is used to circulate hot water through the loop, so it arrives at each fixture very quickly.

Do I need a recirculating loop in my house?

If the house is smaller and the water heater can be centrally located, you don't. Sometimes in a bigger house, you can have two water heaters, both of which are relatively close to their fixtures. We also encourage clients to think



about whether they need fast hot water at every fixture. They may be happy with a water heater that's located close to the master bathroom, but be willing to wait at an infrequently used guest bathroom or a laundry room. Using a manifold system is another option for stretching out the distance from the water heater without a long wait.

When you understand how recirculating systems work, it's pretty obvious what can go wrong from an energy standpoint. First, an inefficient pump that runs all the time can use a lot of energy. Second, the pipe loop filled with hot water can transfer a lot of heat to the house, especially if it's not insulated. You're essentially heating your house with your hot water — which is inefficient in the winter and fights with your air conditioning in the summer. Insulating the pipes helps, but some heating still occurs because pipe insulation

isn't very thick. These effects can add up to a potentially big energy penalty.

If we look at all of the above strategies and feel that the plumbing fixtures in a home are just too far apart and can't reasonably be served by compact or manifold plumbing systems, it's worth considering recirculation. But you have to commit to doing it right, which isn't going to be free.

How do you do a recirculating loop correctly?

1. Insulate all of the loop piping. This is actually a code requirement in North Carolina. Unfortunately, a lot of plumbers aren't aware of it because it's in the energy code, not the plumbing code. It's especially important to insulate the last few feet of pipe right at the water heater, which are often installed later and missed. Making sure to fully insulate bends and tees matters. Insulating

the branches also helps.

2. Don't install a crazy amount of loop piping. If you can do less loop, you get less heating that you don't want. Lay out your loop to get close to those important rooms (master bath, kitchen, etc.) and maybe you don't need to get so close to infrequently used rooms.

3. Use a control so that the pump doesn't have to run all the time. This saves energy from the pump itself and also lets the loop cool down some to reduce the house heating effect. The best controls are either occupancy sensors or buttons that the homeowner can press when they walk into a bathroom to activate the pump when someone is likely to use hot water. A less efficient (but easier and less expensive) option is to use temperature-based control. These controllers activate the pump only when the loop cools down.

4. Don't only rely on timers.

Timers seem like a good idea, but they're not a stand-alone solution and you get no credit in the Home Energy Rating System (HERS) for a timer. I think timers can be helpful when installed with temperature-based control. They can be used, for instance to turn the system off entirely overnight when hot water is unlikely to be needed. However, they're not very effective during the day. People use hot water at fairly random times, and they tend to turn timers off when they aren't getting hot water. If you have a loop that's not on it will take much longer to get hot water at the fixture than it would with a non-loop system, so occupants likely won't be satisfied if they want hot water when the timer is off.

5. Don't allow your plumber to install a "future loop."

The idea behind the "future loop" is that they're going to install the piping in a loop and only add a pump if you complain about how long it takes to get hot water. There are several problems with this:

- You're going to complain. It takes longer to get hot water if the plumbing is installed in a loop.
- It's almost always impossible to get access to insulate all the loop

pipings later. We don't install anything else in homes for the future that we know wouldn't meet today's building code. If you have a loop, it needs to be insulated.

■ If you don't connect the return portion of the loop, you've created a "dead leg" in your hot-water system. A dead leg is a length of piping that is connected to your active hot-water piping but doesn't go anywhere. Water collects there at room temperature or slightly above. Bacteria (including the kind that causes Legionnaires' disease) loves this range of temperatures and is not very easy to trace as the cause of someone getting sick.

So absolutely, we want you to practice water conservation. We're also totally cool with the idea that you might also get fast hot water.

Just don't do it at the expense of energy conservation. You can have both!

Amy Musser and Matthew Vande are the owners of VandeMusser Design, PLLC. They provide HERS services, green-design consultation, and home-energy audits to homeowners in Western North Carolina. Amy is a licensed mechanical engineer and Matt is a licensed architect.



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Living Stone Design+Build crafts award-winning custom homes that exceed clients' expectations. For over 20 years, our proven process and strategic partnerships with architects, designers and realtors has delivered dream-worthy homes at the best value to hundreds of families and couples seeking a happier, healthier life in the mountains. Living Stone Design+Build crafts award-winning custom homes that exceed clients' expectations. For over 20 years, our proven process and strategic partnerships with architects, designers and realtors has delivered dream-worthy homes at the best value to hundreds of families and couples seeking a happier, healthier life in the mountains.

LMT Homes
Lauren Tamayo
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lauren@lthomes.com
lthomes.com
LMT Homes is a modern builder taking a unique approach. Our form and design follow the functionality in a home.

Longview Builders, Inc.
Kevin Hackett
Asheville • 828.423.8902
kevin@longviewbuildersinc.com
longviewbuildersinc.com
We focus on a team approach with owner, designer and builder to deliver award-winning green homes on time and budget.

M.C. Kern Contracting, Inc.
Matt Kern
Asheville • 828.231.1252
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McHugh Designs
Bobby McHugh
Asheville • 828.712.8451
rebhaloo@bellsouth.net
mchugh-designs.com
We strive to make art that you live in. Custom woodwork, in-house design, and attention to detail sets us apart.



Meinch Construction inc
Jesse Meinch
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meinchconstruction.com

Milestone Contracting
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Milo General Contractor, LLC
Andy Stowe
Asheville • 828.702.2735
andy@milogeneralcontractor.com
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MOUNTAIN SUN
BUILDING & DESIGN

Mountain Sun Building & Design
Emily Boyd
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As both a land developer and a design/build firm, we can help clients at any stage of the new home building process. We focus on site-specific design and Zero Energy Homes, creating finely crafted, light-filled interiors that capture the beauty of and connect to their natural surroundings. A small design/build firm focused on site-specific design and zero energy homes, we can work with clients from finding the perfect lot through move in and landscaping. Our passion is creating finely crafted, light filled homes that connect interior spaces with their natural surroundings.

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Nicholson and Sun LLC
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nicholsonandsun@gmail.com
nicholsonandsun.com
Using a foundation of science, aptness for innovation, and passion for arresting climate change, we build unique true green homes.**

Old North State Building Company
James Dose
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office@onsbc.net
oldnorthstatebuildingcompany.com

Osada Construction
Matt Osada
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Pioneer Construction and Development Inc.
Duane Liming
Asheville • 828.242.5101
duane@pioneerashville.com
pioneerashville.com
With over thirty years of experience, Pioneer consistently blends innovative ideas with time honored quality. We work until your project or new home is true to your vision. To learn more call us at 828.768.8771.

