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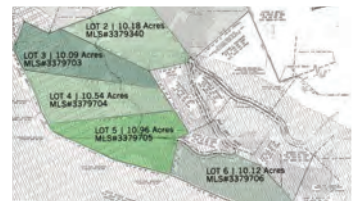


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On the cover

Built by Earthtone Builders and designed by Earthtone Design Studio, this Asheville house received Green Built Homes Net Zero Energy Certification with a grid-tied solar electric system. MARISA MULDOON PHOTO

Dedication

Our community lost two of its cherished leaders in February of 2018. This directory is dedicated to their memories. May they inspire all of us to live freely, love fiercely and honor this earth that we share.



John Myers' legacy lives on in the 270 acres of land he loved and preserved in Upper Hickory Nut Gorge including Little Bearwallow Mountain; in the Hickory Nut Forest community of green homes he created; and in the access he made possible for others to come and

enjoy the beauty that exists in that special place.

— Remembrance by Jane Lawson



Tyler Garrison was passionate about reducing waste, building sustainability and fostering community relationships. His vision created Junk Recyclers, Regeneration Station and Garage TRS. Tyler's energy and quick actions encouraged individuals, businesses and nonprofits to be

more. He embodied the green life and his spirit will encourage us all to do the same.

— Remembrance by Mary Love



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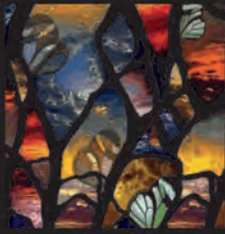
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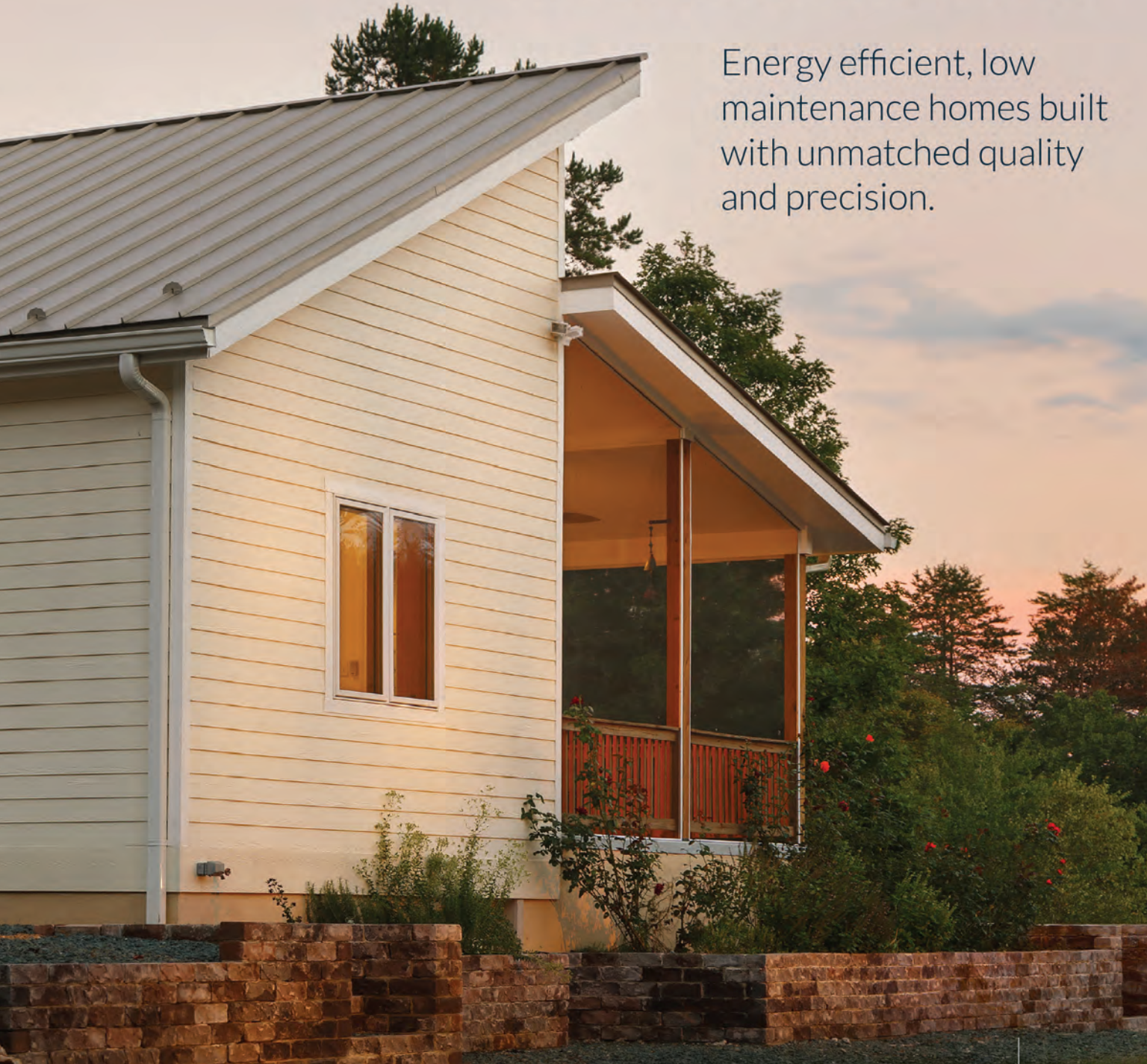
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Welcome to the directory

You hold in your hands a way to connect with sustainability professionals; chart a pathway to building, buying, selling or improving a home; and learn about the latest green building techniques and products.

The articles and case studies in this directory can provide you with technical insights, plug you into our regional clean-energy actions, and inspire you to co-create the sustainable future we are working toward.

If you have been searching for ways to save money, reduce or offset your carbon footprint, or connect with green professionals, this is the place for you. So sit back with your favorite beverage and enjoy.

About our nonprofit

Green Built Alliance is growing and thriving through the support and dedication of green builders and architects, clean-energy enthusiasts, forward-thinking elected officials, conscious citizens, and like-minded businesses. Without you, our nonprofit wouldn't be



GREENBUILT
ALLIANCE

here doing our daily work to improve this community, the energy sector, human health, and the environment through our projects and programs.

Over the past year, our organization has grown in size and scope, as we play an expanded role in promoting and implementing clean-energy projects and programs. We are charged with implementing the Blue Horizons Project and are in partnership with organizations like Energy Savers Network and Community Action Opportunities to do free energy assessments and upgrades for low-income families.

Through our education, outreach and fundraising events, we seek to connect, educate and inspire people of diverse backgrounds to make the changes that can help grow a business, retrofit a home, and steward the environ-

ment.

Green Built Alliance is a membership-supported nonprofit. If you are not yet a member, we invite you to join our organization. If you are already involved, we thank you for your commitment.

There is much work to be done to move us toward a truly sustainable and regenerative society. And now more than ever we need each other to do this work.

We are in the process of looking for a new office for Green Built Alliance. Our hope is to find or build a living model of sustainability that will serve as a community resource hub of people, ideas, products, and design demonstrating how our buildings can serve us well into the future.

Connect with us and explore our online resources:

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Year in Review

- Our Green Built Homes program has now certified more than 1,500 houses. We appreciate all of the builders out there who are making green-building certification a priority. The occupants, our community and the environment thank you.
- In August 2018, our Appalachian Offsets program completed its largest campaign to date in raising \$220,000 to install a solar system at Isaac Dickson Elementary School in Asheville. Our voluntary offset program also installed a touchscreen kiosk at Asheville Regional Airport in June 2018 to encourage travelers to offset the carbon footprint from their flight by donating to support our clean-energy projects in local schools and nonprofits. Visit cutmycarbon.org to donate and learn more about past and future projects.
- Our organization's annual member appreciation and networking party will be held at Highland Brewing on Thursday, Sept. 13, 2018. This event



will serve as the debut of a new short film about our nonprofit's work and the official release of our 2018 Green Building Directory.

- Our nonprofit's fifth annual CiderFest NC fundraiser in 2017 was a success with a record sell-out crowd of 1,500 attendees. The sixth annual event will be held Saturday, Oct. 13, 2018 at the Salvage Station with samples from more than 20 cider makers and artisanal local foods, arts and crafts vendors, live music, movies and more. Buy tickets early at ciderfestnc.com.
- The printing of this year's edition of the Green Building Directory is being increased to 30,000 copies which will be distributed at more than 100 locations across Western North Carolina.
- Our organization has launched and is implementing the Energy Upgrade Program, a free low-income weatherization and energy improvement initiative through the support of Buncombe County and the Southeast Sustainability Directors Network.
- Our nonprofit is serving as the fiscal sponsor for Energy Savers Network, which has completed more than 110 homes during the last year with



energy upgrades and volunteer support. A new full-time employee is now based out of Green Built Alliance to help coordinate ESN's operations.

- With the addition of the three new full-time employees in 2018, we have doubled the size of our nonprofit's workforce to six staff members. The additional team members focus primarily on the Blue Horizons Project, Energy Upgrade Program and Energy Savers Network.
- Green Built Alliance is playing a key role in implementing the Blue Horizons Project and housing two new full-time staff members hired to execute the work. This community-wide clean energy initiative is a collaboration of the City of Asheville, Buncombe County, Duke Energy, and many leading local businesses and nonprofits.
- Through a strategic focus on enhancing our exposure through a new website, advertising, articles, interviews, videos, social media and more, we have expanded our reach by connecting with more people and communities.
- We have initiated an effort to locate or build an eco-office. Stay tuned as we look to make this dream a reality.



Green Building: A Love Story



A raised-seam metal roof was determined to be the best solution for attaching solar panels and providing a clean platform for rainwater harvest.

BY STEPHENS SMITH FARRELL

On paper, Jorge and I wouldn't be candidates for great friends.

In practice, Jorge and I became great good friends through a shared passion for early-era-east-coast mountain biking (EEEECMB) and mountain biking's gateway companion, beer (B).

Jorge (not his real name) was the youngest of a family of seven Maine tree farmers and the first to go to college; yours truly was a fairly well-read hillbilly with a trick knee and a well-worn passport. How six dudes (yep, me and Jorge and four others) managed to share a drafty old house in Boston with one bathroom and a 1940s-era kitchen is another tale entirely (file under Horror!).

Jorge went on to join a hedge fund and I moved back to Cackalack. We kept in touch and eventually I lured Jorge south with tales of biking trails too good to pass up. He came down to ride our infamous Pisgah network and never really left.

Esmeralda (also not her real name) is the daughter of some super green clients (SGC) of mine I'd known for years. Jorge and I ran into her one summer afternoon post ride in Brevard; I seem to recall there being cold B involved.

It bears mentioning that E is drop-dead gorgeous in a no-makeup, Asheville hippie sort of way. Jorge had never seen anything like her and was immediately smitten.

How could I tell? Dude actually stood up straighter, checked his hair and, most telling, refrained from emitting noxious B-induced gases.

Busted.

E is not only a successful businesswoman, designer, botanist, and chef, but also an expert biker who can still mop the floor with either Jorge or me (or both).

Long story short, Jorge fell hard for E and eventually left his hedge-fund job (painful pay cut) to come south to professionalize his pursuit of this Green Goddess Earth Mama (GGEM).

How you gonna keep him down on the (tree) farm once he's seen fair Esmeralda?

You're not.

Motive action was afoot.

At first, it was a hard sell but Jorge is persistent when properly motivated as well as unfailingly kind and well-mannered (for a Yamn Dankee). And he is, of course, Harvard smart.

Soon Essie began to let Jorge hang around unsupervised; naturally, hand-holding ensued.

They eventually got married and got real busy real quick, building both family and house. Their oldest kid is about to head off to college and the house and gardens, designed by yours truly, are more or less complete after all these years of planning and building and planning some more.

In any marriage, both parties are bound to evolve and change. I'm sure this is true for E, but the brunt of the evolving fell to Jorge who, truth be told, had considerably more room for improvement in the sustainability department than our fair Esmeralda. (Sorry, Jorge.)

When they met, Dude didn't know a carbon offset from a hole in the ground. Seriously, Jorge thought renewable energy was an energy drink!

That a Harvard grad could be so oblivious is cause for very real existential concern; that he managed to evolve is cause for a small celebratory serving of Caution-Flavored-Hope (CFH).

We could all use some CFH about now.

These days, Dude is a composting, organic-gardening, local-food loving, green-building machine. He even sorta learned to play the fiddle (although the cats run at the mere sight of his axe).

Love will do that to a man. (The

changes I mean; love should never cause Feline Terror (FT).)

So there's a bit of context to tell you about the super green home we started designing in 1998. It's still happening ('cause if you're done, you're dead, but if you're green, you're growing), but here are the fundamentals.

Project Team

BUILDER — Owner
ARCHITECT — Stephens Smith Farrell Architecture
HVAC — Bullman Heating & Air
SOLAR — Sundance Power Systems

I. The site

We found a gently sloping south-facing site near Burnsville. It has a great solar window and has enough slope to accommodate a "walk-out" lower level without being too steep to garden, etc. It is also fairly close to goods and services, and is walking distance to the school (over a log bridge!).

II. The house

We kept the house as small as we could (about 2,000 square feet) and still managed to accommodate the growing family, occasional guests, and a tiny home office.



The homeowners added a gravity-fed rainwater-harvesting system that irrigates their plot of vegetables, fruit trees, and cutting gardens. **BENOIT ROCHON PHOTO**

Next to location, size is the most potent arrow in the sustainability quiver and, when combined with passive solar strategies and super insulation, made it possible to cover the entire electricity demand with Solar Photovoltaics (SPV).

III. The systems

AFT. This was the first house we designed with an early version of Advanced Framing Techniques (AFT). If at first the carpenters were skeptical, they were full-throated advocates by the end. AFT reduces the amount of lumber and labor, and increases the amount of insulation (for those of you keeping score at home, that's a Very Rare Triple Win or VRTW).

Super insulation. We used exterior insulation to prevent the thermal short-circuiting of standard framing. Today, this method is much simplified by insulated sheathing.

Windows. We bought the best windows we could; at the time, we didn't know about Directional Tuning (DT) wherein each exterior elevations' windows gets a specific Solar Heat Gain Coefficient (SHGC). We did, however, specify triple glazing and this turned out to be a great hedge against glazing condensation. By going with a major manufacturer, we had their support when the seals failed in some of the glazing units after construction. Cheap windows always end up costing more in the end.

ENERGY STAR® appliances. This was a no-brainer and still is. Buy the most efficient appliances you possibly can.

Super-insulated the roof. This is the most critical plane of the thermal envelope so this is where you can really Pour It On (PIO).

Mechanical system. We splurged on a geothermal heat

pump (GHP) which is efficient and quiet; it's also expensive and might not be the best solution given today's technological advances in Mini-Split Heat Pumps (MSHP).

Efficient lighting. We avoided recessed fixtures which act like flues, pulling heated or cooled (expensive) air from the space.

Woodstove. They really wanted a wood-burning fireplace but we were able to talk them into a woodstove. Fireplaces are huge energy-losers and use your expensive heated air for combustion, so please don't do that. If you have a woodstove, make sure it has a dedicated source of exterior air for combustion or Fresh Air Combustion (FAC).

ERV. Super tight houses need a way to bring in fresh air, so look into Energy Recovery Ventilation (ERV). There have been huge advances in this technology lately, so do your research.

Photovoltaics. The house was designed with a huge south-facing roof at a 6/12 pitch (ideal for grid-tied SPV) with a conduit to the mechanical room. It was several years before they had the SPV installed, but it was a major driver in the architecture.

Hot water. We set the house up with a Solar Hot Water (SHW) heater with an on-demand backup propane water heater. As it turns out, this was not a good fit with the radiant floor slab and a family with a large wintertime hot water demand. With the benefit of hindsight and technological advances, we would today recommend an Air-Sourced Heat Pump Water Heater (ASHPWH) and power it with additional solar panels. In this way, one can cover the entirety of a family's domestic hot water needs, not just half (which is about the best you can hope for with SHW).

IV. The finishes

We used local hemlock and stone to cover the exterior walls.

In a budget stretch, we managed to get a raised-seam metal roof. Although a considerable up-charge, this turned out to be the best solution for attaching solar panels without punching a hole in the roof (with the beautiful 'S-S' clamp which pinches the raised seam rather than drilling through the roof) and provides a clean platform for rainwater harvest (normal shingles have algaeicides in them to prevent mold growth; not good for watering vegetables).

They would have had to replace an asphalt roof at least once by now. Asphalt is Mostly Crude Oil (MCO), btw. Replacing a roof is pain enough without having to remove and replace your SPV as well.

They have since added a system for monitoring the house's energy production and consumption that gives real-time feedback. They mounted the dashboard by the fridge which helps keep the kids on budget with their monthly kWh allowance. (Yep, each family member gets an electricity allowance!)

They also have added a clever gravity-fed Rainwater-Harvesting

(RWH) system that irrigates their plot of vegetables, fruit trees, and cutting gardens. Jorge is planning on plumbing the toilets to use rainwater too, but this project is stalled awaiting funding and More Sympathetic Plumbing Inspectors (MSPI).

J and E looked into so-called 'smart thermostats' only to discover they did not pair well with the geothermal equipment. Guess they weren't so smart after all.

Moral of the story?

This is a funky ol' world (FOW), full of paisley-shaped surprises and convoluted turns. If for no other reason, we need to take care of her so future generations can be surprised by her graces, humbled by her subtle charms, and awed by her multitudes of mysteries.

This earth is made for love.

Just ask George.

Stephens Smith Farrell is the nom de plume of famed gardener extraordinaire Shiloh Mendoza, Esquire, BLT, PGG, etc. When not gardening or writing or biking or bending spoons, Shiloh practices architecture in Asheville, where he lives in a net-zero house that really needs to be vacuumed.



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Building a smaller home allowed a budget for high-quality fittings as well as raised beds that now provide fresh salads and vegetables for dinner.

RANDOLPH RICHARDSON PHOTOS

Green Inside and Out

Lessons from Europe Applied in Appalachia

BY RANDOLPH RICHARDSON

“We’re gonna have to build,” we concluded, as the plane climbed past Mount Pisgah on the first leg of our return to Vienna.

After six years living in Austria, we would be returning to the United States for an early retirement and had chosen Asheville as the place to be. But a short visit checking out available homes in the area revealed just how much our time in Europe had changed us.

In the end, we constructed a Green Built Platinum Net Zero home not out of principle, but rather because that’s what suited the lifestyle we wanted.

Before going overseas, we had lived the American dream. A huge, drafty, 3,500-square-foot home for just the two of us, full of rooms and furniture we seldom used. So one of many culture shocks of the move overseas was just how different living arrangements were there.

Vienna is a city of about 1.8 million people packed into 160

square miles. For perspective, that’s the size of Montgomery, Alabama, which has a population of about 200,000 people. When we selected a two-bedroom apartment with about 1,200 square feet, our Austrian colleagues questioned why we had rented a place so large! After all, most couples there shared a living space of 600 to 800 square feet.

Clearly the Austrian dream is different. But maybe not so bad. In 2017, Vienna ranked No. 1 worldwide in Mercer’s Quality of Life

Survey for the eighth year in a row. The small apartments don’t matter; they’re used mostly for sleeping and fixing meals. The main living space lies outside the front door, in the cafes, parks, and museums. Life happens out there.