Preish Construction, Inc.
Mallory Fuller
Asheville • 828.776.4444
homes@preish.com
preish.com



Rare Earth Builders, Inc.
Mark Bondurant
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rareearthbldrs@bellsouth.net
RareEarthBuilders.com
We build high-performing, exceptionally beautiful custom homes while minimizing negative environmental impacts with attention to construction details and client comfort.

THE SMART\$AVER PROGRAM through Duke Energy provides prescriptive and custom rebates for energy-efficient equipment upgrades. Learn more at bluehorizonsproject.com.



RCJ Building Inc.
Robert Jacobelly
Asheville • 828.216.4433
rcjbuilding@yahoo.com
rcjbuilding.net

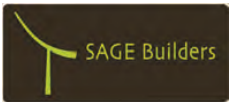
RCJ Building Inc.'s custom homebuilding professionals have the knowledge and expertise that you'll need when you have the opportunity to build the house you've always wanted. We understand what goes into the building process, and more importantly, what goes through the minds of future homeowners during the build.

Robert Roepnack
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jcrdesigns.net

RS Motley Construction
Rob Motley
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rsmotleyconstruction@gmail.com
robmotleybuilder.com

We distinguish ourselves through communication, honesty, transparency, attention to detail, and building each home as if it were our own.

Ruckle Construction & Realty Inc.
Skip Ruckle
Leicester • 828.776.3532
skipruckle@gmail.com



Sage Builders
Doug Keefe
Asheville • 828.713.7208
info@thesagebuilders.com
thesagebuilders.com

SAGE uses Sustainable, Appropriate, Green and Efficient building techniques to create beautifully hand-crafted homes with passive and active solar amenities.

Scroggs Construction Services LLC
Nicholas Scroggs
Swannanoa • 828.552.3222
Nick@scroggsconstruction.com
ScroggsConstruction.com



Sineath Construction Company
Allyson Sineath
Weaverville • 828.645.8518
asineath@sineathconstruction.com
sineathconstruction.com
We're committed to offering you a place constructed with care, using quality, sustainable materials with enduring value and timeless appeal.



Solid Rock Builders LLC
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solidrockbuilders.com

We focus on providing our customers with a wonderful building experience, and a beautiful efficient custom home.



Steel Root Builders
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steelrootbuilders.com

We specialize in modern luxury homes, complete renovations and commercial upfits.

Stewart Builders Inc.
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Sulaski & Company
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We are a builder and developer of well-planned homes and communities.



Sundog Homes
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sundoghomes.com
Sundog Homes is a division of Sundog Development Company LLC, an unlimited general contractor with projects in NC and SC



Sure Foot Builders Inc.
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surefootbuilders.com

We are a green home building company working in the greater Asheville area. It is our passion to build beautiful and creative homes that add value and comfort to the lives of our owners and community. In each home we strive to articulate modern green building practices.

The Brigman Group
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The William Baxter Co.
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THINK BUILD + design
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Asheville • 828.209.8855
think.build.design@gmail.com
thinkbulldesign.com
Eco-friendly design-build and remodeling firm focused on providing superior quality and workmanship for aesthetically pleasing construction of modern homes.



Timberframe Horizons, LLC
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Fairview • 828.222.2555
tom@timberframehorizons.com
TimberFrameHorizons.com
We are a design build firm that specializes in creating energy-efficient custom artisan homes utilizing timber frame construction.



Timberline Custom Homes, LLC
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Town Mountain Builders LLC
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Tyner Construction
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Wheelhouse
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WSM Craft
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Cleaning

Clean Environments
Nina Young
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Commercial Builders



Buchanan Construction, LLC
Rick Buchanan
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rick@buchananconstruction.com
buchananconstruction.com

A green home is healthier to live in and healthier for our planet. It is our mission to build green homes that bring together the features of an environmentally-friendly structure, while maintaining the function and design of a custom built, up-scale home - our unique hybrid of green and luxury.

Deltec Building Company
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Consultants

Builder's Pro
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yourbuilderspro.com
CoConstruct Customization & Local On-site Services including 360° Photos

Crawlspace Sealing



Conservation Pros
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conservationpros.com
Energy-efficiency retrofitting firm specializing in insulation, air sealing, crawlspace encapsulation and duct sealing. Serving WNC since 2007.



The Insulators
Kent Walker
Boone • 828.773.1103
kentw@theinsulators.co
theinsulators.co
Specializing in thermal and acoustic sprayfoam and batt insulation and crawl-space encapsulation.

Developers & Communities

Asheville Housing Authority
David Nash
Asheville • 828.258.1222
dnash@haca.org
haca.org

Building for Life, L.L.C.
Stuart Zitin
Asheville • 828.230.1424
stuartzitin@gmail.com
buildingforlifeasheville.com
We have completed many renovations, additions, and a few new homes in Asheville since 1996. Now we are beginning developing 4 south-facing acres in Oakley, a mile from Biltmore Village. All homes are Energy Star/Green Built Certified—some with breathtaking mountain views and some affordable, including a Cottage Development.

East West Capital
Brian Nelson
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bnelson@eastwestcapitalgroup.com
eastwestcapitalgroup.com
East West Capital is a private-equity investment firm with a focus on acquiring, repositioning and managing value-add projects. We focus on driving successful residential and commercial projects in urban areas and in the path of development. Sources of capital include the principals and funding from Asia and the U.S.



Green Earth Developments
James Boren
Asheville • 386.690.0886
JamesBoren@yahoo.com
loveyournewgreenhome.com
Our business involves developing responsible homes on a site where the trees are considered very important assets to this planet. Love your new green home!

Habitat Re-imagined
Ron Czecholinski
Asheville • 828.407.9989
ron.czecholinski@gmail.com
habitatreimagined.com

LAND OF SKY WASTE REDUCTION PARTNERS helps organizations improve environmental and energy management through efficiency techniques that save money. The WRP team conducts free on-site assessments and provides consulting services to businesses and public facilities throughout North Carolina. Learn more at bluehorizonsproject.com.