So the local real estate market came as a reverse culture shock. Despite what the listings seemed to think, we hadn’t chosen Asheville for its two-story foyers, kitchen islands, or home theaters. We could have found that stuff in Kansas, a lot cheaper. We had come for the beautiful and diverse landscape, wonderful climate, summer festivals, and friendly folks.

Every listing we encountered featured price per square foot. To maximize that, many builders were constructing large two-to-three-level “luxury” homes on small lots. Looking closer, we noticed double-hung windows with plastic bits on them. In Austria, even modest apartments and hotels had featured triple-pane tilt/turn windows that operated like a bank vault.

So we proceeded to defy cost-per-square-foot thinking. We wanted an exceptional lot with a nice view, and a luxurious small home incorporating the latest in building science. Since we were entering retirement, aging in place

Project Team

- ARCHITECT** — BCA Architecture
- BUILDER** — Jade Mountain Builders
- PROJECT MANAGER** — Jade Mountain Builders
- LANDSCAPE ARCHITECT** — Osgood Landscape Architecture
- HVAC CONTRACTOR** — Bullman Heating & Air
- SOLAR PV CONTRACTOR** — Sugar Hollow Solar
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was a key objective, so it would be single level only.

Buying land therefore posed a challenge. We discovered that the requirement for a flat building site outside the city eliminated at least 90 percent of the available land.

A beautiful lot near Fairview ticked all the boxes, until we discovered the community required a minimum home size of 2,400 square feet. We did not intend to blow our budget building square footage we didn't need.

Fortunately, we happened on the new Sovereign Oaks development just east of Asheville, and found the lot we were looking for there. The developer even defied the "evil despoiler" stereotypes by stipulating tree preservation, native plants, edible landscapes, and energy-efficient construction. Better yet, there was a shared greenhouse, apiary, and trails connected to the adjacent Warren Wilson College trail system.

Land acquired, our attention turned to selecting a builder. Most all of them claimed some shade of green. That's where the Green Built Alliance website came in handy, with its tally of how many homes each builder had built at each Green Built certification level. We could now validate each prospective builder's green credentials, and soon found the right match.

Moving to the design stage, our long careers working with contractors served us well. Abraham Lincoln once said, "Give me six hours to chop down a tree and I will spend the first four sharpening the axe." So we entered our first design meeting armed not with concepts, but rather with one floor plan. One.

We had analyzed hundreds of plans, but in the end, we selected a single plan and made slight modifications to tailor the design to our needs and the building site.



The solar PV system was also a must for the homeowners, who previously lived in Vienna, where climate change was viewed as a scientific rather than political issue.

And we sent back the builder's nine-page spec sheet with six pages added.

With our homework done in advance, the floor plan was quickly adapted, and our European influence prevailed as we reduced the initial design to meet a target of about 1,700 square feet. Funny that once the seldom-used formal living and dining rooms are eliminated, what remains feels quite spacious.

While the design proceeded, we turned our attention to the other 95 percent of our lot. Our arborist checked the health of our trees and determined that two large tulip poplars had to go, consequently deciding which wood we would use for door and window trim. A black locust had to go as well — that would do for the deck and raised beds.

Like most folks, with our first estimate, we learned that our initial wish list would considerably exceed our budget. But rather than adopt a lighter shade of green, our study of building science guided our priorities.

Foremost, no compromises on the building envelope. The garage would remain detached for indoor air quality. The 18 SEER variable speed heat pump would stay; its quiet operation was essential with the outdoor unit 10 feet from our bed. And for HVAC, we chose the high bidder, as the other had cringed when we mentioned Manual J and D calculations.

The solar PV system was also a must, having just come from Vienna, where climate change was viewed as a scientific rather than political issue. And green need not be expensive — to manage

"vampire loads" at the home office and entertainment centers, we simply spent a few bucks for switched outlets to manage the usual offenders.

For the construction process itself, we applied lessons learned from careers in industrial project management — hire good people and stay out of their way.

Although we could have visited the site daily, we opted for weekly meetings with the project manager. And when a decision needed to be made, we committed to turn around an answer within 24 hours. As a result, we now hold our builder's record for quickest home completion. Turns out Abe was right.

A year and half later, we're ecstatic with the results. Building a smaller home let us spend the money on high-quality fittings. This home feels more luxurious than the 3,500-square-foot behemoths of our past, with a lot less time spent cleaning. And we could immediately afford the raised beds that now provide fresh salads and vegetables for dinner. The invasive and exotic plants are under control and have been replaced by native trees and shrubs. Now, birds and butterflies offer daily entertainment at close range.

Applying the lessons learned in Vienna, our living space isn't just the 1,700 square feet contained by our walls. It's the thousands of square miles of national forests and a dynamic small city.

After all, life happens out there.

Randy Richardson and his wife Susan moved to Asheville in late 2015. Both are degreed engineers with long international careers in industry and project management.

Randy is now happily retired, while Susan continues her work in project management for commercial construction.

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This Swannanoa home received a Green Built Homes Gold certification, in part due to the rainwater collection system installed by the project team.
EVERGREEN CONSTRUCT PHOTOS

Enough Water For Everyone

A Water Supply Case Study in Swannanoa

BY DARREN HENEGAR

Here in the U.S., we have long been fortunate to have access to some of the safest drinking water in the world available just by turning on the tap. However, continued population growth and economic development has led to increasing concern over maintaining sufficient water supply.

Recently, we faced this challenge head on as we struggled to acquire a sufficient water supply for a home being built in Swannanoa.

The challenge

Our client purchased a tract of land that was on a steep slope protected ridge site. The site was chosen for its amazing views and its affordability given the real estate market. The buyers were under the impression that the existing well could be fracked, yet after further investigation, their worst fears were realized.

Although a well can be drilled up to 1,200 feet deep, the previous owners had two wells drilled on the property, with the deepest being 900 feet deep, and both wells

Simple measures can ensure the availability of these precious resources for generations to come.

were dry. Two adjacent neighbors fracked their wells with very limited success and had recent repairs costing more than \$25,000.

Given these circumstances, we decided to pursue a rainwater collection system for the sole source of potable water for our client. Our project team had been exposed to similar catchment systems while living in St. Croix in the U.S. Virgin Islands.

The project in Swannanoa would rely on an engineered system that filtered rainwater to be safe for use as potable drinking water. The county required an engineered set of plans which would be used for permitting and bank loan acquisition.

Although the county was no stranger to rainwater harvesting, this job was one of the first permitted projects for potable water

use. Since rainwater is not seen as a common source of potable water, it required additional documentation to assure building officials that this was a viable system. Ultimately, it was the engineered design that allowed this project to come into fruition.

The solution

Our 11,000-gallon cistern was built with insulated concrete form blocks and a gently sloped thermoplastic polyolefin membrane roof. The water was collected from a metal roof on the main house and the cistern roof itself.

The tank indicator that was installed could be monitored remotely through a network. This feature was particularly helpful since the client rents the lower floor as an Airbnb and must ensure water availability.

ANNUAL WATER CALCULATIONS		
TAG	DESCRIPTION	QUANTITY
A	MEAN RAINFALL	47 IN
B	TOTAL RAINWATER AVAILABLE	42700 GAL
C	NET COLLECTED RAINWATER AFTER FILTERING	38400 GAL
D	TOTAL PROJECTED USAGE WITH WATERSENSE LABELED FIXTURES	45000 GAL
E	PROJECTED GRAY WATER RECOVERY	7600 GAL
F	NET PROJECTED USAGE WITH GRAY WATER RECOVERY	37400 GAL
G	SYSTEM STORAGE CAPACITY	3 MONTHS IN DROUGHT CONDITIONS

The system was based on annual water calculations developed by Evergreen.



The water is pre-filtered using a German engineered vortex filter which achieves a 95 percent recovery and 5 percent waste. The waste water was diverted into a separate 500-gallon tank used for irrigation.

Since the cistern was built above-ground due to a large vein of rock that prevented a below-ground installation, the main water supply had to be properly insulated and equipped with a thermostatically controlled heat trace wire to prevent freezing.

Our team installed a whole-house filtration system with multi-stage filters and UV-lighting technology which ultimately made the water potable.

We also installed a greywater collection system which supplies the toilets only. This allowed for a projected greywater recovery of 7,600 gallons annually.

ity. Thanks to current technologies and consumer demand, manufacturers have responded to global concerns by developing new products to meet the demands of the most distinguished clients while fulfilling their environmental commitment.

Having earned a Green Built Homes Gold certification, our recent project in Swannanoa illustrates the potential for water conservation, as well as water independence.

Although there is an abundance of water in Western North Carolina, the global demand for water is ever-growing. It is our hope that more homeowners and builders will adopt similar practices. Simple measures can ensure the availability of these precious resources for generations to come.

Darren Henegar is a general contractor and owner of Evergreen Construct Inc. in Asheville. As a husband and father of three children, he understands the importance of protecting resources for future generations. His passion for sustainability and quality craftsmanship offers a depth of experience that is professional, creative and personal.

Why Water Matters

- According to the EPA, the average American family uses more than 300 gallons of water per day at home, with roughly 70 percent of this use occurring indoors.
- North Carolina is one of the fastest-growing states in the nation and research indicates that by 2030, more than 12.2 million people will reside in North Carolina.
- This trend toward population growth is especially obvious here in Asheville. According to a March 2018 article in the North State Journal, "parts of Buncombe County outside of Asheville accounted for 64 percent of (Western North Carolina's) population growth."
- Groundwater collected in wells

remains a sole resource for drinking water in most of the rural parts of Western North Carolina. Wells typically have depths up to 1,200 feet, and a growing population demands that many more wells be drilled. This leaves small towns dependent on wells from local fractured-bedrock aquifers.

- Residents in existing homes can help by retrofitting plumbing fixtures with WaterSense labeled products. According to the EPA, "if every North Carolinian household replaced its inefficient showerheads with WaterSense labeled models, for example, that would save about 21 million gallons of water every day. That's more than enough water to meet the daily needs of two-thirds of the households in Raleigh."

The takeaway

The construction and use of cisterns to store rainwater can be traced back to the Neolithic Age. Though common practice in many parts of the world, this is still a relatively new concept in the U.S.

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Long-range views across the Beaverdam Valley are a feature of this house. SAMSEL ARCHITECTS PHOTOS

BY MARGARET CHANDLER

Our clients came to us after purchasing five acres of steep mountain land with great views looking down the Beaverdam Valley. Avid hikers and mountain bikers, they bought the land in part because of access to nearby trails and proximity to downtown Asheville. In addition, the south-facing slope allowed them to build the energy-efficient, passive-solar house of their dreams.

Energy efficiency was a major design priority for our clients. The goal was to minimize energy use as much as possible while using cost-effective and conventional building techniques.

Polished concrete slabs are used on both floors to provide the proper thermal mass for passive solar energy, and roof overhang depths were calculated for the correct year-round sun exposure. An efficient thermal envelope, energy recovery ventilator, and mechanical system also minimized energy use and allowed the house to achieve a HERS rating of 50 (50 percent more efficient than a standard new home).

The design process started by studying the character of the land. We explored several site concepts and house layouts that worked within the confines of the steep topography, not against it.

From this process, we developed a narrow floor plan that worked parallel to the land, and minimized retaining walls. This narrow layout allowed for daylight to enter on multiple sides of most rooms — one design strategy for reducing the need for electric lighting. These site factors, combined with a tight budget, led us to a design solution that had a simple and compact footprint and minimized driveway and other site work costs.

The upper level has the best valley and mountain-ridge views, so the main living spaces and master bedroom are located on this floor. The lower level connects to the carport and holds guest bedrooms and an office.

Efficient space planning reduced any wasted square footage and packed a lot of functionality into this 2,100-square-foot house. Outdoor spaces to the north and south flank the main living space, which

visually and physically connect the living area to the outdoors. These outdoor spaces offer a variety of shade and sun, depending on the season, as well as a connection to the surrounding landscape and paths around the house.

The house was pre-wired at the time of construction for the homeowners to add on a rooftop mounted photovoltaic solar array. They eventually did install eighteen 285-Watt panels on the roof, giving them a 5.13kW array.

After installing the PV array, our clients began monitoring the home's energy usage, and quickly realized that it was performing at net-zero levels. They approached us again, this time with the request that we find a way to certify their home as net zero.

As many past Green Building Directories have shown, the net-zero trend is catching on in Western North Carolina. Homeowners, designers, and builders alike are becoming more educated about energy efficiency and are open to taking the extra steps to bring their structures to a carbon-neutral level of operation.

We chose the International Liv-

ing Future Institute's Zero Energy Building Certification for this project because they are truly at the forefront of environmental sustainability. From their website, the ILFI is a "non-governmental organization committed to catalyzing a global transformation toward true sustainability."

Project Team

ARCHITECT – Samsel Architects
BUILDER – Standing Stone Builders
HVAC CONTRACTOR – Bullman Heating & Air
HERS RATER – Vandemusser Design

Their zero-energy certification is based on actual building performance, not modeled performance, and requires that one hundred percent of a building's energy needs (on a net annual basis) be supplied by on-site renewable energy. No off-site renewables, off-sets, or on-site combustion are allowed, with an exception for fireplaces that contribute to a home's ambiance.

Their certification submittal



The polished concrete floor slab is sized to absorb solar heat gain in the day-time and release it into the home in the evening, passively heating the house.

process itself is straightforward, but documentation-intensive. The organization requires utility bills showing energy used versus energy produced on-site for a year, and a spreadsheet tabulation of that information. They require a list of all energy-using appliances and a comprehensive electrical diagram showing every energy-using appliance and the power-generating systems installed on-site. In addition to all of this, they require photo-documentation of all appliances, the power-generating systems, and the inverter.

This home was the first project in North Carolina to achieve any level of certification through ILFI, and the first ILFI Zero Energy

Building Certified project in North Carolina.

It also has the smallest PV array of any ILFI Zero Energy Building Certified project, showing that thoughtful design is just as important as large solar arrays to achieve zero energy.

Margaret Chandler, AIA, LEED AP, has been at Samsel Architects since 2012. She has worked in sustainable design since earning her degrees at Clemson University, and briefly lived in a treehouse off the grid in Austin, Texas. Margaret currently serves on the AIA Asheville Executive Committee as chair of Committee on the Environment.

The structure nestles into the hillside with a minimal footprint for environmental and cost-saving purposes.



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Certifying it Twice

High-Performance Home Receives ENERGY STAR® 3 and Green Built Homes Certifications



BY TOM OWENS

Clients came to us a few years ago in search of someone who could both design and build a home that would be environmentally friendly, energy efficient and structurally durable.

They had a budget and general ideas about the interior design. However, they needed a builder with the knowledge of and a commitment to using modern methods and materials to design-build their high-performance home.

We focused first on the design and construction of the building envelope — walls, roof and foundation — then addressed the interior efficiency and comfort aspects. The envelope-first focus dramatically reduces the energy required to heat and cool a high performance home and also ensures the structural integrity is not compromised.

As longtime supporters of Green Built Alliance and its mission, we reached out to fellow members of the nonprofit whenever possible for input and advice on HVAC systems and specifications, roofing, plumbing, electrical fixtures and appliances, water run-off and site preparation.

Using this as the guiding principle, the completed home in Boone has received both ENERGY STAR® 3 and Green Built Homes certification.

The building envelope of the home combines cutting-edge materials such as insulated concrete forms (ICFs), shop-built panelized walls and structural insulated panels (SIPs).

The basement and basement walls are designed and constructed with ICFs, which integrate the strength of concrete and the energy efficiency of expanded polystyrene foam. This method of construction provides both insulation and a vapor barrier while encasing the 10-inch thick concrete poured wall. The result is a superior,

energy-efficient wall that will provide long-term energy cost savings while also adding resale value.

Of the many energy-efficient features of the home, the walls were the largest contributing factor to achieving the double certification. Designed and manufactured to exceed local building codes, the walls were prefabricated off-site in our manufacturing facility.

Project Team

- DESIGNER AND BUILDER** — High Country Timberframe
- ICFS** — StructureTech
- HYBRID ELECTRIC HEAT PUMP WATER HEATER** — Blue Ridge Energies
- PANELIZED WALL SYSTEMS** — High Country Timberframe
- STRUCTURAL INSULATED PANELS** — ACME Panel
- SPRAY FOAM INSULATION** — Blue Ridge Energy Works
- HVAC** — B & R Services Inc.
- ENERGY STAR APPLIANCES** — Lowes Home Improvement
- HERS RATER** — Vandemusser Design

A software program mapped out exact measurements and provided significant raw-material waste savings, down to 2 percent on framing materials rather than the industry standard 20 percent for site-built construction. Every piece of wood used in the home was drawn to exact size, cut in the shop, then given a part number to be used during the wall-panel manufacturing.

Being constructed in our shop meant the walls were never rained on or exposed to the elements. Electrical chases were drilled and the windows and doors were pre-installed, flashed, and taped prior to delivery and installation on site.

Installing as many of the windows and doors prior to delivering the walls on site saves a tremendous

This Boone home received multiple certifications for its high performance.
HIGH COUNTRY TIMBERFRAME PHOTOS

dous amount of time, particularly on sloped building sites where working from scaffolding adds time and cost to a project. The first-floor and second-floor exterior walls were completely installed on the existing subfloor in a matter of hours, not weeks.

The roof system was constructed with 12.25-inch thick, R-48 SIPs over heavy timber trusses and rafters. Using SIP roof panels allowed for the home to be completely "dried in" within a day, while also offering a much more airtight structure. This resulted in reduced energy costs to heat and cool and a quieter and more comfortable space.

Over the top of the SIP roof panels, we built a "cold roof" system, essentially 1-by-4 sleepers with a layer of five-eighths inch plywood sheathing and underlayment. Similar in concept to a rain screen on the exterior walls, it provides for a three-quarters inch air space between the top of the SIP roof panel and the roof sheathing which carries the finish roofing material. The air space created by the "cold roof" allows for any condensation that may develop under the primary roofing material — a not uncommon condition under a metal roof — to dry before it may cause any problems.

The Douglas fir heavy timber roof system offered greater flexibility in the floor-plan layout than traditional trusses without compromising the structural integrity. They also provide a feel to the home that only natural heavy timber can convey and addressed the client's desire for a clear line of site from one area in the home to another.

The longer spans that are possible, without the need for intermediate supports, allow for the creation of a great room which incorporates a vaulted ceiling, large energy-efficient windows, sliding doors and a floor-to-ceiling rock fireplace. The combination of the heavy timber on the inside and the proper placement of windows to capture the forest outside helps to connect the conditioned space with its surroundings.

Energy-efficient windows and doors and ultra-high-efficiency variable speed heat pump systems with Greenspeed Intelligence and a SEER rating of 19, HSPF of 10.5, and an EER rating of 14.5 help keep the lower and main level comfortable.

A mini-split system provides the loft with conditioned air. The mini-split system creates a comfortable environment no matter what the

conditions are outside, with advanced monitoring controls and the personal comfort control offering the control of temperature, fan speed, and air direction.

Ultra-high-efficient water heating equipment contributes to a reduction in energy consumption, lessens air pollution both indoors and outdoors, and reduces greenhouse emissions. An energy recovery ventilator, expels stale polluted air outdoors and refreshes the home with clean outside air, while at the same time recovering energy and pre-tempering the air coming into the home.

This particular home utilizes no renewables for a number of reasons. Even without the use of renewables, there is so much that can be done to improve the efficiency of a home. Simply put, it comes down to being precise and taking the time to do the job the right way.

We know that the building science and best practices are constantly being updated so it's important to stay current and evolve. In addition to the materials and construction methods used, the ability to make all systems work together as a cohesive unit is equally important. A structure meant to house people is a holistic system. There are multiple systems within that structure that have to work together, and we are learning to integrate these systems more efficiently.

The methods and materials used in our high-performance homes are not a low-cost alternative to site-built construction, but a long overdue step forward in general building best practices. The end result is to reduce environmental impact and ensure the client gets the most value for their money. It's also a reflection of who we are as a company, founded and directed by working carpenters, to do the best job possible on every project.

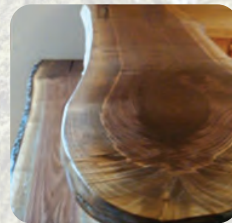
Tom Owens has been a woodworker since 1984, both as a furniture designer/maker and as a timber frame designer and carpenter. Living in the Blue Ridge Mountains of North Carolina since 1994, Tom co-founded High Country Timberframe & Gallery Woodworking Co. in Boone with business partner Peter Jankowski in 1997. In 2010, under Tom's leadership, High Country Timberframe added a Design/Build Division that focuses on the design/construction of high performance homes.

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Going for Zero and Beyond

The Journey to -8 HERS

Design of the new blue house took into account the solar system and passive solar already present at the neighboring yellow home, so as not to block their access. CADY/GUYTON CONSTRUCTION PHOTOS

BY BOONE GUYTON

We built our last house with the goal of being net-zero energy.

The West Asheville lot is a small 0.08-acre infill lot with great southern exposure. That allowed for both solar photovoltaics and passive solar design on our three-bed, two-bath, 1,416-square-foot home.

The house was designed for passive solar to help with heating, with good roof configuration for solar panels (but low-enough height to avoid obstructing a neighboring home's existing solar panels) and a bermed lower level with good natural light.

Our building strategy was typical green building fare: high insulation values in the envelope, good air tightness coupled with ventilation, as well as efficient ap-

pliances, heating and air conditioning equipment.

The lower level walls are precast concrete that come with R-12 foam insulation. R-19 fiberglass batts were installed into the wall cavities for a total of an R-31. The concrete floor has R-10 underneath and R-5 around the perimeter. Additionally, we added closed-cell foam around the bottom perimeter to insulate and seal the bottom beam and behind the concrete floor edge where the bottom of the wall connects to the floor. Closed-cell foam was also blown in around the downstairs bathtub to seal and insulate. Lastly for the downstairs, open-cell foam was blown in around the rim joist to insulate that section between the floors.

Upstairs, we framed the walls with 2-by-6 studs on 2-foot cen-

ters and sheathed it with Zip R Panels that have one inch of R-6 polyisocyanurate foam. These panels provide a thermal break, water and air barrier and help with any possible condensation on the exterior sheathing. In my mind, they work somewhat like a gasket that helps slow air infiltration.

Cellulose was blown in the stud bays resulting in R-29 for the upstairs walls. The windows were Andersen double-pane windows (U-Value: 0.270, SHGC: 0.210). Though triple-pane would have reduced the energy demands some, it didn't seem like a cost-effective improvement.

We used raised-heel trusses for a flat ceiling. The raised heel was sheathed on the outside with the Zip R panels for a thermal break at the ceiling joists and top plates

Project Team

- BUILDER** – Cady and Guyton Construction
- EXCAVATION** – Rare Earth Builders
- GRADING** – Jeff Kegler
- FOUNDATION** – Superior Walls
- FRAMER** – Broad River Builders
- BUILDING SUPPLY** – Builders FirstSource
- HVAC** – Stickle Service Group
- PLUMBING** – Phil Jacques Plumbing
- ELECTRIC** – Jon Fedock Electric
- INSULATION** – Pisgah Insulation & Fireplaces
- PV SOLAR SYSTEM** – Sugar Hollow Solar
- CABINETS** – Claudia Cady
- VENTILATION EQUIPMENT** – Green R
- HERS RATER** – Vandemusser Design

We appreciate the Green Built Alliance for their certification program that encourages more efficient and environmentally thoughtful homes.

— Boone Guyton

of the walls.

The insulation company also sealed in the attic space with closed-cell spray foam at the partition walls and penetrations in the sheetrock at the electrical boxes and fixtures. We blew in R-60 cellulose insulation. The attic is vented with ridge and soffit vents.

We also kept the energy demand down by installing a heat-pump water heater, ductless mini-split rated at 12.2 HSPF and 17.7 SEER; all LED lights; and ENERGY STAR®-certified appliances including an induction cook stove, dishwasher, and refrigerator.

The one thing we did not choose that would have helped the energy equation was a heat-pump clothes dryer. Not only are they more efficient at drying the clothes, they do not vent outside so they don't cause conditioned air to be exhausted to the outside. A drawback is the cost of the unit, though some of the extra cost could be saved by not having to install a vent that is needed for a conventional dryer. They do take longer to dry clothes, which might be a factor for a large family.

With all the systems in place and the solar sized according to earlier modeling, we contracted for a 5.68-kW array that we expected to produce as much as or a little more than the annual con-

sumption.

In fact, according to the final HERS model, the house is -8 (HERS 45 before PV). This suggests a small surplus of solar generation, though that will be dependent on how the occupants operate the home.

The wood used for the interior trim and the vanity came from an oak tree that died and fell in our front yard and a walnut tree we needed to take down on a lot we were clearing. The entryway bench was made from a cherry tree we had to remove from a lot several years ago. We used low- and no-VOC adhesives throughout.

Finishes included blueberry bushes in the landscape as well as some native plants that needed thinning from the landscaping of our own home. We did also use some non-native but non-invasive plants in the landscaping like a Japanese maple to add some specific interest.

All the water fixtures in the house are WaterSense-certified and the toilets are Niagara Stealth with 0.8 gallons per flush and a MaP of 800.

An 80-gallon rain barrel was installed but we did not have room for a rain garden due to the small drainage area and the location of the water supply lines.

At the end of the day, we finished with a Green Built Homes Platinum Net Zero Certification. We appreciate all the work that people put into the home, including the Green Built Alliance for their certification program that encourages more efficient and environmentally thoughtful homes.

Boone Guyton and Claudia Cady have been building houses in the Asheville area since 1993 and have been part of the Green Built Alliance since its beginning as the WNC Green Building Council in 2001.



The living space incorporated passive solar windows, engineered flooring and salvaged oak trim.



Passive and active solar can be seen on the home's south side.

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Practical Priorities

Asheville Home Serves as High-Performance Prototype

BY ROB HOWARD

Today's homebuyers have a tendency to focus on creature comforts and prioritize the components of a home that can be seen and touched like paint colors, kitchen cabinets, countertops and bathroom tiles.

Especially for those designing and building a home from the ground up, the freedom to choose design elements can overtake practicality.

In Asheville, however, green and high-performance building has taken over. Traditional code-built homes are becoming the exception, not the rule. This is due to an already environmentally aware and socially conscious culture of homebuyers that don't need much convincing to look at critical details such as the building envelope and mechanical systems.

While cosmetic touch ups and alterations can be made any time, a home's envelope can't be changed on a whim, or at least not without bank-breaking costs. Spending a little more money upfront on a well-built, high-performing envelope that is airtight with higher insulation levels, thus requiring a smaller HVAC system, can offer a positive return on investment and put money back in a homeowner's pocket in the very first month.

A recently built home in Asheville was designed to serve as a prototype for high-performance homes in Western North Carolina and nationwide, as more communities adopt energy-efficient building practices as their standards.

With 1,776 square feet and an additional 300 square feet of bonus loft space, the home was built on a piling foundation with no crawl space or basement. This style is common in beach houses in the eastern part of the state but seen less frequently by builders in mountainous Asheville.

Additionally, the ground floor features an open floor plan and the vaulted ceilings on the second level are part of the finished space, leaving no room for ductwork



This Asheville home was designed to serve as a prototype for high-performance homes. TRILLIUM PROPERTIES OF ASHEVILLE PHOTOS

within the home.

Pre-engineered and factory-made structural insulated wall panels were delivered to the job site and erected in just a few hours for each level. The interlocking wall panels lack almost all of the thermal bridging that results from traditional stud-frame construction. This super-insulated structure resulted in a low-load home requiring reduced cooling and heating capacity, which lends itself to more energy-efficient methods for controlling the comfort of the interior space.

The builder assembled a team of industry experts to select a cooling and heating solution that would work for the home's atypical blueprint. They ultimately decided to use a multi-zone ductless

heat pump system to fulfill the home's cooling and heating needs.

Together, the construction team determined that three wall-mounted indoor units connected to one multi-zone outdoor unit would sufficiently heat the home during Asheville's chilly winter months, while continuing to save the homeowner money on utility bills.

The team recognized that the home's layout stretched the limits of the units they'd selected, particularly when it came to cooling and heating the divided upper level with just one wall-mounted indoor unit in the hallway. As part of the air distribution strategy, transfer fans were installed to supply conditioned air to the second-floor bedrooms. An energy-recovery

Project Team

- BUILDER** – Wishbone Tiny Homes
- STRUCTURAL INSULATED PANELS** – Eco-Panels
- HVAC CONTRACTOR** – Morris-Herron Heating & Cooling
- HVAC EQUIPMENT** – Mitsubishi Electric Cooling & Heating
- VENTILATION EQUIPMENT** – Green R
- HERSRATERS** – Vandemusser Design

ventilator (ERV) was also installed to provide additional air distribution and mechanical ventilation for healthy indoor air quality.

To confirm they'd made the



right decisions, the team welcomed the Asheville public to an open house to experience the high-performance home upon its completion. Locals experienced the high-performance heating capabilities of the compact units. It was a success for the building team — even as snow fell outside, their guests felt comfortable inside the home and many shared their surprise by how efficiently the split-ductless system worked.

In the end, the home was certified through ENERGY STAR® and Green Built Homes at the silver level, with a HERS score of 58.

The home sends a message to builders looking to cut upfront costs by opting for traditional HVAC systems with convoluted ductwork. Skimping on the quality of the building envelope and mechanical equipment often leads to uneven cooling and heating and uncomfortable building occupants. The ductless system paired nicely with the selected structural insulated panels, and the home now serves as an example of how effective low-load systems can be when a building en-

velope is done right.

Cosmetic changes can be made any time, but most homes only have one shot at an effective, well-constructed building envelope. Hesitant homeowners, who pause at the upfront costs and question the payback of opting for high performance HVAC systems, ought to consider how much granite countertops have saved them on their utility bills.

Rob Howard is performance construction manager with Mitsubishi Electric Cooling & Heating. He provides training and technical support to builders, remodelers, architects, and engineers on variable refrigerant flow cooling and heating systems for residential applications. Rob has more than 15 years of experience in the performance construction industry. He is the former director of construction at Habitat for Humanity of Catawba Valley. He earned his bachelor's degree and a renewable energy technologies diploma from North Carolina State University.



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Dome Dreaming

Local Monolithic Dome Serves as New Model of Stewardship and Harmony

BY JASON MARTINI

We are living in such a time where old systems are collapsing and failing, and it's time to create new models that will support our future generations to survive and thrive.

There are so many new technologies and teachings coming forth that model new ways (and sometimes remembering former ways) of interacting with energy, permaculture, and construction. Learning to live in harmony with the elements and natural world, as well as with each other, is important now more than ever.

My commitment as a realtor is to support this transition and co-create this new model of living by helping visionaries and social change-makers become the stewards of epic lands and homes here in these mountains and beyond.

When a friend of mine recommended I contact a local couple to support them with their land search about two years ago, I graciously accepted. A vibrant visionary couple, Max and Phoenix are highly trained in the healing and culinary arts, and committed to creating a new model for living and community.

They began the search for land with an intention to create a showcase that inspires others to think, feel, and create in a new way.



A monolithic dome that will serve as the owners' home as well as a private event and gathering place is located on this property in Weaverville.

MAX GALLMAN PHOTOS

When I first met them, I recognized and embraced their passion and clear vision to create a unique home and gathering space for community, and to model what is possible by stewarding and being in harmony with the natural world.

The search for land began, and we explored several properties throughout the beautiful Blue

Ridge Mountains surrounding Asheville. After a couple months, we came back to the gorgeous mountaintop property we had seen first, located at the end of Dula Springs Road in Weaverville. There is a stream bordering the driveway to the top, and as you cross the bridge, there is a steady incline to reach the pinnacle

where epic western panoramic long-range mountain views await.

The land had been neglected a bit over the years, and required some love in order to become the location for their new dome home. After a year or so of deep visioning — along with bushwhacking, excavating, and other infrastructure — the home site was prepped. Max



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To guide them through this process, Max and Phoenix enlisted the help of Calvin Hensley with Hendersonville-based U.S. Dome Builders, who has traveled throughout the region to build these structures.

said the process of working with the county for permits was rather seamless, and each stage and milestone was met with graceful support.

As the time came to break ground in early 2018, Max and Phoenix inflated a three-story, 3,000-square-foot Airform on the site, which will soon become the monolithic dome. It will serve as Max and Phoenix's personal home, as well as a private event and gathering space to share with others on occasion.

These amazing structures are constructed following a method that requires a tough, inflatable Airform, steel-reinforced concrete and foam insulation. Each one of the stages of construction needs to be followed in a specific way. To guide them through this process, Max and Phoenix enlisted the help of Calvin Hensley with Hendersonville-based U.S. Dome Builders, who has traveled throughout the region to build these structures.

"They are cost-efficient, earth-friendly, extremely durable and easily maintained. Most importantly, a Monolithic Dome uses about 50 percent less energy for heating and cooling than a same-size, conventionally constructed building," according to Monolithic.org. "Monolithic Domes are neither restricted by climate nor by site location. In terms of energy consumption, durability, disaster resistance and maintenance, Monolithic Domes perform well in any climate, even extremely hot or cold ones. And they can be constructed on virtually any site: in the

mountains, on beaches, even underground or underwater."

There have recently been advances in the material used in monolithic dome construction, which now includes AirCrete. A much lighter and stronger material than the traditional cement material, domegaia.com reports that "structurally reinforced AirCrete can cut costs of conventional methods of construction by a factor of 10."

We are living in a time where it is essential that we end the mass consumption of raw materials, and utilize a more efficient, economical, and sustainable way to build our living structures, as well as embrace renewable energy sources. Thanks to Max and Phoenix for visioning and building one of the area's first Monolithic Dome homes, Western North Carolina now has a local model to experience and see what is possible.

Jason "Papa Jah" Martini is a realtor with Keller-Williams Professionals and founder of New Earth AVL Realty with the mission of turning dreams into reality. Jason is committed to living in harmony with the earth and with others. He has helped many families in our community find their ideal home or land, and supported others in selling their home or land and transitioning to a new chapter in their life. He feels blessed to call these ancient grandmother mountains his home, where he aims to raise up his daughter Sophia to be the best human she can be as part of the next seven generations.

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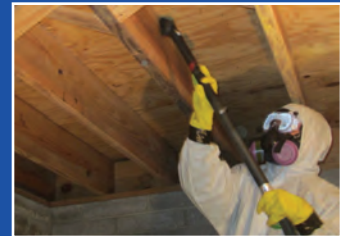
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Breaking Through

Green Built Homes Certification Program Hits 1,500 Milestone

BY GARRET K. WOODWARD

What once was considered a fringe industry has now become a force in the housing market of Asheville and Western North Carolina.

"It does seem like a green-certified house in our market has become less of a luxury and more of a necessity, which I think is great," said Jody Guokas, founder and president of JAG and Associates Construction. "It's somewhat expected if you're building new construction in Asheville that you're going to be building with some sort of environmental consciousness. And that's kind of our goal to be creating a product and a program that becomes the norm — green certification has become a pretty strong part of the market."

In the spring of 2018, the Green Built Alliance's own Green Built Homes certification program reached the milestone of having certified 1,500 houses since its inception in 2004.

"Green Built Homes has been successful by providing education and a road map to building green, setting builders up for success on their first home. Third-party raters inspect each home in progress to not only prevent greenwashing through third-party verification, but also to catch mistakes before it is too late," said Green Built Homes Program Director Maggie Leslie. "Every builder wants to build a quality home, but with many trades on site, it can be hard to catch every little mistake. The job of the rater is to inspect the many minor details that can have a lasting impact on indoor air quality, durability, and efficiency for the life of the home."

From the ground up

While growing substantially over the years, the program has maintained a consistent focus on helping small- and medium-sized home builders remain competitive in the green building industry.

"We're fortunate here in Western North Carolina and Asheville



Children play football beside a Green Built Home in Asheville Area Habitat for Humanity's 21-house neighborhood being developed off of Beale Road in Arden. ASHEVILLE AREA HABITAT FOR HUMANITY PHOTO

to have so many passionate green builders," said Greg McGuffey, president of Earthtone Builders, who joined the program in 2005. "Matched with a population that's also passionate about the environment, we have a perfect setting to advance the green building industry as shown by this milestone."

Since starting to work with Green Built Homes in 2006, Guokas' company has become one of the program's largest certifiers. As of the summer of 2018, JAG and Associates Construction had built and certified 126 houses through Green Built Homes, with nearly 20 other projects registered and in progress.

"There are some other green programs out there that are less stringent and really require less verification, where you just fill out the paperwork, sign it and send it in," Guokas said. "But, with Green Built Homes, there's that guaranteed third-party verification and inspection component, which to me gives it real value. I'm not just telling you I build green homes; I'm proving it to you by bringing in this third-party inspector to verify all things we're doing."

With multiple levels of certifi-

cation (certified, silver, gold, platinum, net zero ready, and net zero), the program offers guidelines for green building, workshops, consultation services, technical and marketing assistance, field consultation, design reviews, and more.

"This has been, and always will be, one of my goals as a green builder — to help make green homes the standard rather than the exception. At the end of the day, this movement is about the health of our planet and our awareness of living in better balance," McGuffey said. "Creating homes that are built with this awareness in mind is a fundamental part of a brighter future for us all. I look forward to what this future holds and the new normal for what a home can be."

As the program's largest certifier, Asheville Area Habitat for Humanity has been involved in Green Built Homes since 2008, certifying 141 homes.

"Just because we're building simple, decent and affordable housing, it's still the single biggest investment a family will make, and we feel we have to provide the best-built, best-performing product we can," said Paul Reeves, di-

rector of construction services for Asheville Habitat. "As long as Green Built Homes is certifying homes, I see us staying with them as a local partner. We really do value that local connection, and we're fortunate to have that knowledgeable, skilled group. We'll be here for the long haul."

Dollars and sense

Studies show that investing in green construction is one of the safest investments you can make. Green homes can cost as little as 1 percent more, with an average of 5 to 10 percent more depending on the technologies and the upgrades chosen. (The rater also helps ensure the most cost-effective choices are being made.)

The investment, however, will be easily paid back over the life of the home through monthly energy and water savings, reduced maintenance and increased resale value. During the recession, Green Built Homes proved to hold their value better as home values in the marketplace were declining.

"My passion for Green Built Homes is due to the fact that everyone wins," Leslie said. "The builder can make more money, the

homeowner gets a better home, all while protecting the environment and our children's future."

With more than 250 builders having participated in the program since its inception, these skilled tradesmen bring a variety of backgrounds but tend to share similar motivations for certifying with Green Built Homes. For many builders, it's their way of helping to create a better, healthier and more efficient existence. The fact that Green Built Homes sell faster and for a higher sales price is just an added benefit.