Hickory Nut Forest Eco Community

Jane Lawson
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laughingwaterscontact@gmail.com
hickorynutforest.com

Hickory Nut Forest Eco-Community in Gerton 17 miles from Asheville, sits on over 100 acres with waterfalls, wildflowers, and mountain vistas. 20 home sites with green, solar homes surrounded by forever-wild land, organic orchard/gardens, hiking trails, and Laughing Waters Retreat Center, which utilizes hydropower generated from Hickory Nut Creek.

Homeward Bound of Western North Carolina

Santiago Cely
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homewardboundwnc.org



JAG & Assoc.
Construction, Inc.
Jody Guokas
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JAGGREEN.com

JAG Construction is a small company specializing in in-town urban spec construction. Our goal is to make healthy, creative, long-lasting homes more available to the general public. We're examining new ways to reduce the impact of construction on the environment around us and preparing for a future of alternative energy.

Mountain Meadows on Crooked Creek

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ashevillmountainmeadows.com



Mountain Sun Building & Design
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As both a land developer and a design/build firm, we can help clients at any stage of the new home building process. We focus on site-specific design and Zero Energy Homes, creating finely crafted, light-filled interiors that capture the beauty of and connect to their natural surroundings. A small design/build firm focused on site-specific design and zero energy homes, we can work with clients from finding the perfect lot through move in and landscaping. Our passion is creating finely crafted, light filled homes that connect interior spaces with their natural surroundings.



Olivette Riverside Community and Farm

Allison Smith
Alexander • 828.407.0040
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olivettenc.com

Olivette is a 346-acre planned community and historic farm on the French Broad River, just 6.7 miles from downtown Asheville.

Roberts Mountain

Adrienne Buck
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therainyage@yahoo.com
bestbuiltcustoms.com



Sure Foot Builders Inc.
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We are a green home building company working in the greater Asheville area. It is our passion to build beautiful and creative homes that add value and comfort to the lives of our owners and community. In each home we strive to articulate modern green building practices.

Education



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Asheville Home Builders Association
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Green Opportunities

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greenopportunities.org
Green Opportunities (GO)'s mission is to train, support, and connect people from marginalized communities to sustainable employment pathways. In addition to technical training in construction and culinary arts, GO's holistic programs include wrap-around support services, high school equivalency classes, life skills training, counseling, and job placement assistance.

Lenoir-Rhyne University Asheville

Michael Dempsey
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Pursue a master's degree in Sustainability Studies or MBA in Social Entrepreneurship, with tuition discounts for Green Built Alliance members.

MTN STEM Solutions

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NC Sustainable Energy Association

Raleigh • 919.832.7601
info@energync.org
energync.org
The leading nonprofit dedicated to creating clean energy jobs, economic opportunities and affordable energy to benefit all of North Carolina.

North Carolina Building Performance Association

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Organic Growers School

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Energy Efficiency & Automation



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Energy-efficiency retrofitting firm specializing in insulation, air sealing, crawlspace encapsulation and duct sealing. Serving WNC since 2007.



Vandemusser Design
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vandemusser.com
We provide technical consulting and certification services for green residential construction to builders, architects, developers, and homeowners in Western North Carolina and beyond. Our company is run by an architect and engineer with extensive experience in the industry. We are here to assist with all technical aspects of green building.

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ECS Southeast, LLP
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ECS is the premier local provider of geotechnical engineering and environmental consulting services. We specialize in steep slope properties, retaining walls, landslides, specialty foundations, contamination assessments, and asbestos/lead/mold testing.

Geothermal Design Center

Geothermal Design Center Inc.
Rick Clemenzi, PE, CGD
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We work with all kinds of geothermal systems - residential, commercial, wells, slinky, pond, hybrid, isolated, and distributed. We specialize in low-impact geothermal installation

IONCON
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Sustainability-in-Engineering: Commercial and Residential structural engineering, occupancy/code analysis, specialty sustainability services for renewable energy, mechanical and shipping containers.

Medlock & Associates Engineering, PA
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Medlock & Associates is a full-service structural engineering firm with 20+ years of success providing practical yet innovative design solutions.

Paul E. Fulton, P.E.
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We provide technical consulting and certification services for green residential construction to builders, architects, developers, and homeowners in Western North Carolina and beyond. Our company is run by an architect and engineer with extensive experience in the industry. We are here to assist with all technical aspects of green building.

Finishes - Exterior

Carolina Colortones Inc.
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Finishes - Interior

Asheville Kitchens & Baths
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ashevillkitchensandbaths.com



HomeSource Design Center

HomeSource Design Center
Kayeigh Sedlack
Asheville • 828.712.6860
kayeigh@the-homesource.com
the-homesource.com
One convenient location providing home improvement, new construction and remodeling products; kitchen and bath design; and all your construction needs. Specializing in cabinets, countertops, hardwood flooring, tile, closet systems, stone, cabinet and bath hardware, and window treatments. Visit our showroom to view samples, make selections or speak with a designer.



RockStar Marble & Granite
George Douglas
Fletcher • 828.505.2137
george@rockstarmarble.com
rockstarmarble.com
RockStar Marble and Granite is a leading countertop supplier of hand-finished natural stone, quartz and recycled products. Opened in 2006, we have built our customer base by providing top quality products at a fair price and a reasonable time frame.

Square Peg Construction Inc.
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Flooring

EnnisArt Decorative Concrete
Daniel de Wit
Weaverville - 423.306.1705
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HOMESOURCE
Design Center

HomeSource Design Center
Kayeigh Sedlack
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kayeigh@the-homesource.com
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Catherine Silver
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The Arch is your source for sustainable high-quality flooring, Vermont Natural Coatings wood finishes, and American Clay Earth Plaster. The Arch offers sales and application services for American Clay. We are a full service dealer for Fornò Bravo wood fired residential and commercial pizza ovens offering sales, installations, consultation. Visit our showroom today.



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Jon Gleman
Zirconia - 828.697.0357
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wholelogreclaimed.com
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The EnergyWise Home program through Duke Energy is the greatest opportunity for our community to avoid the need to build a new power plant. A free contractor-installed device on your home's heat pump or electric water heater will reduce consumption during times of high demand. Other than the annual discount applied to your bill, most program participants never notice a difference. Learn more at bluehorizonsproject.com.

Furnishings



Atelier Maison & Co.
Sean Sullivan
Asheville - 828.277.7202
sean@ateliermaisonco.com
ateliermaisonco.com
Atelier Maison & Co. is dedicated to providing design-forward, unparalleled home furnishings. We are committed to educating our community on the importance of sustainable, well-crafted, environmentally friendly and healthy furnishings that contribute to good indoor air quality.

Rest Right Mattress
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Home Energy Raters



Eco-Sense
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Certifying single family and multi-family projects for Green Built Homes, Energy Star for Homes and Duke/Progress rebates.

Residential Energy
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We provide technical consulting and certification services for green residential construction to builders, architects, developers, and homeowners in Western North Carolina and beyond. Our company is run by an architect and engineer with extensive experience in the industry. We are here to assist with all technical aspects of green building.

Home Inspectors

Asheville Inspections LLC
Andrew Erskine
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ajerski@gmail.com
ashevilleinspections.com
Here at Asheville Inspections we stay current with new building technology and education to give you the best service.

HVAC



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George Willis
Asheville - 828.299.1809
george@aircraftsmanheating.com
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Healy HVAC
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Mitsubishi Electric
Trane HVAC
Myles Britton
Suwanee - 804.762.1428
mbritton@hvac.me.com
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With our technology, you can meet the needs of environmentally conscious homeowners by delivering unbeatable personalized comfort and improved indoor air quality with superior operational efficiency. Our smart systems offer a multi-zone outdoor unit that connects to multiple indoor air handlers that are spread throughout the home, creating comfort zones.

Indoor Air Quality & Health



Atelier Maison & Co.
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Atelier Maison & Co. is dedicated to providing design-forward, unparalleled home furnishings. We are committed to educating our community on the importance of sustainable, well-crafted, environmentally friendly and healthy furnishings that contribute to good indoor air quality.



A Healthier Home, LLC
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Immune system challenges, overall body health and wellness can be connected to your home environment. Board certified indoor environmental consultant, home health investigator.



Blue Ridge Radon Solutions
Dudley Wilson
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blueridgeradonsolutions.com
Blue Ridge Radon Solutions provides radon testing and mitigation, including passive radon systems and consultation during construction. Serving all of Western North Carolina.



Green R, Inc.
Ron Pariseau
Mars Hill - 828.680.9615
Ron@GreenRinc.com
Ventilation is key to the Indoor Air Quality of your energy efficient home. Give us a call and we can help you select the right equipment from bathroom fans to whole house fresh air exchange equipment.



Living Stone Design+Build
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Living Stone Design+Build crafts award-winning custom homes that exceed clients' expectations. For over 20 years, our proven process and strategic partnerships with architects, designers and realtors has delivered dream-worthy homes at the best value to hundreds of families and couples seeking a happier, healthier life in the mountains. Living Stone Design+Build crafts award-winning custom homes that exceed clients' expectations. For over 20 years, our proven process and strategic partnerships with architects, designers and realtors has delivered dream-worthy homes at the best value to hundreds of families and couples seeking a happier, healthier life in the mountains.

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Conservation Pros
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Energy-efficiency retrofitting firm specializing in insulation, air sealing, crawlspace encapsulation and duct sealing. Serving WNC since 2007.

EnergySmith Home Performance
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We can audit, survey, diagnose and improve your home by installing products to ensure the home resists the elements properly.



Pisgah Insulation & Fireplaces of N.C.
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The Insulators
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kentw@theinsulators.co
theinsulators.co
Specializing in thermal and acoustic sprayfoam and batt insulation and crawl-space encapsulation.

Insurance



Hummingbird Insurance
Geoffrey Ferland
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Interior Designers

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Allard & Roberts Interior Design, Inc
Talli Roberts
Asheville • 828.271.4350
talli@allardandroberts.com
allardandroberts.com



GRIFFIN ARCHITECTS, P.A.

Griffin Architects PA
Robert Griffin
Asheville • 828.274.5979
inquiries@griffinarchitectspa.com
GriffinArchitectsPA.com

Griffin Architects provide years of experience and interpretations of specific information relative to the clients needs, the site and its orientation, and the neighborhoods relationship to the community. We offer 3-D Energy Modeling/Virtual imaging services of custom residential designs and additions, commercial developments, environmental design, community planning, and historic preservation.

ID.ology Interiors & Design
Laura Sullivan
Asheville • 828.252.4403
Laura@idologyasheville.com
idologyasheville.com

Interior Finishers



RockStar Marble & Granite
George Douglas
Fletcher • 828.505.2137
george@rockstarmarble.com
rockstarmarble.com

RockStar Marble and Granite is a leading countertop supplier of hand-finished natural stone, quartz and recycled products. Opened in 2006, we have built our customer base by providing top quality products at a fair price and a reasonable time frame.

Westside Painting Inc.
Simon Eaton
Asheville • 828.450.0998
westsidepainters@gmail.com
westsidepainting.com

Land Planning



Equinox
David Tuch
Asheville • 828.253.6856
David@equinoxenvironmental.com
equinoxenvironmental.com
Providing specialized design services inspired by nature for site design, planting design, drainage and stormwater to create beautiful and functional spaces.



Fusco Land Planning & Design, PLLC
Matthew Fusco
Asheville • 828.243.6604
matt@fuscola.com
FuscoLA.com



Otter & Arrow Land Planning
Kevin Tate
Roswell • 828.551.1414
kevin@otterandarrow.com
otterandarrow.com



W & V Land Management and Resource Recovery LLC
Carrie Vogler
Weaverly • 828.777.6637
carrie@voglerllc.com
voglerllc.com

Planning and execution of sustainable property improvements including forestry, mulching, driveway building and repair, boulder walls and dry-stacked masonry tree service, consulting and mapping.

Landscape Architects

BareRoot Designs, PLLC
Jennifer Verprauskus
Candler • 980.500.9931
barerootdesignsAVL@gmail.com
barerootdesigns.com



Equinox
David Tuch
Asheville • 828.253.6856
david@equinoxenvironmental.com
equinoxenvironmental.com

Providing specialized design services inspired by nature for site design, planting design, drainage and stormwater to create beautiful and functional spaces.