Jessica Arrowood of Vandemusser Design reviews a Green Built Homes checklist during a framing and insulation inspection of a house under construction in The Villages at Crest Mountain in Asheville. DAYNA REGGERO PHOTO

"I'm deeply devoted to good health, and so it just seemed like a no-brainer that if you are going to do something, do it right," said Sean Sullivan, president of Living Stone Design + Build, who began certifying with Green Built Homes in 2006. "After building and living in my first home for seven years, I discovered that it had radon. From that point on, I've been deeply dedicated to having good indoor air quality."

And while the process of building certified green homes is a reflection of their personal values, builders report that there is increasing recognition of the financial value of their product as well.

"I've got a degree from Warren Wilson College in environmental studies, and environmental preservation and energy efficiency is a pretty core part of my values. If I'm going to be building homes, I want to be building them within that same value system," Guokas said. "What I've seen is that banks and appraisers have started to realistically give value to green certification and efficiency, which means the system is actually starting to

recognize the value of quality construction."

Growing into the future

As codes have changed and technologies have advanced, so too has Green Built Homes. The program continues to evolve, becoming more stringent and providing new opportunities.

"Having been involved with the program since its inception, what I am most proud of and what I feel is a true measure of the program's success, is that many builders started out building certified homes and now build to silver and gold level as their standard," Leslie said. "By providing continued education on the job site, builders are always learning and they find how simple, affordable adjustments can result in a much better home for the buyer and the environment."

In 2016, the program added a Net Zero Ready and Net Zero Energy Certification to encourage and reward builders that push the envelope even further and provide homeowners with homes ready for a post carbon world. In less than two years, the program has certified 17 Net Zero and 5 Net Zero Ready homes.

"With our involvement in this program, it's amazing how good of a house we're building now 10 years later. Those houses get better every year — energy audit scores are better, air quality, living conditions, quality of build," Reeves said. "Habitat for Humanity International and all the affiliates in the country have a commitment to sustainable green practices, and the partnership with Green Built Homes brings us to the table."

For Guokas, that milestone of 1,500 certified Green Built Homes also speaks volumes about the shifting mindsets and legislative priorities within the state's building sector.

"It's been interesting to watch that the mainstream is starting to follow green building a little bit, where the North Carolina building code has changed a lot of over the last decade to bring in a lot of things that used to be solely required by green building," Guokas said. "These things start to push the baseline of construction into a more efficient and higher quality realm. People are starting to catch up, and that's great. But, now where do we go? It keeps us on our toes to keep pushing ahead and taking our building envelopes to the next level."



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Coulda, Woulda, Shoulda

(Flawed) Reasons People Don't Use Green Building Certification Programs

BY LEIGHA DICKENS

If I had a dollar for every time a client chose not to certify their custom new home through a third-party green-building program, then I'd have more dollars than you might think.

Even among clients who express ambitious energy-efficiency goals or have great concern for material sustainability, indoor air quality, or waste reduction, I have found that when given the choice of whether or not to pursue a green-building certification, clients all too often choose not to do it.

Many of their reasons are understandable on the surface, and I empathize with everything a homeowner has to consider in the course of bringing their dream to life. But, the decision not to certify is still a short-sighted one, which I have seen homeowners come to regret later.

Let's look at the common reasons people decide not to get a green certification (e.g. ENERGY STAR® for Homes, LEED, Green Built Homes), and why those reasons are flawed.

#1: I'm overwhelmed.

Most green-building programs require you to enroll before you start to build. It's even preferable to do it early in the planning stage. Therefore, the builder and designer both need to understand what they're getting into, and may

need to undergo training or certification to fulfill the program requirements.

The terms and acronyms involved in green-building programs can be confusing (RESNET, HERS, ACH50, ahh!) and the requirements can sometimes be technical. The process of realizing a custom home — designing the dream, finding a builder for the dream, getting estimates for construction of the dream, figuring out all the fun and sexy stuff like what windows best frame your view, how to lay out your kitchen, and specifying the HVAC system (OK, maybe that last one is just me) — can take enough of a homeowner's brain power as it is.

I get it! But that is why all of these programs come with a built-in guide — the program rater. The rater is the person you hire who is trained in the program, comes to the jobsite to inspect construction, makes sure the requirements are being followed, and oversees paperwork. The rater also provides guidance, help, and training, and is often happy to do so, which is easier and more effective if he or she is hired early in the home design process.

#2: You mean I have to pay for certification?

Yes, you do. Sometimes multiple fees: one to the organization that puts the program on, and yes, one to that aforementioned rater.

I'm not arguing that green cer-



Green certifications require performance testing, such as the iconic blower-door test of house air-tightness. Knowing a house is going to be tested — and must pass the test — makes everyone involved in building it likely to be more thorough with the details. STEVE LINTON PHOTO

tification is free. What I am arguing is that this cost is worth it, and if you're like most people building

their dream home, you'll likely be tempted to spend far more than these fees on other, less valuable






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Program	Created By	Description	# in NC ¹
	US EPA	Focus on energy efficiency, with some provisions for indoor air quality and moisture durability. Energy Star Certified Homes use 15%-30% less energy than conventional new homes.	82515 homes in NC (2007-2017)
	Green Built Alliance	Developed and administered here in WNC. Requires green building practices in the categories of site opportunities, water efficiency, building envelope, heating and cooling systems, appliances lighting and renewables, indoor air quality, material sustainability, and homeowner/community education.	~1500 homes in NC (2007-2017)
	National Association of Homebuilders	The only ANSI certified green building program. Requires green building practices in the categories of lot development, resource efficiency, energy efficiency, water efficiency, indoor environmental quality, and homeowner education.	12463 homes in NC (2007-2017)
	US Green Building Council	Requires green building practices in the categories of integrative process, location and transportation, sustainable sites, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and innovation.	~4000 homes in NC (2007-2017)
	US EPA	Focus on indoor air quality with requirements for moisture durability, HVAC systems, and material selections for low- and zero-VOC products throughout construction.	141 homes in NC (2008-2018 ²)

¹ source: North Carolina Building Performance Association 2017 North Carolina Energy Efficient, Green, and High Performance Home and Building Inventory Report
² source: Indoor Air Plus

things throughout the project. For most homes, green certification fees are not that expensive in the grand scheme of things — usually less than 1 percent of the total cost to build.

But having to pay for certification is a feature, not a bug. These programs need your support. They wouldn't exist otherwise, and they do a good thing for the world by advancing green building standards. Think of it like a donation to the goal of green building.

And the raters? Well, they have to make a living too. They've undergone extensive training on how to make homes healthier and use less energy, and you're paying to have access to that knowledge. It's great knowledge to have! No different than you are already paying your builder, your electrician or your doctor, to have access to what they know when you need it. Rather than having to know everything yourself, invest in that knowledgeable team member to help you.

Plus, an argument can be made that using a rater can actually pay for itself by saving you money upfront through help in making cost-effective choices on energy efficient upgrades, as well as every single month forward via energy savings.

#3: There's no rebate for me.

Sure, rebates are nice, and they can be effective motivators for change. Locations with rebates for green-building certification tend

to have more certified homes than areas that don't. But at the end of the day, not everything worth doing comes with a rebate attached to it.

Yet here in Western North Carolina, there are quite a few rebates for green building, some of which go to the builder (such as a generous rebate from Duke Energy for calculated kilowatt hours savings) and some of which go to the homeowner (such as 5 percent rate discount from Duke Energy for ENERGY STAR® Certified homes).

Additionally, real estate studies in North Carolina have found that green-certified homes can sell faster, and at higher prices, than those not certified. Here's the catch: banks, appraisers, and homebuyers require proof that a home is green, and the best proof is in a third-party certification, which uses agreed-upon technical standards and inspections to ensure those standards have been followed.

Unfortunately, just promising that a home has green stuff in it isn't enough.

#4: My builder is going to build it green anyway; I don't need certification to prove it.

I consider myself a green builder. In the past two years, I've helped my company build 100 percent of our homes to ENERGY STAR® standards, and many to Green Built Homes as well. And

the best part is that getting those certifications has taught us so much more about green building than we would have figured out on our own.

It is the process of certification, on each and every home, that helps us build just a little bit better of a house than we might have otherwise, because every single job is inspected by that third-party rater. That's another eye to catch mistakes, and teach us about new concepts, or old ones applied in new ways. And most green-building certifications require performance testing of key systems, giving one more opportunity to uncover something that might have otherwise come back to bite the homeowner later.

Most builders would love to be able to tell you they are perfect, and that your building experience will be absolutely perfect as well. But, most know it won't be, because most builders employ humans. Humans overcome their foibles by having good systems, and third-party certification is an incredibly helpful such system.

I have absolutely seen that when humans have clearly defined standards to shoot for (a green-building program), a guide to help

along the way (the program rater), and feedback on how they're doing at it (inspections and tests during various points of construction), the end result is far superior one.

The Bottom Line

The fact of the matter is that green-building certification makes a difference: to the quality of the final project and to the community at large. It can be overwhelming, but resources abound to simplify the chaos.

Now I'm going to change the original scenario. If I had a dollar for every client who called me after their home was built to ask how to get their home certified, and I have to tell them that it is too late, that's where I'd have a lot of dollars.

That's why I want you, the homeowner, to put your dollars toward getting your green-building certification.

Leigha Dickens is in her eighth year as the green building and sustainability manager with Deltec Homes and Deltec Building Co. She is a RESNET HERS rater and UNC Asheville alumna of the physics and environmental studies departments.



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Sustainability Simplified

Ten Solutions In and Around Your Home

Gardening is a great way to engage and contribute to community. ORGANIC GROWERS SCHOOL

BY LEE WARREN AND RICHARD FREUDENBERGER

Life is full. We understand. That's why we made a list of sustainability solutions that are easy, fun, and hopefully doable.

If you pick three to implement each year for three years, then you'll nearly tackle the list. These solutions often have additional benefits of money savings and community building.

1. Alternatives to Dryers

One of the cheapest, simplest, and maybe most satisfying sustainability solutions is the good old-fashioned clothes line. The dryer involves a fairly high use of energy, so anything we can do to take advantage of the universally free solar-drying technology that is the sun, the better off we'll be. Also, your clothes will be better for it. Regular dryer use creates wear on most fabrics, and woolen blends, socks, and delicates should likely never go in the dryer. Some ideas:

■ **Old-Fashioned Clothes Line.** A simple line from a tree to the house, either retractable or not, is super cheap and easy. Even if you have to sink in a post, it should be fairly inexpensive.

■ **Racks.** There are nice, low-impact, in-house foldable racks which can be used in summer or winter, and are good for drying smaller things. In the winter, they add much needed humidity to the

house as well.

Visit clotheslines.com/clothes-drying-racks for additional ideas.

2. Composting

Saving kitchen scraps can be as easy as tossing them into a bucket in the kitchen. But what to do with them when the bucket is full? There are three simple options:

■ **Worm Bin.** Make an indoor worm bin with some help from a local garden store. The worms will eat your kitchen scraps, gladly. And it'll be a learning experience for the whole family. Make sure to size it for the needs of your household.

■ **Compost Pile.** Create a simple outdoor compost pile with four pallets and some T-posts. Add the kitchen scraps along with grass clippings and leaves. Don't worry about maintaining the pile (unless you get excited about compost, which you likely will). Over time, it will decompose on its own. And it's a great way to make a nutrient-rich addition to your garden beds.

■ **Compost Service.** Subscribe to a compost service in town such as Compost Now. They come and pick up your kitchen scraps and then bring you back compost at the end of the season. They make use of the scale and also create jobs in the local economy. Everyone wins.

3. DIY Passive Solar

Western North Carolina summers aren't as hot as other places in the South but we do tend to get

a few weeks of temperatures in the 90s. And winters aren't near as challenging as our northern states, yet sometimes we're running heat for six or more months out of the year. A simple technique can harness the natural heating and cooling cycles of nature to make our homes more temperature friendly.

■ **Summer.** In the summer, open all the windows and doors at night and run fans to cool down the home. Our nights offer some significant cooling, even in the summer months. In the morning before the heat index rises, close everything up, including curtains (ideally insulated ones) so the cool air stays in the home. I have experienced a 15-degree difference inside versus outside by using this technique.

■ **Winter.** In the winter, do the reverse. Let the sun come through the windows to warm the rooms as much as possible during the day. If you have a concrete floor, that sun will store warmth in the mass of the floor to be released later on. Make sure to tightly close curtains and doors at night to hold the heat in.

Electricity Reductions in the Home

■ **Phantom-Load Management.** Do you know those black boxes that come standard with computers, TVs, printers and most other electronics these days? Well they stay on, absorbing power, whether your device is on or not. One way to mitigate this is to plug in these

devices (think entertainment center or home office workstation situation) to a power strip that you can shut off all at one time. You'll save a little bit every day, which can really add up over the year.

■ **Water-Heater Timer.** It shuts your water heater off except when you know you'll be home and using it, which allows for the water heater to take a break from the constant heating of the entire tank of water. There will be an investment in the initial installation but the efficiency savings are significant. This only applies to electric water heaters of the old-style tank variety.

Garden, Garden, Garden!

■ **Plant a Garden in the Front Yard.** If you're in the city or suburbs and have neighbors, a great way to contribute to community, also known as social sustainability, is to engage. A front-yard garden keeps you visible, and neighbors are often interested in what you're planting and why. Sit on your stoop and drink some coffee or better yet, put some chairs and a table in your garden and create a place for folks to sit and chat. Maybe it'll turn into an impromptu gathering spot.

■ **Kitchen Herb Garden.** Having herbs on hand, right outside the kitchen door is a great way to engage with not only growing, but the healing power of medicine that is in culinary and medicinal herbs. If you put them close to the house, you're likely to use and en-

joy them on a more regular basis. Three really easy-to-grow herbs include parsley, sage, and oregano. Run out to snip some off for a super fresh addition to your meal, gather some for a table bouquet, or pick, crush, and inhale for a boost of delightful smells. Get started with these and you'll realize how fun growing herbs is.

6. Insulating Windows and Doors

Take a piece of tinsel (yes, Christmas tinsel) or a candle and walk around to all your closed windows and doors to see if there is any airflow (leaks) along the joints, seals, hinges, latches, and edges. Mark the spot with tape and then go back and seal those areas with inexpensive weather stripping. It's that simple. If there are significant or chronic problems, consider replacing windows with storm windows, which are not cheap, but will save money and fuel in the long term.

7. Locality

■ **Drink the Local Water; Stop Buying Plastic.** Asheville has some of the best water of any city in the U.S. Just ask all the breweries that have moved here; it's mostly because of the water. Some of us can't tolerate or don't like to drink the chlorine and fluoride chemicals that are added to the water and even feel nervous about the potential of pharmaceuticals in the water system. A great solution for this is a whole-house water filtration system. This may be the most expensive option on this list, but is well worth the health and environmental benefits. The filtration system can take out all of the unwanted components and leave the minerals. These systems can last for years and also support a local business.

■ **Buy Local.** This may be the very best sustainability solution on the entire list. Buying local keeps money in the community, circulating to as many folks as possible and enriching projects, lives, and local businesses. We vote with our dollars. When we buy from big corporations with headquarters elsewhere, we are saying that we want more of that. When we buy from local businesses, we are voting for more vitality in our own communities. Buy local whenever possible.

More Efficient Lighting Choices

■ **Switch to LEDs.** It's hard to find a sustainability solution with more impact for the least investment.

LEDs are the best choice on the market today, even better than compact fluorescent bulbs which had challenges with longevity and temperature and color issues. LEDs are efficient and reliable, and perform well on temperature and color. The K rating on the packages will help you select within a range of warm to cool lighting. Additionally, the prices are now lower than ever. In fact, Duke Energy has programs that provide free or highly discounted bulbs for your home. Visit duke-energy.com/home/products to explore the offers available in your area.

■ **Sun tubes.** Instead of skylights — which are expensive, require major construction, and have a higher probability of leakage or damage — check out sun tubes, aka solar tubes or sun tunnels. These bring in the natural light in a significant way but are more affordable and more protected than skylights. There's still an investment for installation but it's well worth it to light up a dark room or hallway, especially for people who work at home all day. They're so effective, you'll have guests reaching for the nonexistent light switch.

9. Refrigeration

This is the one appliance that matters most. Refrigeration is one of the biggest consumers of energy in your household. If you're looking to take a conservation approach, this one appliance is a great place to start. Find out the energy rating of your fridge, or any appliance you have or want to buy. Buy appliances certified by ENERGY STAR®, and reference their website's helpful lists and comparisons at energystar.gov/productfinder. This research will help you figure out the kilowatt consumption and likely cost per year. If you're in the market for a new fridge, consider the following tips:

■ Most people need a smaller refrigerator than they currently have. Consider stepping down a size.
 ■ Double-door side-by-side refrigerators are notoriously leaky. Consider a single-door model.
 ■ Consider a fridge without an ice maker. While convenient, they use more energy and break over time.

10. Water Reduction in the Home

The water you drink is less than 5 percent of the water used in the house. So how can we easily reduce water use?

■ **Rainwater Collection.** A simple rainwater collection system with a

barrel can be obtained from a hardware store for less than \$80. More sophisticated ones are available, but we recommend starting simple. The water of course is not potable (drinkable) but you can use it for gardens or outdoor washing of any kind. They're effective when used properly. Be sure to keep the gutters clean and have an overflow plan so the water doesn't just splash down and create damage to the soil or the foundation.

■ **Replace Your Toilet.** New construction requires efficient toilets but older homes almost always have toilets that use as many as five gallons per flush, which is an egregious use of purified drinking water. Buying a new toilet will cost in the \$100-and-up range, but they are equipped with significant water-saving components. The dual-flush model, for example, uses about 1.1 gallons per flush on the low end or 1.6 gallons per flush on the high end. There are also some inexpensive retrofit float valve devices that will save you a little bit and you don't need a plumber. But a new toilet is really the way to go for the most impact.

■ **Flow Reducers.** Faucet nozzles for the kitchen or bath, and low-flow showerheads are very inex-

pensive to buy and easy to install. When in the market for new plumbing fixtures, seek out WaterSense-labeled products, which meet the EPA's specifications for water efficiency and performance.

Lee Warren is the executive director of Organic Growers School, which has been offering organic education to Southern Appalachia since 1993. She is the co-founder, designer, and builder of an off-grid, sustainably-built CoHousing Neighborhood at Earthaven Ecovillage; founder and manager of Imani Farm, a five-acre pasture-based cooperative farm; and managing partner of SOIL, School of Integrated Living, which teaches organic food production, regenerative systems, and community living.

Richard Freudenberger is the energy and resource coordinator for Living Web Farms in Mills River, where he develops long-term sustainability and renewable energy strategies and teaches a variety of energy, green building, and biofuels workshops. He was the former research director of Mother Earth News.