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Nicholas Anthony Tropeano, PLLC
Nicholas Tropeano
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nick@tropeanolanddesigns.com
tropeanolanddesigns.com



Osgood Landscape Architects
Joel Osgood
Asheville • 828.337.7496
jo@osgoodla.com
osgoodla.com



Otter & Arrow Land Planning
Kevin Tate
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otterandarrow.com

Landscapers

Ambrose Landscapes
Steve Ambrose
Asheville • 828.768.1861
dave@reliablecorn.com
landscapingasheville.com

Appalachian Creek Garden Nursery and Landscape
Jeff Seitz
Swannanoa • 828.296.7396
appcrk@yahoo.com
appalachiancreek.com



Asheville Drainage + Rain Harvesting
Benjamin Portwood
Asheville • 828.222.3720
info@ashevilledrainage.com
ashevilledrainage.com
Landscaping with water in mind, resolving drainage issues, capturing rain water, design and installation of both residential and commercial projects.

Gardenology, LLC
Adam Garry
Asheville • 828.337.4060
adgarry@hotmail.com
gardenology-asheville.com



Otter & Arrow Land Planning
Kevin Tate
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kevin@otterandarrow.com
otterandarrow.com

YummyYards
Laura Ruby
Weaverly • 828.785.8624
laura@yummyyards.com
yummyyards.com

Landscaping Supply



Southeastern Native Plant Nursery

Brad Martin
Candler • 828.670.8330
brad@southeasternnatives.com
southeasternnatives.com
We are a wholesale nursery providing native trees and shrubs to landscapers, garden centers, state and federal agencies in WNC.

Lenders

Union Home Mortgage
Sarah Leone
Asheville • 828.229.1521
sleone@unionhomemortgage.com
unionhomemortgage.com/branches/asheville

Mold & Moisture



A Healthier Home, LLC
Rick Bayless
Asheville • 828.243.5192
rickbayless@ahealthierhomenc.com
ahealthierhomenc.com
Solve, prevent environmental issues: mold, dust, odor, moisture, pollutants, HVAC, air flow, illness. Certify healthy conditions in your home.

Mueller Environmental & Sustainability Solutions, Inc.
John Mueller
Candler • 828.667.8578
johnmueller.pe@gmail.com
muellerhomeenvironment.com

Precision Restoration Services
Aaron Carey
Weaverly • 828.645.4546
precisionrestoration@frontier.com
prs2restore.com

Pest Control

Economy Services
Wilson Jones
Asheville • 828.254.0691
jones.wilsond@gmail.com
economy-services.com
ESI uses reduced risk pest control products in our exterminating services to protect your home, family, pets, and the environment.

Plumbers



Blue Planet Plumbing LLC
Georg Efrid
Asheville • 828.423.6289
katti@blueplanetplumbing.com
blueplanetplumbing.com
Blue Planet specializes in premium water filtration (so you can stop paying for bottled water), main line replacements, energy efficient water heater options (hybrid & tankless), well work, inspections, etc. Offering Industry leading warranties!

Goodman Plumbing
Jacob Goodman
Asheville • 828.774.7076
info@goodmanforthejob.com
goodmanforthejob.com

Plumbing Supply

ProSource Supply
Will Thomason
Asheville • 828.575.1177
wthomason@prosourcesupply.com
prosourcesupply.com

Realtors



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nestrealty.com/asheville/agents/a/manda_boren.html

Amy Smith at Modern Mountain Real Estate
Amy Smith
Asheville • 828.333.3235
amy@asmithrealtor.com
asmithrealtor.com



Beth Zabriskie at Nest Realty
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nestrealty.com/asheville/agents/bethzabriskie_katsmith.html



Bobbi Holland at Nest Realty
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nestrealty.com/asheville/agents/Bobbi_Holland.html

Cape and Green Team
at Nest Realty
 Robin Cape
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 capeandgreen@nestrealty.com
 capeandgreen.com

EXIT Realty Vistas
Commercial & Residential
 Kimmy Hunter
 Weaverville • 828.484.1758
 kimmy@reivnc.com
 reivnc.com



Jackie Rocks Green at Dawn
Wilson Realty
 Jackie Tatelman
 Black Mountain • 828.713.5193
 jackie@dawnwilsonrealty.com
 dawnwilsonrealty.com

A eco-certified realtor who is customer-focused and knows how to navigate the complexities of real-estate transactions, Jackie lives in a gold-certified green home that has solar PV and thermal. She has built two green homes. Jackie works with buyers and sellers in the Asheville area including Black Mountain and Marshall.

Keller Williams
Professionals Realty
 John Senechal
 Asheville • 828.230.4021
 johnsenechal.kw@gmail.com
 johnsenechal.kwrealty.com



Love The Green Team
 Mary Love
 Alexander • 828.279.6723
 mary@lovethegreen.org
 lovethegreen.org

Love The Green Team is a women/veteran-owned full-service real estate company. Our mission is to create a sustainable world, one home at a time. We provide services to buyers and sellers, and property management services. We are your matchmaker for the home that you love which fits your budget.



MOSAIC Community
Lifestyle Realty
 Mike Figura
 Asheville • 828.707.9556
 Mike@mymosaicrealty.com
 mymosaicrealty.com

We specialize in green real estate and in-town properties. Our approach is to advance the interests of our clients by being attentive to their needs and to negotiate aggressively on their behalf. Real estate is our job and passion. Call or email for a free consultation over coffee or tea.



National Land Realty
 Pat Snyder
 Fairview • 828.772.5899
 psnyder@nationalland.com
 nationalland.com

National Land Realty supports clients looking to buy or sell large land tracts (10+ acres) for homestead, conservation, investment, recreation, agricultural, family estate, and residential purposes. Our team leverages best-in-class technology and partners with local experts who focus on sustainable forestry and ecological design to protect our natural resources.



New Earth AVL Realty at Keller Williams
 Jason Martini
 Asheville • 828.515.1771
 jmartini@kw.com
 newearthavl.com

Visionary full-service real estate company! We are committed to turning dreams into reality, with a high level of gratitude, integrity and service. Community-focused and Earth-honoring practices. Partnering with Whole Tree Permaculture to gift fruit and nut trees to clients and friends!

Recycling



Asheville Area Habitat for Humanity ReStore
 Asheville • 828.254.6706
 restore@ashevillehabitat.org
 ashevillehabitat.org

The Asheville Habitat ReStore sells donated items to the general public with proceeds supporting Habitat's building programs. Find building supplies, appliances, furniture and much more. The removal of usable materials from structures is available throughout their Deconstruction service.

Junk Recyclers Inc
 Phillip Stoltz
 Asheville • 828.707.2407
 junkrecyclers1@gmail.com
 junkrecyclers.net

Waste Pro
 Teri Reedy
 Arden • 828.684.7790
 treedy@wasteprousa.com
 wasteprousa.com

Renewable Energy



Asheville Solar Company
 Nate Pembleton
 Candler • 828.808.4153
 nate@ashevillesolarcompany.com
 ashevillesolarcompany.com
 Asheville Solar Company is a small, family-run business that places honesty and customer benefit before profit.



Geothermal Design Center Inc.
 Rick Clemenzi, PE, CGD
 Asheville • 828.712.6786
 rclemenzi@geothermaldesigncenter.com
 geothermaldesigncenter.com



MB HAYNES Corporation
 Rachel Paulman
 Asheville • 828.254.6141
 rpaulman@mbhaynes.com
 mbhaynes.com

Save energy and slash power bills with solar energy systems. Free analysis and financing, and help with tax incentives.

Palmetto AVL
 Patrick Harper
 Asheville • 828.233.5565
 patrick@palmettoavl.com
 palmettoavl.com



Pisgah Energy
 Evan Becka
 Asheville • 828.206.4780
 evan.becka@pisgahenergy.com
 pisgahenergy.com

Providing comprehensive solar and energy storage design and development services for commercial, municipal and institutional clients across the Southeast.



Solar Crowdsourcing
 Don Moreland
 Decatur • 770.548.2714
 don@solarcrowdsourcing.com
 solarcrowdsourcing.com



Solar Dynamics Inc.
 Ole Sorenson
 Asheville • 828.665.8507
 ole@soldynamicsnc.com
 soldynamicsnc.com

Solfarm Solar Co.
 Lizzie Matuszewska
 Asheville • 828.332.3003
 office@solfarm.com
 solfarm.com



Sugar Hollow Solar, Inc.
 Phelps Clarke
 Fairview • 828.776.9161
 info@sugarhollowsolar.com
 sugarhollowsolar.com

We are a locally owned, full-service renewable energy company focused on great design, installation and service of solar arrays, electric vehicle (EV) charging stations, energy efficiency, battery backup and radiant heating systems. Our team has over 75 years of combined experience helping homeowners, business and government go solar.



Sundance Power Systems, Inc.
 Dave Hollister
 Weaverville • 828.645.2080
 info@sundancepower.com
 sundancepower.com

Committed to empowering homeowners, businesses, and organizations with solar ownership and supporting a clean-energy future through our Community Benefits Program. Sundance Power Systems has been setting the standard for renewable energy in the region since 1995. We are committed to empowering homeowners, businesses, and organizations with solar ownership and supporting a clean energy future through our Community Benefits Program. Our technical expertise includes off-grid and battery back-up energy solutions.

Renovators & Remodelers



A & B Construction and Development, Inc.
 Jeremy Bonner
 Asheville • 828.258.2000
 jeremybonner@a-b-construction.com
 a-b-construction.com



Best Built Inc.
 Adrienne Buck
 Clyde • 828.280.0415
 bestbuiltinc@outlook.com
 bestbuiltcustoms.com
 Veteran Green Built contractor located in Haywood County. Design-built custom homes tailored to fit your lot or one of ours. Lots or Home/Land packages available.



Continuous Improvement Construction LLC
 Duane Honeycutt
 Black Mountain • 828.551.7573
 cicllc.duane@gmail.com
 cic-llc.squarespace.com



Corner Rock Building Co.
 Zachariah Banks
 Weaverville • 828.348.1004
 zach@cornerrockbuilding.com
 cornerrockbuilding.com



Evergreen Construct Inc.
 Darren Henegar
 Leicester • 828.779.4077
 evergreenconstructinc@gmail.com
 evergreenconstruct.com
 Evergreen Construct specializes in custom-built homes and renovations, using your inspiration to create mindfully crafted structures through a collaborative process.



Falcon Construction and Development
 David Ross
 Asheville • 828.274.3055
 tanya@falconbuilt.com
 falconbuilt.com
 Residential and Commercial construction services. 2012 Parade of Homes Best in Show winner. Specializing in quality green construction and design build of both new homes and remodels of existing

Forward Construction Inc.
 Jim Forward
 Asheville • 828.298.9532
 JTFBuilder@gmail.com
 The Forward family provides each client with the attention to detail, caring, and enjoyment they deserve when building and remodeling.

APPALACHIAN OFFSETS is a voluntary carbon-offset program from Green Built Alliance that offers businesses, organizations, and individuals the option to easily reduce or offset their carbon footprint. Supporters offset their emissions by paying into a community fund that helps make energy-efficiency improvements within local nonprofits, schools and low-income housing. Learn more and donate at cutmycarbon.org.



HomeSource Design Center
 Kayleigh Sedlack
 Asheville • 828.712.6860
 kayleigh@the-homesource.com
 the-homesource.com

One convenient location providing home improvement, new construction and remodeling products; kitchen and bath design, and all your construction needs. Specializing in cabinets, countertops, hardwood flooring, tile, closet systems, stone, cabinet and bath hardware, and window treatments. Visit our showroom to view samples, selections or speak with a designer.



HomeSource Real Estate & Construction, Inc.
 Tim Alexander
 Asheville • 828.252.1022
 tim@homesourcebuilders.com
 homesourcebuilders.com

Fully licensed and insured custom home builder and remodeling contractor, providing expertise and commitment in construction. Offering turnkey service, including home design, kitchen and bath design, and product selection under one roof. Current and past projects include more than 100 custom homes and hundreds of remodels from large to small.



Jade Mountain Builders & Co. Inc
 Hans Doellgast
 Fairview • 828.216.3948
 hans@jademountainbuilders.com
 jademountainbuilders.com

Jade Mountain Builders is a team of 39 craftsmen who pride themselves on taking an ecologically sensitive approach to building homes.



JAG & Assoc. Construction, Inc.
 Jody Guokas
 Asheville • 828.216.0914
 jody@jaggreen.com
 JAGGREEN.com

JAG Construction is a small company specializing in in-town urban spec construction. Our goal is to make healthy, creative, long-lasting homes more available to the general public. We're examining new ways to reduce the impact of construction on the environment around us and preparing for a future of alternative energy.