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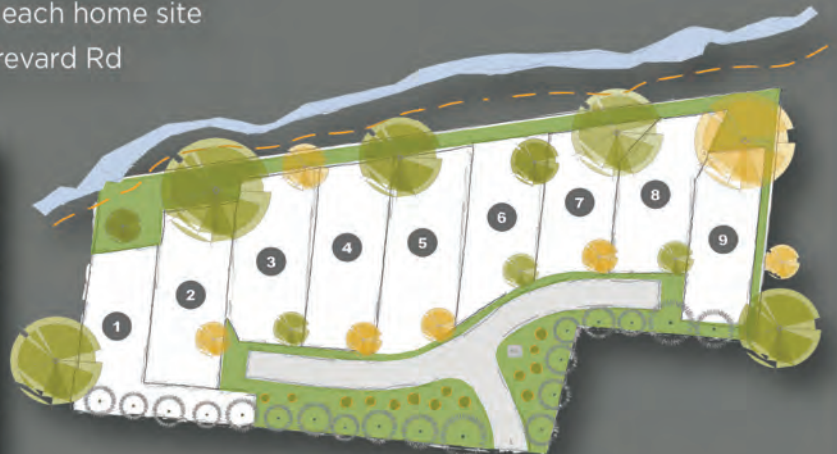
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Building Up Our Youth

Program Creates Career Pathways in Building Trades for At-Risk Youth

BY GWEN HILL

In the summer of 2018, Asheville-based nonprofit Green Opportunities kicked off the second of three planned cycles of its new YouthBuild training program, a tuition-free pre-apprenticeship program designed for out-of-school youth in Buncombe County.

Ten young adults ranging in age from 16 to 24 are enrolled in the latest YouthBuild training cycle; 80 percent of the participants are teenagers, and 40 percent are women. About 90 percent are high-school dropouts hoping to earn their GED® while gaining meaningful skills and work experience in an in-demand field.

Green Opportunities (GO) was one of 77 programs nationwide to receive a YouthBuild grant from the U.S. Department of Labor in the fall of 2017. YouthBuild is a recognized pre-apprenticeship program that helps at-risk youth complete high school equivalency programs, earn industry-recognized certifications, and undertake training to build affordable housing for low-income or homeless individuals in their communities.

"The YouthBuild program at GO is a unique opportunity for young people," says Karen George, who has served as the YouthBuild program instructor since January 2018 and also runs a natural building company. "It's really more like 'Life Build.'"

GO's YouthBuild participants study the Home Builders Institute Pre-Apprenticeship Certificate Training (HBI-PACT) curriculum, learning construction and leadership skills while studying for their GED® or High School Equivalency Diploma. Students earn a modest weekly living stipend while learning a curriculum that encompasses safety and first-aid, construction math, general tool knowledge, employability, building, carpentry, and weatherization. Students receive personalized support services as needed, including counseling and financial coaching, from an on-staff case manager, as well



YouthBuild instructor Karen George helps student Anthony Bowers design and build a prototype donation box for GO's community kitchen. GWEN HILL PHOTO

as assistance securing employment from GO's job developer.

The full-time program lasts for six to nine months, allowing participants to complete the HBI coursework at their own pace.

"I have watched students go from using a nail gun for the first time to being a leader on our construction projects," George said. "Through the YouthBuild program, the sky is truly the limit for our students."

On-the-job training and project-based experience are key components of the YouthBuild training model. GO's current YouthBuild cohort will cut their teeth in construction by completing the Southside Arts Pavilion project started by GO's first cycle, as well as construct three single-family, affordable homes in Asheville's Southside neighborhood in partnership with the Asheville Housing Authority. Deltec Homes is partnering on the construction of those houses, with building expected to begin in the

summer of 2018.

GO launched the first of three planned YouthBuild training cycles in November 2017. Members of GO's first YouthBuild class initially honed their framing and carpentry skills by building a chicken coop in GO's on-site construction workshop, before breaking ground on a covered outdoor arts pavilion in the Southside Community Garden. As the home-building experience is a key component of the YouthBuild program model, George also arranged for her first class to participate in a Habitat for Humanity build in Arden. She plans to continue incorporating service-learning with Habitat into the curriculum for the second YouthBuild cohort.

The students benefit from these collaborations, receiving an education in



YouthBuild students Atticus Monfredi (left) and Erik Whitesides practice clamping and gluing hardwoods to create cutting boards for GO's culinary training program graduates.

GWEN HILL PHOTO



YouthBuild student Eddie Green volunteers on a Habitat for Humanity build site. He learned to use a track saw to cut soffit for the Habitat house.
KAREN GEORGE PHOTO

green building through their exposure to the principles being applied in the real world, such as those demonstrated by Deltec's sustainable construction methods and Habitat's certification of Green Built Homes.

Participating in on-the-job training opportunities, including building the garden pavilion and securing a paid welding apprenticeship, were highlights of the program for Eddie Green, who earned his HBI Pre-Apprenticeship certificate in early May.

"It's been a good experience, something I'd like to tell other folks to come and try," Green said. "They introduced me to new people that I never knew."

While Green already held a high school diploma when he entered YouthBuild last fall, the program staff helped him improve his math skills and successfully navigate new experiences, such as opening a bank account and networking with potential employers.

"If I didn't go through this program, I'd be in the same predicament as before, still looking for a job," Green said. "This program helped me do a lot of things that I never thought I could do."

GO's YouthBuild program has yielded real results for participants of its first cohort. To date, 13 students have received their OSHA 10-Hour Construction Safety

Cards, five earned a CPR/First-Aid Certification, four completed the HBI Pre-Apprenticeship Certificate Training in carpentry, and two earned their High-School Equivalency Diplomas. Three students also secured entry-level jobs in the construction industry: one as a carpenter, another as a metalworker, and a third as a mason.

A 2014 graduate of GO's former Built Environment training program, YouthBuild Program Coordinator Eric Howell is well aware of how a training program like YouthBuild can help students change course and thrive.

"GO saved me from going down a path that I didn't want to go down," Howell said. "I love my job at GO. I'm able to help out others who are heading down a path that is unhealthy for them."

To learn more about GO's YouthBuild program, visit greenopportunities.org or contact Eric Howell at eric@greenopportunities.org.

Gwen Hill is the communications manager at Green Opportunities (GO), where she was the 2015/16 Tzedek Social Justice Fellow. Before moving to Asheville, she spent seven years working in the nonprofit sector in New York City with a focus on workforce development. She holds degrees from Florida State University and Hunter College.

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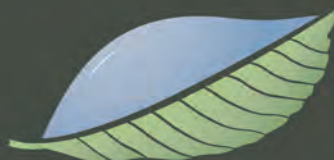
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Rebuilding Affrilachia

The Value of History and Equity in Our Growing Community



DeWayne Barton taking care of the flowers and plants in the community garden. GARRET K. WOODWARD PHOTO

BY GARRET K. WOODWARD
Just inside the entrance gate of the Burton Street Community Peace Garden in West Asheville hangs a sign that reads, "Good planets are hard to replace. Treat kindly."

The large hillside garden is accented by a variety street art installations made of discarded items collected by DeWayne Barton (aka B-Love), who runs the property. Constantly moving around the garden, watering plants and adjusting artwork, perhaps adding a finishing touch here and there, Barton can be hard to locate, his movements tracked by the sounds of an active garden hose or hammer and nail.

"The garden was started when this was a heavy drug area. We wanted to create a spot where people could chill," Barton said, adding that he initiated the garden with the help of his wife and youth from the neighborhood. "The war on drugs in the United States and the war in Iraq was why we created

this space, where people in the neighborhood could have a peaceful place to absorb trauma. So, how do we create green spaces in the community to absorb trauma?"

Barton is the founder of Hood Huggers International, an Asheville-based social enterprise with the mission of preserving African American culture, landmarks and properties in cities that are undergoing rapid change — physically and socially — due to gentrification and variety of other factors.

Through Hood Huggers, Barton also leads educational tours to shed light on the notable African American people, places and things that make up this rich, and often forgotten, culture at the center of Asheville's history. Barton aims to raise awareness for the ways this area's proud African American history is still actively being wiped out every day, as existing homes are torn down, once-wooded properties are ripped up and community gathering places are displaced.

Wise Words

- **HOOD HUGGER:** A Hood Hugger is anyone who restores themselves while helping to transform their communities for the good of all.
- **AFFRILACHIA:** Affrilachia refers to African Americans living in Appalachia. Originally coined by Frank X Walker, "Affrilachia is an ever-evolving cultural landscape poised to render the invisible visible," according to theaffrilachianpoets.com.

"And that's part of the reason we wanted to do the tour, part of the reason we're trying to hold onto this space, to be able continue to tell that story. They're tearing down all the landmarks (in these) historically African American places," Barton said. "This being a tourist town, there was nobody as a business talking about the African American history, be-

cause (the city) is on super-warp speed as far as erasing (the history). If we don't tell it, who will?"

With the slogan "Rebuilding Affrilachia," the garden and tours also have ties to the local Green Opportunities nonprofit, which was co-founded by Barton and Dan Leroy.

"That community trauma is from Jim Crow segregation, urban renewal, (and now) gentrification. I was born here and raised in Washington, D.C., then came back to Asheville in 2001," Barton said. "This was all wooded areas (back then), where I'd come down here from D.C. to get away from the craziness. Go into the woods here and find peace. I began to see all the development and problems in the community. It made me active, made me want to write a new narrative, so we started Green Opportunities."

With all of the recent development in the city, and especially as it creeps closer to the garden in West Asheville, Barton sees the rel-



DeWayne Barton.

"I began to see all the development and problems in the community. It made me active, made me want to write a new narrative"

— DeWayne Barton

evance of the green-building industry to what he's doing and the potential for all parties involved to work together toward a better tomorrow.

"If you go in any neighborhood, there's a basketball court and certain things, but where is the place that talks about the environment, the arts and social enterprise?" Barton said. "We saw the developers in the neighborhoods building the green homes, and we said, 'Wow, the people who could really use this the most are the low-wealth African American communities,' so they won't have high energy costs, they can learn a skill set and get employed based on the all development that's happening. Let's try to be a bridge to get those contractors to work with people in these areas."

Barton stressed the need for contractors and builders to take an active role in learning about and making connections in the neighborhoods where they work.

"Get the history of the area and the land, respect the people. We act like this information is hidden," Barton said. "Be inclusive to the very neighborhoods you're building in — checking in to a community meeting, send a letter to the president of the community association about your building, just general outreach."

As Hood Huggers and Green Opportunities continue to build their own bridges, Barton emphasized that the only way Asheville can move forward — and do so with its history intact amid positive growth — is through collaboration across organizations.

"The city always has had a pattern of sacrificing the African American neighborhoods for the growth of the city, not including them. And being the second most gentrified city in the country, as a community we have to create a new narrative," Barton said. "And it's going to take everybody. And part of the problem is that Asheville works in silos — everybody's got their own secret plan they keep in their own silo ... and they don't see the collective connections that have to be made to improve the city."

Sitting in an open-air library building in the middle of the garden, Barton leaned back in his chair, gazing out across the property, where urban materials blend in with a serene, rural setting. A few birds chirp in the tree above the library. It's another sunny day in West Asheville, and Barton is already headlong into another day of visualizing what it will take to change the social tide.

"As a community, we've got to build some accountability in the middle to connect all of those dots. And it won't be one organization or governmental agency that will do that. And until we do that, I just don't see anything changing. I see a lot of positive, but it's all pieces of a puzzle all scrambled — they aren't even on the same table," Barton said. "There are too many great things happening in the city, there are enormous things, but how can we be more efficient and effective? How can we be a leader, and not follow the trends of the country? How do we do that?"

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BY CARI BARCAS

Resulting from a two-year collaboration between local government, business, nonprofit and environmental leaders, the Blue Horizons Project is a comprehensive hub of energy-efficiency programs to empower community members to save money and help create Western North Carolina's clean energy future.

Launched in the spring of 2018, the Blue Horizons Project is designed to improve access to the wide variety of energy-efficiency programs and resources available to Buncombe County residents and businesses.

"By increasing access to these programs and resources, we hope more community members will be inspired to be a part of our clean energy future," said Brownie Newman, Buncombe County Commissioner. "We want the entire community to know how they can save money and energy in their homes and businesses, as well as improve their health and preserve our region's beauty."

The structure and offerings of Blue Horizons Project were informed by a rigorous review of Western North Carolina's energy use performed by Rocky Mountain Institute. The resulting data revealed that Buncombe County's energy demand peaks during winter's coldest days, driven primarily by residential heating. This data drives the focus of the Blue Horizons Project, which is a portfolio of strategic energy efficiency and demand response solutions.

"We now know more about our area's energy usage than almost any other community in North Carolina. That allowed us to design a set of programs to address our specific needs," said City Council Member Julie Mayfield, a chair of the Energy Innovation Task Force (EITF) whose work informed the creation of the Blue Horizons Project.

The EITF includes a diverse cross section of representatives from the city, county, Duke Energy Progress, regional nonprofits and the local business community, along with environmental and clean-energy advocates, who have been meeting since mid-2016. This advisory group has spent the past two years gathering data and developing strategies to support its goals of transitioning the region to a clean energy future and averting



the need for Duke's to build a new natural gas plant in the coming years that would serve only to meet that winter peak energy use.

"The goals of reducing energy demand and moving us to a clean energy future are addressed by retrofitting homes that have the highest energy and utility bill burden," said Green Built Alliance Executive Director Sam Ruark-Eastes, who is a member of the EITF. "We are launching this campaign to encourage everyone in Western North Carolina to improve their homes, businesses, and this community through energy efficiency, renewables, and storage."

The nonprofit Green Built Alliance is housing two new full-time staff positions that will execute the work of the Blue Horizons Project.

"The Blue Horizons Project will connect with and empower all communities in Buncombe County to save money and energy to ensure our region's future and resilience," said Blue Horizons Project Coordinator Sophie Mullinax, one of the new hires tasked with engaging the community in this effort. "We are especially passionate about helping people who are least able to afford high energy bills and cannot afford full-cost improvements to their homes."

Also on staff at the Blue Horizons Project is Jonathan Gach, who manages the Energy Upgrade Program that will serve community members with the most need and least access to energy efficiency.

Blue Horizons Project Energy Upgrade Program will partner with

community organizations including Energy Savers Network and Community Action Opportunities to complete efficiency upgrades to low-income homes identified through referrals from local nonprofits including United Community Development, Habitat for Humanity, Community Action Opportunities, Eblen Charities, Asheville Buncombe Community Christian Ministry, and Mountain Housing Opportunities.

After receiving an energy assessment to identify areas for improvements, these homes will benefit from basic efficiency upgrades such as air sealing, duct repair, insulation, LED bulbs, and door and window weatherization. Participating families will also receive information on ways to further reduce their energy use through changing behavior.

Income-qualified families receiving support are identified primarily through referrals by local nonprofits (including area churches) and secondarily through potential outreach events. Priority is given to families who currently received LI-HEAP subsidies for home-heating assistance. (For more information on the Energy Upgrade Program, read the article on page 52.)

The Blue Horizons Project is being funded through collaborative contributions from Buncombe County, the City of Asheville, Duke Energy and a Southeast Sustainability Directors Network grant.

"Changing our energy future will take collaboration and partnership from every aspect of the

community. Duke Energy is delighted to support the Blue Horizons Project as a platform to move to a smarter and cleaner energy future," said Jason Walls, Duke Energy's Local Government and Community Relations Manager.

Project input was provided by all members of the Energy Innovation Task Force, including representatives from the City of Asheville, Buncombe County, Duke Energy Progress, Green Built Alliance, Sierra Club, Green Opportunities, Mission Hospital, Biltmore Farms, New Belgium Brewing, Buncombe County Tourism Development Association, UNC Asheville, Self-Help Credit Union, Asheville Chamber of Commerce, Sundance Power, Community Action Opportunities, and the Sustainable Advisory Committee on Energy and the Environment.

To learn more about Blue Horizons Project and the various energy-efficiency programs available, visit bluehorizonsproject.com, and follow the project on Facebook and Instagram. For details about how the program can help your home or business, email sophie@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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Above, Energy Upgrade Program Manager Jonathan Gach goes over tips for using a caulking gun with volunteers from Energy Savers Network during a workday at a local low-income home. At right, Gach installs weatherstripping on the front door of a local low-income home. DAYNA REGGERO PHOTOS

Big-Picture Weatherization

Blue Horizon's Energy Upgrade Program

BY JONATHAN GACH

The Asheville area is fortunate to have a variety of organizations on hand locally to help low-income residents face the challenges that can come with owning or renting a home.

Eblen Charities' Energy Assistance program can help families pay for high utility bills. Others, like Mountain Housing Opportunities' Emergency Home Repair program, can replace heating equipment for free.

Knowing that applications and eligibility can be intimidating for people, these organizations have staff available to help applicants through the process. However, there remain obstacles to con-

necting the support that is available to the families who need it.

Some families become overwhelmed by the daunting task of deciding which program to apply for or diagnosing what their home needs most, and as a result, they end up seeking no help at all.

For this reason, through the efforts of the Energy Innovation Task Force, the Blue Horizons Project Energy Upgrade Program was launched in early 2018 to provide free home assessments to help low-income households prioritize improvements and connect to the right organization for support. Their program is funded through the support of the Southeast Sustainability Directors Network and Buncombe County.

A free home assessment can do a lot for a family before any improvements are made to their home. In fact, it turns out that as much as a third of a home's energy use can be avoided solely by changing occupant behaviors.

Parents often remind their children to turn off the lights and not leave the refrigerator door open, but what about washing clothes with cold water and adjusting your water-heater temperature setting? Sometimes even small changes to comfort settings can result in dramatic savings.

The assessment process may also suggest that a variety of improvements are needed, ranging from installing accessibility grab bars for the disabled, to sealing ducts or replacing windows.

So how does it all get done? First, by helping to prioritize improvements, and second, by connecting the residents with the right community resource to support.

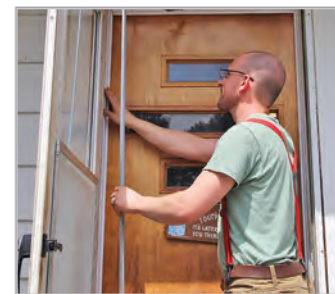
Taking the time to go through this assessment process at the outset can make a big difference in how many improvements can be accomplished and how quickly they can be completed. Concerning improvements to occupant health, durability, and affordability, the ideal outcome is most effec-

tively achieved when homes and their components are addressed as a whole.

Since the majority of the typical home's utility expense goes towards occupant comfort, often the most significant opportunity for improving a home's performance is to increase the retention of conditioned air. When a home keeps conditioned air in the right places, it doesn't only make the house more affordable to heat or cool; it also improves indoor air quality and avoids damage caused by moisture ending up in the wrong places. This means that a lot of benefit can come to low-income families from merely sealing their home tight and ventilating it right.

The benefits of air-sealing are then multiplied when the home receives a new heating and cooling system. The right recipe of improvements from a variety of resources can help low-income families and the elderly enjoy graceful aging, stay in their homes longer and do so affordably.

But this initiative's scope is not limited to its work with low-income clients. The Blue Horizons



Project campaign is focused on leveraging energy savings across our entire community to create a cleaner energy future for Western North Carolina. (To learn more about the campaign as a whole, see page 48.)

If you or someone you know would like a free consultation and/or in-home energy assessment, email jonathan@bluehorizonsproject.com.

Jonathan Gach is the Blue Horizons Project's Energy Upgrade Program Manager. His love for houses is motivated by his passion for fostering the ability to adapt to change. Through his work, he hopes people enjoy more resilient living through durable, healthy, and affordable homes.