DUKE ENERGY'S HOME ENERGY HOUSE CALL program offers eligible homeowners a free home-energy assessment to help you learn how your home uses energy, including where you can improve comfort and maybe even save money. You'll also get a free Energy Efficiency Starter Kit. Learn more at bluehorizonsproject.com.



Pioneer Construction and Development Inc.
 Duane Liming
 Asheville • 828.242.5101
 duane@pioneerashville.com
 pioneerashville.com

With over thirty years of experience, Pioneer consistently blends innovative ideas with time honored quality. We work until your project or new home is true to your vision. To learn more call us at 828.768.8771.



Rare Earth Builders, Inc.
 Mark Bondurant
 Canton • 828.492.0534
 rareearthbldrs@bellsouth.net
 RareEarthBuilders.com

We build high-performing, exceptionally beautiful custom homes while minimizing negative environmental impacts with attention to construction details and client comfort.



RCJ Building Inc.
 Robert Jacobelly
 Asheville • 828.216.4433
 rcjbuilding@yahoo.com
 rcjbuilding.net

RCJ Building Inc.'s custom homebuilding professionals have the knowledge and expertise that you'll need when you have the opportunity to build the house you've always wanted. We understand what goes into the building process, and more importantly, what goes through the minds of future homeowners during the build.



River Birch Builders
 Pierce Harmon and Griff Gamble
 Asheville • 828.423.9813
 riverbirchbuilders@gmail.com
 riverbirchbuildersnc.com

We offer quality and craftsmanship in the building of green and energy-efficient homes. We offer design and build services for fully customized homes, and experience with a range of architectural styles and sizes. From start to finish, we'll work closely with you to make your dream home become a reality.



RockStar Marble & Granite
 George Douglas
 Fletcher • 828.505.2137
 george@rockstarmarble.com
 rockstarmarble.com

RockStar Marble and Granite is a leading countertop supplier of hand-finished natural stone, quartz and recycled products. Opened in 2006, we have built our customer base by providing top quality products at a fair price and a reasonable time frame.

Willow Creek Builders
 Travis and Rachel Brown
 Leicester • 828.768.7770
 rachel@willowcreekbuilders.org
 facebook.com/willowcreekbuilders
 Willow Creek Builders offers residential and light commercial services across WNC. We specialize in new construction, accessory structures, and additions.

Residential Designer

Caledonia Homes
 Russel McMillan
 Asheville • 224.213.0356
 rfmcmillan@gmail.com



HomeSource Real Estate & Construction, Inc.
 Tim Alexander
 Asheville • 828.252.1022
 tim@homesourcebuilders.com
 homesourcebuilders.com

Fully licensed and insured custom home builder and remodeling contractor, providing expertise and commitment in construction. Offering turnkey service, including home design, kitchen and bath design, and product selection under one roof. Current and past projects include more than 100 custom homes and hundreds of remodels from large to small.



MOUNTAIN SUN
 BUILDING & DESIGN

Mountain Sun Building & Design
 Emily Boyd
 Asheville • 828.713.0549
 emily@mountainsunbuilding.com
 mountainsunbuilding.com

As both a land developer and a design/build firm, we can help clients at any stage of the new home building process. We focus on site-specific design and Zero Energy Homes, creating finely crafted, light-filled interiors that capture the beauty of and connect to their natural surroundings. A small design/build firm focused on site-specific design and zero energy homes, we can work with clients from finding the perfect lot through move in and landscaping. Our passion is creating finely crafted, light filled homes that connect interior spaces with their natural surroundings.



Timberframe Horizons, LLC
 Tom Rouse
 Fairview • 828.222.2555
 Tom@TimberFrameHorizons.com
 TimberFrameHorizons.com

We are a design build firm that specializes in creating energy-efficient custom artisan homes utilizing timber frame construction.

Responsible Investing



Earth Equity Advisors
 Leesa Sluder
 Asheville • 877.235.3684
 leesa@earthequityadvisors.com
 earthequityadvisors.com

Based in Asheville, Earth Equity Advisors, four-time Best for the World Certified B Corporation, manages diversified investment portfolios for clients across the country. Our focus is sustainable, responsible and impact investing.

Reuse Retail



Asheville Area Habitat for Humanity ReStore
 Asheville • 828.254.6706
 restore@ashevillehabitat.org
 ashevillehabitat.org

The Asheville Habitat ReStore sells donated items to the general public with proceeds supporting Habitat's building programs. Find building supplies, appliances, furniture and more. The removal of usable materials from structures is available throughout their deconstruction service.

Roofers

Living Roofs, Inc.
 Emilio Ancaya
 Asheville • 828.252.4449
 emilio@livingroofsinc.com
 livingroofsinc.com
 Green roofs and living walls :: design and installation



RCJ Building Inc.
 Robert Jacobelly
 Asheville • 828.216.4433
 rcjbuilding@yahoo.com
 rcjbuilding.net

RCJ Building Inc.'s custom homebuilding professionals have the knowledge and expertise that you'll need when you have the opportunity to build the house you've always wanted. We understand what goes into the building process, and more importantly, what goes through the minds of future homeowners during the build.

"WHY SHOULD WE TOLERATE a diet of weak poisons, a home in insipid surroundings, a circle of acquaintances who are not quite our enemies, the noise of motors with just enough relief to prevent insanity? Who would want to live in a world which is just not quite fatal?"

– Rachel Carson, "Silent Spring"

Salvage



Asheville Area Habitat for Humanity ReStore
 Asheville • 828.254.6706
 restore@ashevillehabitat.org
 ashevillehabitat.org

The Asheville Habitat ReStore sells donated items to the general public with proceeds supporting Habitat's building programs. Find building supplies, appliances, furniture and more. The removal of usable materials from structures is available throughout their deconstruction service.



Whole Log Reclaimed
 Jon Cleman
 Zirconia • 828.697.0357
 jon@wholelogreclaimed.com
 wholelogreclaimed.com
 Suppliers of Rustic & Refined Reclaimed Wood Products since 1984. Character Floors, Mantels & innovative Box Beams are our specialties.

Site Work



Rare Earth Builders, Inc.
 Mark Bondurant
 Canton • 828.492.0534
 rareearthbldrs@bellsouth.net
 RareEarthBuilders.com

We build high-performing, exceptionally beautiful custom homes while minimizing negative environmental impacts with attention to construction details and client comfort.