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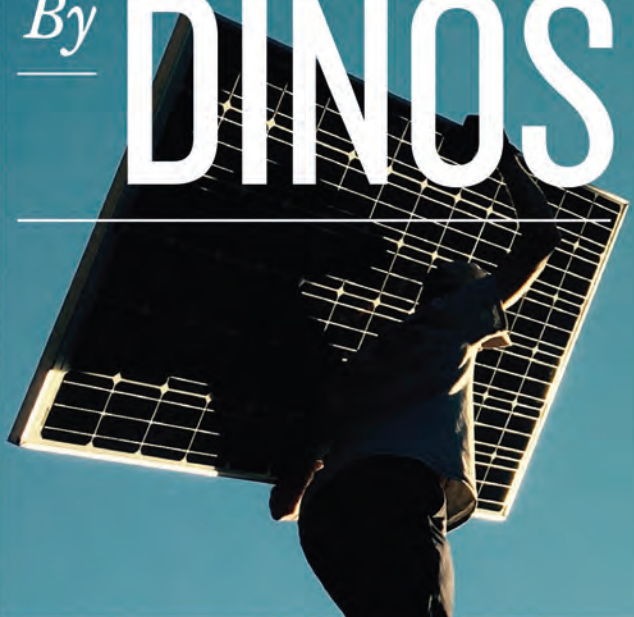
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Filling the Gaps

Energy Savers Network Helps Low-Income Homes

BY GARRET K. WOODWARD

It was the basketball-sized hole in the dining room window that stuck out the most for Alice Wyndham.

"It was the second house we worked on. He was a veteran who had cancer. His mother had died six months prior. He lived alone. Nobody to care for him, and nobody had cared for his house in Montford for a long time," Wyndham said. "And there was this hole as big as a basketball in the dining room window. He had a piece of cardboard leaning up against it. In the bathroom, one of the walls didn't touch the ceiling, so air was just going up into there. The furnace? One of the ducts wasn't even attached."

Wyndham is the development director for Energy Savers Network, a nonprofit volunteer organization that provides energy-efficiency improvements for low-income households in Asheville and greater Buncombe County.

"So, we went into that veteran's house and built several interior storm windows, sealed the ceiling in the bathroom, weather-stripped the doors, and reattached the duct," Wyndham said. "And I can't imagine he didn't have a warmer winter."

In its two-and-a-half-years of existence, ESN has worked on nearly 200 homes, averaging about three a week and hitting as many as six when there are additional volunteers or other organizations chipping in to help.

Founded by Wyndham and Executive Director Brad Rouse, ESN aims to do the most with the least by going into these households and making simple adjustments that have major impacts on the heating and cooling bills, occupants' health and general sense of well-being of a household.

"Some of these heating bills can be \$200 to \$500 a month, and some of these people we work with have an income of around \$700 a month," Wyndham said. "It's a social justice issue, where some of the people who can least afford the heating bills live in the



Energy Savers Network Development Director Alice Wyndham (left) and Operations Coordinator Yulia Shaffer work on the porch of a local home being weatherized by the organization. An Asheville School student (far right) lends a hand.
PAT BARCAS PHOTOS



homes that use the most energy."

"It's a vicious cycle," said Yulia Shaffer, volunteer coordinator for ESN. "They can't invest in fixing these things, and yet the energy bill still increases. And those savings on the heat bill can mean survival."

"We start with a one-hour assessment, then we come back with three or more volunteers who work upwards of four hours," Wyndham said. "We work on behavior with the occupants, educating them about things that can save energy, test their hot water heater and see if we can turn that down, work with the thermostats and turn it to a more energy-efficient setting."

ESN's services are free to the resident, with the organization usually spending \$150 to \$200 per home on supplies such as LED lightbulbs and weather stripping. Of all the green initiatives that the organization provides, ESN is especially proud of the numerous interior storm windows they install, which can prevent heat from escaping out of the windows in winter. ESN hosts weekly "window-making parties," where they construct the windows at an estimated cost of about \$20 per window.

"A big part of our niche is that nobody in town really addresses windows," Wyndham said. "We

"It's a social justice issue, where some of the people who can least afford the heating bills live in the homes that use the most energy."

— Alice Wyndham,
Energy Savers Network

build interior storm windows that fit in with foam around the edge so they're easy to put in. They're made with optical vinyl, so they're clear, but they're light. People can put them in, pull them out, and put them behind their couch."

Wyndham estimates that around 40 percent of Buncombe County could qualify for the services provided by ESN.

Since August 2017, Green Built Alliance has been involved as the fiscal sponsor of ESN, which also receives support from a variety of city and state grants and other organizations.

"With Green Built Alliance, we're able to connect with way more organizations in the region. We're able to spread the aware-

ness around the community," Shaffer said. "Since we joined Green Built Alliance, it's really given us the structure and technical support we need as a volunteer organization. We can now be more scientific about our approach."

Though ESN is constantly buzzing with activity, client demand typically slows down in the warmer months of the year. This isn't because there is less need; it's simply that referrals drop off because people in need are less likely to turn to local charities when the weather is warmer. Nevertheless, ESN continues to reach out to any and all that may need its services.

"We're always looking for volunteers to join us, and to schedule work days," Wyndham said. "People who struggle financially don't necessarily think about green initiatives, because they're really just trying to meet their basic needs. But, it is a very basic need to be able to have a more efficient home to save money on heating and cooling bills. People go to these charities to get help for their heating needs. In the summer, it can be a hard to find clients, but we know they're out there."

To learn more about Energy Savers Network or get involved, visit energysaversnetwork.com.

A Roadmap to Renewables

Buncombe County Sets Goal of 100 Percent Renewable Energy

BY JEREMIAH LEROY

How does a local government succeed in making the transition to 100 percent renewable energy? I don't know.

Wait. As the person who has been charged with spearheading this initiative on behalf of Buncombe County, I'm not supposed to admit that out loud (or even worse, in writing). Frankly, my penchant for occasionally being too honest has gotten me in trouble on more than one occasion, but since I'm the one writing the article, I can also take the time to clarify, so stick with me.

In 2017, the Buncombe County Commission joined several local governments around the country in adopting a resolution that set a goal of reaching 100 percent renewable energy for county operations by 2030 and for the broader community by 2042.

It's an aspirational goal to be sure, and a timeline that is more ambitious than most. So as you can imagine, "how do we get there?" is one of the more common questions I get on the subject. (By the way, if anyone reading this has a super easy answer to that question, drop what you're doing and call me immediately.)

When I say the answer to that question is "I don't know," I don't actually mean that we have no idea what we're going to do. What I really mean is that there isn't any single method through which a community like ours can make this goal a reality. It's a complex issue, so naturally it has a complex solution.

The Buncombe County Office of Sustainability has a relatively small staff. By relatively small, I mean the staff consists of just me. So am I going to do this all by myself? Well I do know the answer that one. In case you are wondering, it's no – definitely no.

This is going to take the entire community – local governments, utility companies, nonprofits, the business community, and of course individual citizens. We will all have to play an active role in making this happen. If we are to be successful,



In 2017, the Buncombe County Commission joined several local governments around the country in adopting a resolution that set a goal of reaching 100 percent renewable energy for county operations by 2030 and for the broader community by 2042.

this is a journey we have to take together and the county is in a great position to help lead the charge by setting a goal that will help push our community toward a clean energy future.

A major challenge in these efforts is translating sustainability ambitions into concrete actions and specific information across a community. One of the first steps we're taking, in partnership with the City of Asheville, is to create what we are calling "A Roadmap to Renewables."

The intent is to implement a planning process through which we can identify the concrete and actionable steps our community can take to reach our goal. A commitment to 100 percent renewable energy is a call to action. This has to be about more than just "where we can install more solar?"

We need to identify things like:

- Potential City/County collaboration on renewable projects.
- Increasing commercial/residential energy-efficiency efforts.
- Opportunities for public/private partnerships.
- Reducing institutional barriers such as city/county permitting processes and Duke's interconnection application bottleneck.
- Working with Duke Energy to continue to increase renewables in its portfolio.
- Factoring in advancements in new technology like coupling renewables with battery storage.

The list goes on and on.

Another major step in moving us toward our goal has been the creation of the Blue Horizons Project. Blue Horizons is a joint venture between local governments, community organizations and Duke En-

ergy. The idea is to provide a centralized hub for all things clean energy in Buncombe County.

From residential weatherization programs to commercial solar installation and all things in between, Blue Horizons Project can help individuals and businesses access the resources they need to save money and help the community reach its clean energy goals. Undoubtedly I am biased, but I think it's pretty cool. (For more information on the Blue Horizons Project, read the article on page 48.)

In case you haven't noticed the theme here, what I'm saying is that clearly there is no magic bullet to get to 100 percent renewable.

I would however like to amend my initial statement. I think there actually may be an answer to the question of, "How do we get there?"

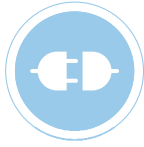
I think the answer is: Together.

Jeremiah LeRoy became Buncombe County's first sustainability officer in 2017, bringing with him to the job a wealth of experience in finance, tax, and IT departments. Having worked for Buncombe County for more than 12 years, he now oversees implementation of its carbon-reduction and renewable-energy goals.

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Asheville, Buncombe County Seek to Expand Affordable Housing

BY JEFF STAUDINGER

“Affordable housing” may seem an oxymoron to many people in Asheville and Buncombe County. And for good reason.

Although there is plenty of residential development happening in the area, most of the new rental housing developed in Buncombe County over the past few years has been in high-end market-rate units, while only a couple of properties affordable to low-income households were developed during this time.

Meanwhile, according to recent market studies, new affordable housing is being gobbled up quickly, with an occupancy rate consistently holding at 100 percent, and more than a thousand families on waiting lists.

The root of the problem

Market-rate rents have been rising in Asheville and Buncombe County by 4 percent annually, although there are some signs that market-rate apartment development may be slowing. The median rent for a two-bedroom, two-bath apartment – not including utilities – was almost \$1,150 in 2016. The median single-family home value is \$273,000, according to Zillow, which is a 6.5 percent increase from last year, and up dramatically from the low of \$162,000 in 2012.

The most common definition of affordability is that a household pays no more than 30 to 35 percent of its gross income on housing. Nearly half of all renter households in Buncombe County spend more than 30 percent of their gross income for their housing costs, and a quarter of all renter households in Buncombe County spend more than 50 percent of their gross income on housing. There are many factors contributing to this income-to-housing cost mismatch.

Asheville’s wages are lower and the cost of living is higher than most other North Carolina cities.

The Asheville area’s many assets have made it a highly desirable place to live, and the demand for housing has exceeded the supply.



A 70-unit private-sector affordable housing development is now under construction in Asheville by Swannanoa Bend LLC. The City of Asheville is providing loan funds from its Housing Trust Fund, as well as a Land Use Incentive Grant. PHOTO COURTESY OF KIRK BOOTH

Although it appears that production is high, Bowen National Research predicted that the Asheville metro area would need more than 6,000 new units affordable to households earning 120 percent of median income or less by 2020 in order to meet demand. It is clear that this level of production is not being met.

The area’s topography does not support the large subdivision-style developments that would bring high-volume developers to the region.

Finally, the loss of skilled construction workers during the recession has also constrained the creation of new housing.

The response of the community

These trends have informed the response to address affordable housing from local governments, including the City of Asheville as well as Buncombe County.

The city’s response has been robust. With a strong intent to create more public-private partnerships to increase affordable hous-

ing supply and preserve existing affordable housing, the city has upped the ante of its investments in affordable housing.

City voters overwhelmingly passed a \$25 million general obligation bond for affordable housing in the fall of 2016. The Asheville City Council has apportioned \$10 million to direct investments in affordable housing through its Housing Trust Fund, and \$15 million into repurposing strategic city-owned property for affordable housing development.

The city has also made a \$4 million commitment to the redevelopment of the Asheville Housing Authority’s Lee Walker Heights community, with a plan to more than double the number of affordable apartments there from 98 to 212.

The city has additionally incentivized private developers to make a portion of their otherwise market-rate developments affordable through grants, density bonuses, and other regulatory relief. Asheville is also encouraging homeowners to add “Accessory Dwelling

Units” to their existing homes.

Through these programs and others, the city hopes to help create 2,800 more affordable units by 2022.

At the same time, Buncombe County is using its Affordable Housing Services program to directly support affordable housing development through an annual awards process that funds non-profit organizations developing affordable housing. Buncombe County also supports affordable development through its Fee Rebate program.

The reality of the issue

These programs, while necessary, will not solve the issues of affordability in Western North Carolina.

National trends such as “the Missing Middle,” which promotes appropriate in-fill development at a neighborhood scale, the transformation of public housing through the Rental Assistance Demonstration program, and the emergence of a “YIMBY” movement (instead of NIMBY) all show promise here.

Programs and approaches that lower families’ residential operating costs through smart energy efficient construction and alternative energy are equally important, as are transportation alternatives and a focus on housing that is close to jobs, schools and services.

Recognizing that our entire community’s quality of life hinges on ensuring diverse and inclusive housing choices is a key value we need to embrace.

Jeff Staudinger is recognized as a leading proponent of local affordable housing finance policy and strategy. He worked as Asheville’s community development director, and as the assistant director of its Community and Economic Development Department. He was recognized by the North Carolina Housing Coalition as its Affordable Housing Professional of the Year in 2016. Jeff offers consulting services to local governments, nonprofits and housing developers.



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This accessible kitchen (above) incorporates an oversized pathway around island, oversized island, wall mount ovens and microwave, extra lighting and plug molding on the end of the island. This accessible bathroom (below) has features including a curbless shower, hand-held sprayer, window (in shower) and sola-tube for natural light, with extra emphasis on artificial light and lever handles. LIVING STONE CONSTRUCTION PHOTO

Aging in Place

Accessibility Is “Hip” in the Mountains

BY SEAN D. SULLIVAN

It is often said in our household, particularly on birthdays, that “you are only as old as you feel.”

The truth of the matter is that we are all aging in place every day.

Most Gen Xers have had experience dealing with aging parents and their living situations. So why has it taken so long for us to accept the inevitable about our own accommodations?

One sunny afternoon, I sat down with the Smiths, soon-to-retire clients of ours, and shared our mantra that if we are going to design-build a home for them, then we should do it right, with no regrets.

I explained that one of the considerations we make on every home is for our client to be able to “age in place.” I looked across the table and noticed that their eye-

brows were raised. They responded somewhat defensively with, “Do you think we are that old?”

I reassured them I was not commenting on their current health situation but simply wanted to deliver a home that, first, allowed them to live there as long as they needed without being forced into a retirement home, and, second, would be comfortable for anyone who chose to visit, including parents, neighbors and friends.

They put their trust in me and we continued on with the design of their soon-to-be beautiful (and barrier-free) home.

If you are like the majority of Americans over the age of 55, you want to find the perfect retirement spot and then be able to continue living in that familiar environment throughout your maturing years.

According to the AARP, older



homeowners overwhelmingly prefer to age in place, which means living in your home safely, independently and comfortably, regardless of age or ability level.

Aging-in-place homes are in limited supply, and often the result is that we are forced out of our own houses and into an assisted-living facility.

Odds are high that someone in your family will need a nursing home sooner or later. More than two-thirds of people over the age of 65 will require some type of

long-term care services during their lifetime, and more than 45 percent of people will need a period of care in a nursing home, according to the Centers for Medicare and Medicaid Services.

The cost of that care can financially cripple a family. But there are steps you can take: design and build (or renovate) a home that will accommodate your needs and allow for an in-home caretaker.

We all enjoy where we live in the mountains. However, due to the topography, finding a barrier-free home can be especially challenging here.

To support aging in place through our design process, we consider implementation of accessible entrances and exits, wider doorways, curbless showers, specific types of handles, blocking for grab bars, an extra emphasis on lighting, and the possible use of an elevator. Clients are often surprised to learn we can install an elevator for much less than the cost of building an extra bedroom on the main level.

We also design-in a “flex” room which can be used as a home office or a future bedroom for a caregiver.

Close to one year went by before the Smiths began their move to Asheville. They later called us to share that their adult daughter had moved home with them after having recently broken her ankle. To everyone’s surprise, the move went incredibly smooth as the daughter was able to get around anywhere in the house on crutches with ease.

So, whether it is your hip, knee, or ankle that gives out, the satisfaction of forward thinking and a job well done will pay off and save you money and comfort in the end.

Just ask the Smiths; they immediately became our greatest sales team.

Sean D. Sullivan is the president of Living Stone Construction, a leading design+build firm in Asheville. He is also a Certified Aging-In-Place specialist and past president of the Asheville and North Carolina Home Builders Associations. Sullivan’s current duties include chairing NAHB’s Design Committee and membership of their Executive Board. To learn more about aging in place, or Living Stone Construction, visit LivingStoneConstruction.com.



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Hardwood Harvesters

Local Sawmills Play Integral Role in Tree-Cycle Movement



Angie Solsbee decided to mill trees from her property and reuse them in the building of her new house and barn. Her finished flooring is pictured (left). Solsbee's pine, poplar, and maple logs were cut into lumber, kiln dried, and milled into flooring, trim and barn doors (right).

BY PHIL LONG

Green building refers to the practice of creating structures and using processes that are environmentally responsible and resource-efficient throughout the building life-cycle.

While there are many components of sustainable building, the purpose of this article is to explore the tree-harvesting side of this movement and the many possibilities of "tree cycling" — the recycling of trees that are removed from an owner's property and used to build parts of their businesses and residences.

Local sawmills are on the front lines of this movement, working with builders and homeowners to harvest trees from their properties and incorporate them into the building of their homes.

While customers sourcing their wood on site enjoy a variety of perks including cost savings and reduced environmental impact, many point to the emotional value as the greatest benefit. Many people experience strong feelings of sentimentality that something from their land was used in the construction of their home, business, or furnishings.

Angie Solsbee, a nurse at Mission Hospital in Asheville, said the idea of cutting down trees on her property to build a house almost

broke her heart. It was of great consolation when she and her builder decided that they would mill the trees and reuse them in the building of the house and barn. The pine, poplar, and maple logs were cut into lumber, kiln dried, and milled into flooring, trim and barn doors.

"Processing the lumber does take more time but it is definitely worth the effort," she said emphatically. "I wouldn't have done it any differently. All I can say is that it just feels good."

Solsbee reports enjoying her pine floors much more than the other expensive, store-bought flooring found in other parts of the house. Like many homeowners who have chosen to harvest trees from their property, Solsbee found there is a positive energy in knowing where the wood comes from versus using wood with no history.

For the myriad benefits of harvesting and reusing your own trees, there also are a few important things to consider before making the decision. Harvesting your own trees takes time and effort. If you are going to use the wood inside your home, we strongly suggest that your lumber is kiln dried.

Green wood will "move" and shrink and because they grow in nature, the wood needs to be sterilized so all living things in the

Barking Up the Right Tree

Bee Tree Hardwoods shared this digest of the most common types of wood they see used and frequent applications.

- Pine is used in flooring applications as well as for paneling on walls and ceilings.
- Poplar is common for trim on doors and windows, and very popular for paneling as well because of the beautiful colors.
- Oak is mainly used for flooring and cabinets because of its hardness, but also used in paneling.
- Maple, cherry, and walnut are favorites for countertops, bar tops, table tops, and other pieces of furniture.
- Black locust is indigenous only to this area of the country and because of its hardness to weather and insects, it is used mainly for decks and fences, although outside furniture is also a popular application.

wood are neutralized. Pine and poplar have shorter air-drying times, so they can be dried almost immediately. However, hardwoods, like oak, maple and others, need to be air dried for longer periods of time before they can go into the kiln. Consult your local dry kiln for exact air-drying times.

The effort comes in the form of getting the trees cut properly, transporting to your local mill, finding a suitable location for air-drying, arranging for kiln drying, and last, milling the boards into usable lumber for the chosen application.

Here in North Carolina, we are blessed with more than 650 species of trees, most in the Appalachians here in the western part of the state, but very few peo-

ple know that 61 of these species are considered threatened or endangered.