V & V Land Management and Resource Recovery LLC
 Carrie Vogler
 Weaverville • 828.777.6637
 carrie@voglerllc.com
 voglerllc.com

Structural Materials



Jennings Builders Supply & Hardware

Ali Mangkang
Fletcher • 828.376.0200
info@jbswnc.com
jenningswnc.com
Locally owned since 1984, Jennings offers building materials and design services in Fletcher, Brevard, Cashiers and Franklin.



Timberframe Horizons, LLC

Tom Rouse
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TimberFrameHorizons.com
We are a design build firm that specializes in creating energy-efficient custom artisan homes utilizing timber frame construction.

Supporting Members

Asheville Downtown Association

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ashevilledowntown.org

Cady/Guyton Construction

Boone Guyton & Claudia Cady
Alexander • 828.683.3688
boone.guyton@gmail.com

CompostNow

Stefano Rivera
Raleigh • 516.996.0073
stefano@compostnow.org
compostnow.org
CompostNow is a doorstep collection service in Asheville and the Triangle that makes composting easy for households and businesses. They provide a weekly collection of compostables, turn it into nutrient-dense compost and gives it back to members and local community gardens.



Duke Energy

Marc Faircloth
Sumter • 803.934.2535
marc.faircloth@duke-energy.com
duke-energy.com/newhomes
The Residential New Construction Program helps homebuyers find the best, most energy-efficient and comfortable new homes on the market. Homes are verified by independent, nationally accredited Home Energy Rating System Raters to meet stringent standards. Find participating builders at duke-energy.com/mynewhomewnc. For details on our builder program, visit duke-energy.com/newhomes.

Integrative

Joy Kirk
Asheville • 828.250.0970
joy@integrative.com
integrative.com
At Integrative, you can expect the proven results of a large firm with the flexibility of a small creative enterprise. You can expect the professionalism of seasoned experts with the fresh ideas of an avid entrepreneur. You can expect the technical muscle of talented programmers who understand your needs.

Merrie-Woode

Foundation, Inc.
Jim Dunn
Sapphire • 828.743.3300
denice@merriewoodde.com
merriewoodde.com

Rockbrook Camp for Girls

Jeff Carter
Brevard • 828.884.6145
jeff@rockbrookcamp.com
rockbrookcamp.com



Suburban Propane

Darren McArdle
Asheville • 828.252.4733
dmcardle@suburbanpropane.com
suburbanpropane.com
Residential and commercial propane delivery and service. Serving our customers and local communities for over 90 years.

The Collider

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Asheville • 828.254.6283
mary@thecollider.org
thecollider.org

Surveyors



Blackrock Surveying and Land Design PC

Jamie Brady
Asheville • 828.225.4341
jbrady@blackrocksurveying.com
blackrocksurveying.com
Our services include topographic surveying, construction staking, boundary determination and relocation, subdivision designs, elevation certification and consultation on property use.



Kee Mapping & Surveying, PA

Brad Kee
Asheville • 828.575.9021
brad@keemap.com
keemap.com

Sustainable Wood Products



Architectural Woodcraft

Craig Weis
Asheville • 828.258.9977
craig@architecturalwoodcraft.com
architecturalwoodcraft.com
Locally made cabinets, doors and energy star windows. Implementing green finishes and bamboo sustainable and reclaimed woods. Restoration specialists.



Southeastern Hardwoods dba

Bee Tree Hardwoods
Phil Long
Swannanoa • 828.581.0197
phil@southeasternhardwoods.com
beetreehardwoods.com
We specialize in Locally Harvested Appalachian hardwoods, softwoods, timbers, live-edge slabs, & lumber. Our staff has years of experience and will work with you personally to select the lumber you need. We also provide custom sawing, drying, and milling for your next project!



Whole Log Reclaimed

Jon Gleman
Zirconia • 828.697.0357
jon@wholelogreclaimed.com
wholelogreclaimed.com
Suppliers of Rustic & Refined Reclaimed Wood Products since 1984. Character Floors, Mantels & innovative Box Beams are our specialties.

System-Built Homes



Deltec Homes

Leigha Dickens
Asheville • 828.253.0483
ldickens@deltechomes.com
deltechomes.com
Deltec Homes is an award-winning pre-fabricated homebuilder. Offering round, traditional and modern styles, our homes are best known for energy efficiency, flexible floor plans and durability. We also offer a line of pre-designed net-zero homes. We pride ourselves on manufacturing homes sustainably in a facility powered with 100% renewable energy.



Mountain Brook Homes Inc

JD Wallace
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mountainbrookhomesinc.com



Timberframe Horizons, LLC

Tom Rouse
Fairview • 828.222.2555
Tom@TimberFrameHorizons.com
TimberFrameHorizons.com
We are a design build firm that specializes in creating energy-efficient custom artisan homes utilizing timber frame construction.



Green Source Construction Management, Inc

Josh Scala
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greensourcebuilder@gmail.com
facebook.com/blackmountain-greenbuilder

Nanostead LLC

Jeremy Stauffer
Marshall • 828.206.2526
jsstauff@gmail.com
nanostead.com



IMAGINE a building designed and constructed to function as elegantly and efficiently as a flower: a building informed by its bioregion's characteristics, that generates all of its own energy with renewable resources, captures and treats all of its water, and that operates efficiently and for maximum beauty.

IMAGINE true sustainability in our homes, workplaces, neighborhoods, villages, towns and cities – Socially just, culturally rich and ecologically restorative.

WHAT IF ... every intervention resulted in greater biodiversity and social equity; additional outlets for beauty and personal expression; a deeper understanding of climate, culture, and place; a realignment of our food and transportation systems; increased soil health; and a more profound sense of what it means to be a citizen of a planet where resources and opportunities are provided fairly and equitably?

– International Living Future Institute's Living Building Challenge

Training

Green Opportunities

Eric Howell
Asheville • 828.398.4158
eric@greenopportunities.org
greenopportunities.org

Green Opportunities (GO)'s mission is to train, support, and connect people from marginalized communities to sustainable employment pathways. In addition to technical training in construction and culinary arts, GO's holistic programs include wrap-around support services, high school equivalency classes, life skills training, counseling, and job placement assistance.

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Asheville • 828.258.9977
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Thomas Gibson
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tom@ironwoodstudios.org
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Joe Archibald
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joe@narwhalbuit.com
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Asheville • 828.713.7208
info@thesagebuilders.com
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