Whether or not you decide to join the "tree cycle" movement, please take down your trees responsibly. Every tree has a history.

Phil Long is the owner of Southeastern Hardwoods, also known as Bee Tree Hardwoods. Founded nearly two decades ago, the company is known throughout Western North Carolina and beyond as a provider of quality soft and hardwoods with more than 20 species of wood. It also provides custom sawing, drying, and milling orders. With a passion for wood since childhood, Phil has been a hobby woodworker for almost 40 years.

The Value of a Green Appraisal

Making the Most of Your Green Home

BY RYAN MILLER

When buying, selling or appraising a home with green features, three key factors determine whether or not value will be added to the transaction as a result of those characteristics.

To fully realize higher sale price, buyer interest or appraised value on a green home, it is important to ensure that:

- Available green feature data, including builder or homeowner purchase costs, is properly listed and accounted for.
- Knowledgeable appraisers and real estate agents are involved.
- Comparable data is available to evaluate the greater market value of homes with green features to those without.

How can you ensure that your green home is valued higher than others?

Let's start with an example:

House A is a three-year-old green home in Asheville. It was certified by the Green Built Homes program; has the perfect amount of insulation, a well-designed and installed energy-efficient HVAC system, and a new solar photovoltaic (PV) system; and is beloved by its owners for the comfort and low-utility bills that it offers. But, they need to move out-of-state for work and the house is put on the market to sell.

House B was built around the same time across the street with the same square footage and, for all intents and purposes, looks aesthetically the same as House A. But, this house has no green features. It leaks air causing comfort issues, the heating and air system is code-minimum for energy efficiency, and it's full of incandescent light bulbs. Its owners are looking to downsize and put it on the market at the same time as House A.

How can the owners of House A ensure they obtain an appraisal value and sale price that's higher than that of House B?

Think about the green features of House A as a money-printing machine sitting on the floor in the

corner of the living room. Imagine that every day for the past three years, the machine printed out a crisp, clean and authentic \$20 bill that now amounts to \$21,900. And, that it's going to continue to do so for the life of the home.

Effectively communicating the financial value of the green features — or, the money-printing machine — will help ensure a higher appraisal value and sale price. Providing documented evidence of the Green Built Homes certification, the added insulation, the builder's extra costs for the energy-efficient HVAC system and the other features will substantiate claims that they're worth more money than the code built features of House B. Advertising the house's added comfort, healthy indoor air quality, lower energy bills and other features will help the home-buyer be more comfortable with the higher sale price.

To get the higher appraisal value, the appraiser needs to be able to accurately compare the additional value of House A's green features to similar homes that also have money-printing machines, and then compare those to houses more like House B that don't have them. If there is evidence in the market that the green features contribute to a higher appraised value and sale price, the appraiser can add additional value. If there's not, they can only do so in very limited circumstances.

The advantage of a "green" appraiser

Good news: A national certification program exists for green-

certified appraisers. This program trains appraisers to understand and properly value houses with renewable-energy systems, energy-efficiency measures and other green features. While lenders cannot request a specific green-certified appraiser for an appraisal, a builder, homeowner or real estate agent can request a green-certified appraiser or, at the least, one that is knowledgeable of green home valuations. If one is available, great! If not, another appraiser can be requested until an

appraisal is performed.

providing additional value for the green features, even though they're certified to do just that.

A shorter, less costly green certification program for appraisers is needed in North Carolina. Combined with an increased availability of comparables data, a major part of the problem can be solved.

The role and resources of real estate agents

Agents in the Western North Carolina market readily list green features in homes — more so than



BEACH HENSLEY HOMES PHOTO

any other market in the state. But, that process is still a manual one whereby the agent has to first find the necessary information, then upload green home certification documents, check the necessary green feature boxes, list additional features in the comments and input a home energy rating number in the right place.

Is there a faster and better way? Yes, there is, but it's not being used! Green home data is readily available electronically (computers!) and can be shared instantaneously (internet!) but these capabilities are not being used by MLS directories in the state, including in Western North Carolina. If they were, every time a home

Bad news: There are only two green-certified appraisers in the entire state of North Carolina! Why is that? Well, the certification program is five days long, is not free and even when appraisers have completed the program, so few builders, real estate agents, homeowners and lenders know about the program that no one asks for them, making the certification not worth the trouble. And, in markets where green home data is not readily listed in MLS transactions and well-known to home buyers and sellers (note: not the Asheville market), the green-certified appraiser won't have any comparables to use, preventing them from

accurate appraisal is performed.

was listed on the MLS, a simple data process would pull the green features — home energy rating, insulation levels, green certifications, solar PV size, etc. — into the listing and make sure that they're accurate. (A special note here: a HERS rating of zero means the home is net-zero energy — not that it doesn't have a home energy rating!)

How would green home appraisals and sales transactions be better with these data capabilities?

Real estate agents would save time (and money) by having listing data auto-populated for them.

This data would be sourced from verified databases to ensure their accuracy (note: an ENERGY STAR® microwave does not result in an ENERGY STAR®-certified home).

Home energy ratings, green home certifications and other features would be readily available for appraisers and real estate

If there is evidence in the market that the green features contribute to a higher appraised value and sale price, the appraiser can add additional value. If there's not, they can only do so in very limited circumstances.

agents to use for comparables.

Homebuyers would be able to more readily view the wealth of green features in homes and seek out the ones with them, encouraging non-green homes to take action.

There are also simple ways to work around any potential drawbacks to increased automation of green home listings.

What if the Realtor doesn't want to list those green features? No problem, just click the "don't include" button and they go away.

What happens to green features that may degrade over time, or a change to the home that makes it use more electricity than at the time of the original home energy rating? No problem, because the features are populated

electronically and come with a timestamp so you can see when the rating was performed, or system installed, and determine if updated information is needed.

Key takeaways

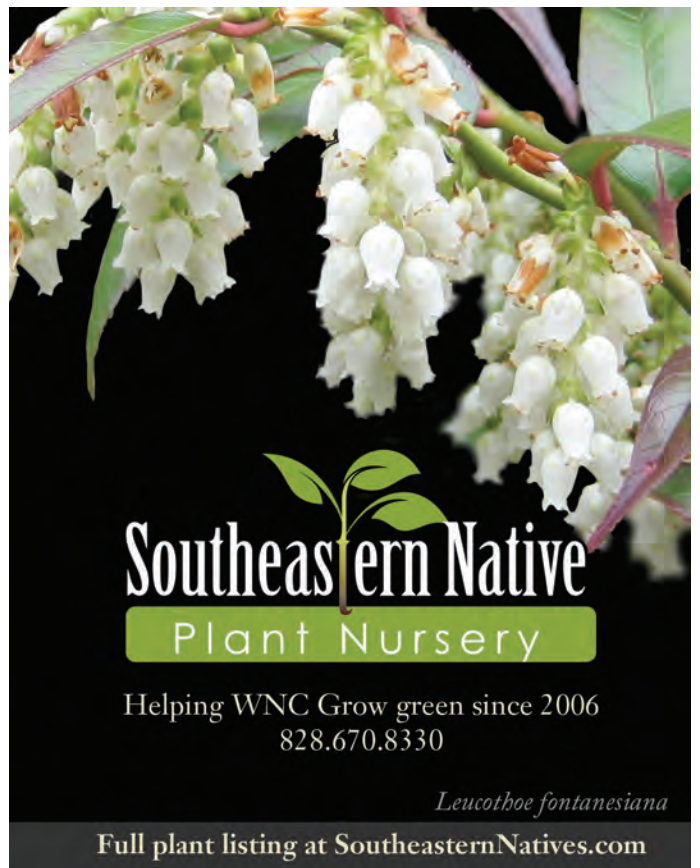
First, green homes are worth more money than others. Earlier this year, North Carolina Building Performance Association found a 9.5 percent sale price premium for energy-efficient, green and high-performance homes sold in the Charlotte, Triad and Triangle markets combined over 2015 and 2016. The Triangle market alone yielded a 22 percent increase. We don't yet know what the data shows for the Western North Carolina market, but perhaps we should find out!

Second, there is a tremendous opportunity for the Western North Carolina real estate community to demonstrate support for and leadership in green homes by requesting their MLS directories to take action on automating green feature information. There are a wealth of resources available to do so.

Third, to ensure that green homes like House A receive higher appraisal values and sale prices, green-feature data needs to be readily listed in MLS directories and effectively communicated to key parties in the transaction, particularly the appraiser. And hopefully, particularly to the green-certified appraiser. The more commonplace money-printing machines are in green-home listings in the area, the more additional value they can carry in real estate transactions.

Hopefully, the ongoing improvements to comfort, health, safety, energy usage and other benefits provide ongoing reason to buy and live in green homes, even if the up-front cost may be a little higher. After all, there's a money-printing machine in the corner of the living room.

Ryan Miller is the founder and executive director of North Carolina Building Performance Association, the state's not-for-profit trade association for energy-efficient, green and high-performance construction companies and professionals. In January 2018, the National Association of Home Builders awarded Ryan the 2017 Young Green Professional of the Year award in part due to his work to "green" North Carolina's MLS directories and increase the visibility of green homes in the state. Learn more about this work at buildingnc.org.



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Train Drain

The Role of Higher Education in Developing a Sustainable Workforce

BY HEATH MOODY

As our workforce faces the challenging mass exodus of baby boomers retiring over the next decade, there exists a unique opportunity to explore solutions that could not only put numerous Americans to work, but also solve some of our country's greatest struggles.

This retirement boom is inevitable and already underway. Pew Research Center estimates that every day, 10,000 workers become eligible for retirement. This will eventually create a void in the workforce never seen before.

The skilled-trades sector is expected to be one of the hardest affected by this shift. It's estimated that 60 percent of skilled trade positions could leave the workforce in the next five years. Some companies began reporting difficulties in hiring skilled labor as early as 2013. Many sources say this challenge has the potential to significantly influence the economy.

For many years, American high schools taught all students vocational and job-ready skills along with reading, writing, and arithmetic. In the 1950s, however, a different educational philosophy emerged that instead separated students into specific educational tracks with more focused curriculum based on perceived ability.

As this approach was established, concerns emerged that students were being assigned to tracks not based on aptitude but according to socio-economic status and race. In response, rather than bring vocational studies back into the core curriculum, a shift was made to put all students into a college-preparatory track.

Although well-intended, this move has been problematic. According to the Bureau of Labor Statistics, 30 percent of U.S. high school students now graduate with neither academic nor job skills. While 68 percent of high school students attend college,

the BLS reports that 40 percent of them don't complete a four-year degree. And of those who do complete, the BLS says a third of graduates end up in jobs that didn't require a four-year degree.

Today, community colleges and technical trade schools educate more than half of all American undergraduates. These organizations are well-poised to train the workforce to whom skilled-trade Baby Boomers can pass the torch.

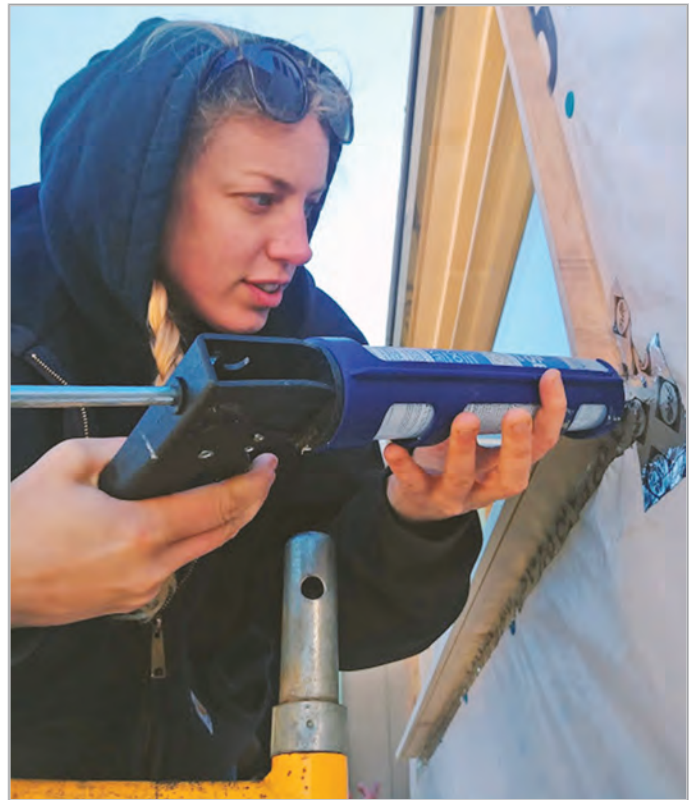
Community colleges even allow some students to get college credit while in high school, which can fast-track training efforts even further. This should in no way undermine universities, but be symbiotic; for example, by having articulation agreements for transfer students. Universities play a critical role in society and community colleges are a major source of their transfer students.

Studies show that many students who get job-specific skill training go on to get additional higher education, as the modern workforce favors those who have firm, transferable skills and are open to continuous learning.

By providing educational options early, we can not only address problems with K-12 and higher education but also put young people to task in recreating our energy infrastructure to address climate change while growing the economy.

Despite some political setbacks and the loss of the state's solar tax credit, North Carolina still ranks second behind California nationwide for cumulative solar installation and utility-scale systems.

Duke Energy also just introduced a \$62 million solar rebate program for North Carolina residential, business, and nonprofit customers. This not only offsets carbon and helps utilities meet demand, but it's putting young North Carolinians to work, doing jobs that they can feel good about. Many employees and job creators



AB Tech students receive hands-on lessons in green building (above, below and right). HEATH MOODY PHOTOS



The Engineering and Applied Technologies division at A-B Tech in Asheville offers additional programs in skilled-trade areas including HVAC, environmental engineering, electrical, automotive, welding, computer-aided drafting technology, and more.



alike want to know that they are contributing to solutions, and not adding to the problems of society and the environment with the work they're doing.

Asheville-Buncombe Technical Community College is just one of the resources in Western North Carolina offering programs in skilled trades such as building construction science, construction management, and sustainability technologies. The Engineering and Applied Technologies division at A-B Tech in Asheville offers additional programs in skilled-trade areas including HVAC, environmental engineering, electrical, automotive, welding, computer-aided drafting technology, and more.

Programs like these across the state and country are providing much needed affordable and consolidated training for a variety of skilled trades. In the traditionally energy-intensive construction industry, this training is helping to make our homes and buildings more energy-efficient and healthy, not only for the planet but the building's occupants as well. Renewable energy programs, such as the new consolidated Solar Photovoltaic certificate at A-B Tech in Asheville, are training a new workforce to help meet the demand of a rapidly growing solar industry.

Community colleges also offer many affordable continuing-education opportunities that address workforce development, as well as life-enrichment classes.

The Higher Education Act of 1965 supported the wide-scale construction of public colleges

and affordable ways for students to fund their education. Today, even as tuition costs have risen and education budgets have shrunk, our community colleges remain affordable public assets that we should value and support.

Just as President Franklin D. Roosevelt's New Deal trained youth and put them to work in creating public infrastructure while helping to form the once-largest middle class in the world, our schools, colleges, and universities also have a role to play in addressing our current labor shortages.

These invaluable institutions are uniquely positioned to improve the sustainability of our workforce by providing educational options, as well as addressing tangible environmental and economic issues around climate change and growing income inequality.

Heath Moody has been an instructor at Asheville-Buncombe Technical Community College since 2005. He helped develop A-B Tech's Sustainability Technologies program through a Department of Energy grant in 2010, and became chair of that department of the college in 2011. Having studied at Appalachian State University, he holds a bachelor's degree in anthropology and sustainable development, and a Master of Science in industrial tech and appropriate technology. He has served on Green Built Alliance's Board of Directors since 2012, as an advocate for sustainable and affordable housing in the Asheville area.

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Heat Pump Revolution

The Benefits of Variable-Speed Heat Pumps

BY AMY MUSSER

Sometimes the green-building industry evolves quickly, with a product making a quantum leap in efficiency. This is happening in 2018 with variable-speed heat pumps.

These have been on the market for a couple of years, but they are finally hitting the tipping point where the price has come down and they're becoming more popular. Here's why you should consider one for your next project.

Variable-speed heat pumps look the same as traditional heat pumps, but their technology performs better in several important ways.

They're a lot more efficient, which means they're cheaper to operate, quieter, and better at dehumidifying your home in the summertime. They are especially good at something traditional heat pumps haven't been able to do well — heating your house when it's really cold outside.

A 2014 study on variable-speed heat pumps by the Electric Power Research Institute showed an efficiency gain of 40 percent on the heating and cooling part of a utility bill, which is about in line with what the major manufacturers are claiming.

"The primary accolade we get from our customers is that their new system provides the warmest heat they have ever experienced while their heating bills are the lowest," said Duane Gentry at Gentry Heating.

One frequent complaint with electric heat pumps is that the backup "strip" heating that these systems use in cold weather is really inefficient, so homeowners see particularly large utility bill spikes in January and February. This is also bad for utilities.

You may have heard about community efforts — including the City of Asheville, Buncombe County, and Duke Energy — to avoid building a gas "peaker plant" in Asheville through the work of the Energy Innovation Task Force and the Blue Horizons Project. (See article on page 48 for more

on these efforts.)

Peaker plants are needed to add power to the electricity grid at times when customers are using a lot of power at the same time. Asheville tends to experience its peak power episodes early in the morning during cold weather, and backup heating for residential heat pumps is a major contributor to the problem.

Variable speed heat pumps use substantially less backup heating, and in the right application might not need any. Duke Energy is exploring ways to speed up the adoption of variable speed heat pumps, because they have the potential to reduce peak power usage. They already have some incentives in place, and a project is underway to study variable speed heat pumps in a few homes to determine whether even greater incentives can be justified.

"Heating and cooling use the most energy in an average household — more than 40 percent of an average monthly bill," said Duke Energy Senior Product and Services Manager Mark Otersen. "We are actively working to advance the market for variable speed heat pumps to help our customers save energy and money, while increasing the comfort of their homes".

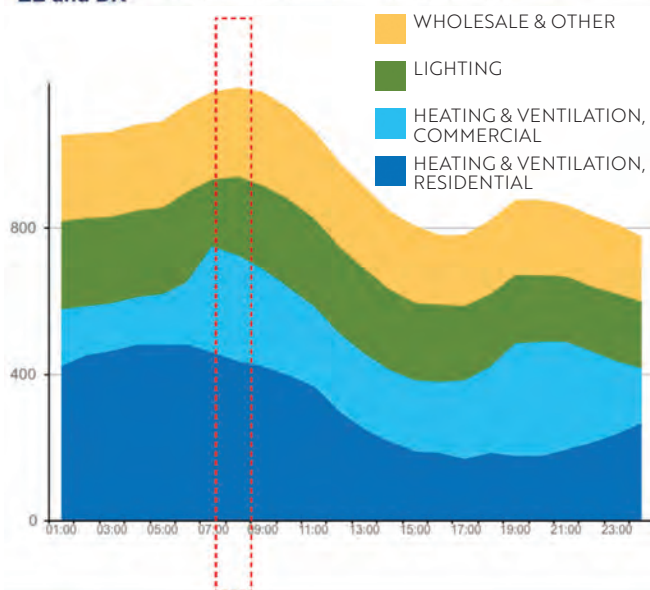
At the same time, the cost of these systems is quickly coming down as more people install them and companies can manufacture them more cheaply. In our home-energy rating business, these are quickly gaining market share among the green homes that we certify.

If you're looking to replace your current heating system or if you're building a new home, ask your HVAC installer about a variable speed heat pump.

Amy Musser is a founder of Vandemusser Design, an Asheville area company that provides green certification and energy-efficiency consulting to contractors, architects, and homeowners. She and her husband and business partner, Matthew Vande, have lived in a net-zero energy house since 2011.

A closer inspection of a peak winter day reveals five end uses account for >60% of peak load—and opportunities for strategic EE and DR

DEPW Estimated Hourly Consumption by End Use - Peak Day 2015



Source: NREL Hourly End Use Data, Buncombe County Building Stock, DEP Sales Data, DEPW System Demand Data



Our area experiences its peak power episodes early in the morning during cold weather, and backup heating for residential heat pumps is a major contributor to the problem. Variable speed heat pumps use substantially less backup heating, and in the right application might not need any.

GRAPHIC COURTESY OF ROCKY MOUNTAIN INSTITUTE



Variable speed heat pumps look the same as traditional heat pumps, but their technology performs better in several important ways.

PHOTO COURTESY OF VANDEMUSSEER DESIGN

Advanced Metering Infrastructure

The Next Generation of Energy Metering Comes to WNC



Replacing an old meter with a new meter is relatively simple, but with tens of thousands of meters to be replaced, it will take until approximately mid-2019 to complete the entire project in WNC. While similar to the older meters, new Smart Meters (right) can be identified by the “Open Way” lettering on the face. For more information about Smart Meters and AMI, visit duke-energy.com/our-company/about-us/smart-grid/smart-meter.

PHOTOS COURTESY OF DUKE ENERGY PROGRESS

BY NED RYAN DOYLE

AMI, shorthand for Advanced Metering Infrastructure, is being rolled out in the Western Carolinas this year for Duke Energy customers and is projected to be completed by mid-2019. So, what is AMI? Why does it matter?

AMI, as the name suggests, is a next-generation energy-metering system for residential, business and commercial Duke Energy cus-

tomers that will replace our current energy-metering system. Often called smart meters, AMI essentially offers the ability to provide two-way communications between a utility customer and the modern grid infrastructure.

In various forms, AMI has already been deployed in many regions nationally as a key component in developing a more efficient and reliable energy distribution system, as well as provid-

ing customers with more timely and useful information about how they use electricity.

Historically, our electric infrastructure has been a one-way street with a central generating station sending power out to customers based only on customer demand for energy. As demand goes up, the generating station ramps up production, when demand falls — such as at night — then production is dialed down. But that traditional utility model is changing rapidly and AMI is a key to making it a smooth and effective transition for the better.

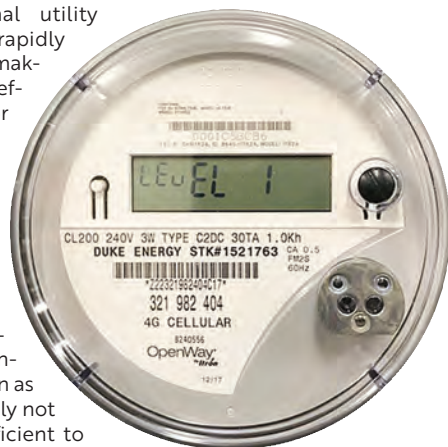
Upgrading to an AMI infrastructure matters particularly in Western North Carolina because of our intermittent winter time requirement for exceptionally high energy demands, known as “peak load.” It’s simply not cost-effective or efficient to build excess generating capacity to meet those few limited peak load periods. AMI will provide valuable data to Duke Energy and their customers that will enable them to more cost effectively improve efficiency and reduce some of that demand by shifting and managing those loads at the time of peak demand.

Concurrently, new sources of distributed energy, primarily solar photovoltaics in the Western North Carolina region, are expanding and sending electricity into the grid distribution system. This energy needs to be managed by the grid system for efficiency, reliability and safety. The AMI system is one key to achieving that goal. For example, the new AMI meters will provide more information and services for solar grid-tied customers and make it easier to flip the switch for residential clean energy.

Today’s utility customers want more control over the energy they use and by extension, what it costs. With AMI technology and energy

apps emerging rapidly, customers can better benefit from Time of Use programs, Demand Side Management, and more. AMI and smart meters are pivotal in making these apps and programs effective.

Of course, there’s more than just the AMI upgrade in developing a cleaner, more sustainable energy infrastructure. A unique collaboration between the City of Asheville, Buncombe County and



Duke Energy Progress, known as the Energy Innovation Task Force, has launched a long-term campaign called the Blue Horizons Project to educate and engage the community in grid modernization. (Learn more about this project on page 48.)

The campaign includes energy efficiency, weatherization, demand response, energy storage technology, electric vehicles, expanding solar energy and much more. However, one of the key initial elements to success will be the new Advanced Metering Infrastructure.

Ned Ryan Doyle is a sustainable energy and environmental advocate with decades of experience and activism. Currently co-chair of the Energy Innovation Task Force’s Technology Work Group, he works from a personally designed and owner-built fully off-grid workshop powered by solar energy. Contact Ned at nedryandoyle@earthlink.net.



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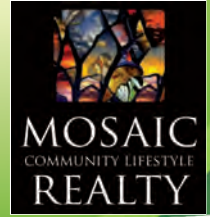
Solar Photovoltaics certification at A-B Tech

A-B Tech now offers a certificate in Solar Photovoltaics within the Sustainability degree program. The certificate combines quality hands-on training for jobs in the rapidly growing solar industry. Register now to be part of the clean-climate solution in one of NC's fastest growing job sectors. Learn more at abtech.edu/solar-certificate.

Contact us at (828) 398-7349 or hmoody@abtech.edu

Thank You to All of Our Members!

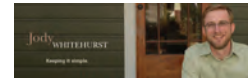
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For more information about membership, visit greenbuilt.org/membership

Reduce What You Can, Offset the Rest

Six Ways Businesses Can Reduce Their Carbon Footprint

BY CARI BARCAS

An increasing number of Western North Carolina businesses are doing the right thing for their business and the planet by making moves toward carbon neutrality.

As a resource to all community members interested in having a smaller footprint, the Asheville-based nonprofit Green Built Alliance routinely collaborates with businesses around town to educate them on ways they can save resources and reduce their carbon emissions.

Through its Appalachian Offsets local carbon-offsetting program, the nonprofit launched a campaign this spring to educate

and encourage local businesses to reduce their emissions first and then offset the rest.

Here are several key actions businesses can take:



1. Reduce energy use.

For most businesses, energy use is the main contributor to carbon footprint, often accounting for as much as 50 percent of emissions.

Get the best bang for your buck through efficiency in key areas:

■ **Lighting:** Install energy-efficient lighting such as LEDs, and make sure lights are off when out of use either manually or buy using automatic sensors.

■ **Office equipment:** When not in use, turn off equipment manually or use automatic power shutdown systems.

■ **Heating/cooling:** Add more insulation, do regular maintenance

on heating and cooling appliances, insulate hot water tanks and piping, invest in energy-efficient systems, and use a programmable thermostat.

2. Recycle packaging and compost food scraps to reduce waste sent to the landfill. Landfill waste produces methane, a greenhouse gas. Take time to develop a company waste-reduction plan and try to phase out single-use plastics.

3. Minimize air travel and shipment. On our carbon tab, air travel adds up quickly. Ship products by ground transit when possible.

4. Reduce fuel use. Consider ways to cut back whether by improving the efficiency of your distribution or encouraging employees to commute via bus, bike or ridesharing.

5. Prioritize sustainable procurement. A significant chunk of a business' carbon emissions is embedded in the supply chain. Where do your materials come from? Buy lo-

CALCULATE

Our website, cutmycarbon.org, offers a calculator to help you assess your business' carbon footprint. You'll just need access to basic info about your energy use, which can be found on your utility bills.

DONATE

Once you have a better sense of your business' footprint, you can choose to make a tax-deductible contribution toward a project right here in Western North Carolina to offset some or all of your carbon emissions.

CELEBRATE

All of our business donors are acknowledged with the inclusion of their logo on our website and social media. Place our sticker in your window so your customers know you're helping to build a better future for our community.

cal when possible. What are they made of? Opt for recycled or recyclable packaging and other materials whenever possible.

6. Offset. Green Built Alliance administers the local Appalachian Offsets program, which is unique from other carbon-offset initiatives because all contributions stay in Western North Carolina to directly support our local community. Appalachian Offsets recently completed fundraising to install a \$1 million solar system on Isaac Dickson Elementary in Asheville, which will help bring to fruition the new building's design as one of North Carolina's first net-zero energy schools.

We will soon be funding another clean-energy project in our community. To learn more about donating or set up an informational meeting with your organization, connect with Appalachian Offsets at cutmycarbon.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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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.



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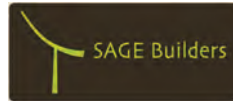
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surefootbuilders@gmail.com
surefootbuilders.com
We are a speculative and custom home building company working in the greater Asheville area. It is our passion to build beautiful and creative homes that add value and comfort to the lives of our owners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



The Brigman Group

Tim Brigman
PO Box 683
Weaverville, NC 28787
828.273.1185
timbrigman@gmail.com
thebrigmangroup.com
The Brigman Group is a team of collective thinkers dedicated to high quality construction through custom, investment, and renovated home building in Western North Carolina.

The William Baxter Co.

William Baxter
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Almond, NC 28702
828.506.8759
thewmbaxterco@aol.com



Thompson Properties, Inc.

John Thompson
452 Butler Bridge Road
Fletcher, NC 28732
828.684.7750
Info@ThompsonPropertiesInc.com
ThompsonPropertiesInc.com



Timberframe Horizons, LLC

Tom Rouse
PO Box 1921
Fairview, NC 28730
828.222.2555
Tom@TimberFrameHorizons.com
TimberFrameHorizons.com
We are your local design-build firm that specializes in creating energy-efficient custom artisan homes utilizing timber frame construction.



Timberline Custom Homes, LLC

Mark Montini
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Asheville, NC 28813
828.628.6800
timberlinehomes@att.net
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Town Mountain Builders

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Tyner Construction

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Wells Construction Group

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Wheelhouse

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wheelhousebuilders.com

Wood Family Builders

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Cleaning



Clean Environments

Clean Environments

Nina Young
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Commercial Builders



Buchanan Construction, LLC

Rick Buchanan
1642 Hendersonville Road,
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828.650.6565
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, upscale home - our unique hybrid of green and luxury.

Deltac Building Company

Don Thompson
69 Bingham Road
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DeltacHomes.com



High Country Timberframe & Gallery Woodworking Co.

Tom Owens
PO Box 1858
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828.264.8971
tomo@highcountrytimberframe.com
highcountrytimberframe.com

We are a fully insured, licensed general contractor specializing in high-performance homes. Our homes are designed and constructed to meet Green Built Homes and NC Energy Star 3 Standards. We offer design and build services for fully customized homes, and are experienced with a range of architectural styles and sizes. High value building options include our proprietary ShopBuilt High Performance Panelized Wall Systems, Structural Insulated Panels, Timber Frame and Insulated Concrete Form Construction.

Consultants

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D & J Properties

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davewalt@bellsouth.net
BalsamGreen.com
Need help with your green building project? We are a team of experienced consultants and designers acting as owner advocates throughout the design build process. Let us show you the many shades of green and explain our various services in our 5,000 sq ft LEED showroom.

Sustainability Consulting -

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PO Box 17804
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home-grow@organicgrowersschool.org
organicgrowersschool.org/consulting-coaching

Crawlspace Sealing



Conservation Pros

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Asheville, NC 28806
828.713.3346
sara@conservationpros.com
www.conservationpros.com
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"When the forest and the city are functionally indistinguishable, then we know we've reached sustainability." – Janine Benyus



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Below grade waterproofing, Tuff-N-Dri R3,5,10 or any combo. Slab on grade to seal up to RS-10 Air Moisture Barriers EnviroN-Dri, Encapsulated crawlspace. Interior Drains

Developers & Communities

Asheville Housing Authority

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Building for Life, L.L.C.

Stuart Zitin
139 3rd Street
Asheville, NC 28803
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stuartzitin@charter.net
buildingforlifeasheville.com
We have completed many renovations, additions, and a few new homes in Asheville since 1996. Now we have begun developing 4 south-facing acres in Oakley, a mile from BiltmoreVillage. All homes will be Energy Star/Green Built Certified—some with breathtaking mountain views and some affordable, including a Cottage Development.

East West Capital Group

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28 Schenck Pkwy 2B-200
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eastwestcapitalgroup.com
East West Capital is a real-estate private-equity investment firm with a focus on acquiring, repositioning and managing valuable 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 Acres Eco Community

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Green Earth Developments

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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

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habitatreimagined.com



JAG & Assoc. Construction, Inc.

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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 houses 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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bernie@ashevillmountainlots.com
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Mountain Sun Building & Design

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mountainsunbuilding.com
As both a land developer and a Design/Build firm, MSB&D 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.

Roberts Mountain

Adrienne Buck
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828.280.0451
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bestbuiltcustoms.com
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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.



Sure Foot Builders Inc.

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Ecotourism



Fusco Land Planning & Design

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Education



AB Tech
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hmoody@abtech.edu
abtech.edu
Our programs focus on a variety of teaching techniques, including live projects. Students acquire skills in energy efficiency, renewable-energy technologies, and construction materials and methods associated with high-performance buildings. We are Asheville's training center for renewable energy, advanced framing methods, green building, energy-auditing techniques, and software associated with building-energy analysis.



Asheville Home Builders Association

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Green Opportunities

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gwen@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.

NC Sustainable Energy Association

Mike Davis
4800 Six Forks Rd., Ste. 300
Raleigh, NC 27609
919.832.7601
mike@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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IBEW Local 238

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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.

Engineers



Appalachian Landslide Consultants, PLLC

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HydroCycle Engineering

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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.



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Finishes - Exterior



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Interface is the worldwide leader in design, production and sales of environmentally-responsible modular carpet for the commercial, institutional, and residential markets. We seek to be the first company that, by its deeds, shows the industrial world what sustainability is in all its dimensions: people, process, product, place and profits.

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Mountain Marble & Granite, Inc.
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RockStar Marble & Granite
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The Arch Architectural Finishes, Flooring and More
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Asheville, NC 28804
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Sustainable flooring, American Clay Earth plaster, lime plaster, applicator services, clay workshops, Forno Bravo pizza ovens, outdoor fireplace kits, complete installations, Vermont Natural Coatings, contractor pricing



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Home Energy Raters



Eco-Sense Design & Consulting
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hunter@ecosensedesign.com
ecosensedesign.com
Certifying for Green Built Homes, Energy Star for Homes and Duke/Progress rebates.

Residential Energy Diagnostics
Elliott Nailen
Fairview, NC 28730
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elliott@goredforgreen.com
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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.

Home Inspectors

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Mitsubishi Electric Cooling & Heating
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Blue Ridge Radon Solutions

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



Your Ventilation Specialist

Green R, Inc.

Ron Pariseau
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828.680.9615

Ron@GreenRInc.com
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 Construction

Molly Sullivan Reeves
706 NC Highway 9
Black Mountain, NC 28711
828.669.4343

molly@livingstoneconstruction.com
livingstoneconstruction.com

Living Stone 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.

Insulation



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

O&B Colonial

Michael Borst
704.562.6144
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Interior Designers



Alchemy Design Studio

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ALLARD & ROBERTS
interior design

Allard & Roberts Interior Design, Inc

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D&J PROPERTIES

D & J Properties

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Need help with your green building project? We are a team of experienced consultants and designers acting as owner advocates throughout the design build process. Let us show you the many shades of green and explain our various services in our 5,000 sq ft LEED showroom.



Green Built Environments

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Whether designing new homes, remodeling existing spaces, or helping people to buy or sell property, I strive to help create places that support us and our families to be safe, healthy, and to live gently on the earth



Griffin Architects PA

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Griffin Architects provide years of experience and interpretations of specific information relative to the clients needs, the site and its orientation, and the neighborhood's 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.



The Brigrman Group

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The Brigrman Group is a team of collective thinkers dedicated to high quality construction through custom, investment, and renovated home building in Western North Carolina.

Interior Finishers

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ROCK STAR
MARBLE & GRANITE

RockStar Marble & Granite

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RockStar Marble and Granite is a leading counter top 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.

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Land Planning



Equinox

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



V & V Land Management and Resource Recovery LLC

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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



Equinox

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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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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.



Osgood Landscape Architects
 Joel Osgood
 14 Church Street
 Asheville, NC 28801
 828.337.7496
 jo@osgoodla.com
 osgoodla.com

Landscapers

Appalachian Ecoscapes, INC
 Dylan Kirby
 PO Box 5453
 Asheville, NC 28813
 828.989.8999
 dylan@appalachianecoscapes.com
 appalachianecoscapes.com

Grass to Greens
 Katie Gelin
 PO Box 898
 Asheville, NC 28802
 828.775.0614
 g2ginfo@bountifulcities.org
 grass2greens.com
This program of Bountiful Cities specializes in edible and permaculture landscape design, installation, and maintenance for urban and rural properties.

Snow Creek Landscaping, LLC
 Timothy Boone
 226 Clayton Road
 Arden, NC 28704
 828.687.1677
 marketing@snowcreekinc.com
 snowcreekinc.com

Thorpe Landscapes, LLC
 Daniel Thorpe
 Lot 3 Winding Ridge
 Black Mountain, NC 28711
 717.752.6496
 dsthorpelandscapes@gmail.com
 thorpelandscapes.com
Professional Landscaping Installation and Maintenance Company. Specializing in environmentally friendly hardscapes, new construction installations, and storm water management solutions.

Landscaping Supply

Pisgah Plants
 George and Jennifer Hodges
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 Candler, NC 28715
 828.670.8733
 info@pisgahplants.com
 pisgahplants.com



Southeastern Native Plant Nursery
 Brad Martin
 36 Kel-Co Road
 Candler, NC 28715
 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



Alfie
 Jill Lieberman
 19 Arlington Street
 Asheville, NC 28801
 828.776.8636
 jill@alfieloans.com
 www.alfieloans.com



Prime Mortgage Lending
 Zachery Adam
 862 Haywood Road
 Asheville, NC 28806
 828.242.4780
 zachery@goprime.com
 goprimeasheville.com
Prime Mortgage Lending will provide complete, inclusive mortgage solutions that are educational, transparent, honest and sincere.

Union Home Mortgage
 Teresa Roach
 1200 Ridgefield Boulevard, Suite 170
 Asheville, NC 28806
 828.229.1521
 troach@unionhomemortgage.com
 unionhomemortgage.com

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 precisionrestoration@frontier.com
 restorewnc.com

CREATE LESS TRASH
 by not ordering food to-go and not accepting plastic utensils or straws.

Pest Control

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 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
 George Efrid
 111 Forest Street
 Asheville, NC 28803
 828.274.4858
 katti@blueplanetplumbing.com
 blueplanetplumbing.com

Goodman Plumbing
 Jacob Goodman
 Asheville, NC 28804
 828.774.7076
 info@goodmanforthejob.com
 goodmanforthejob.com

Realtors

Appalachian Realty Associates
 Erik Aasland
 23 Arlington Street
 Asheville, NC 28801
 828.255.7530
 duckfat@ioa.com
 appalachianrealty.com
Full Service Real Estate Brokerage



Beverly-Hanks & Associates Realtors
 Bobbi Holland
 One Town Square Blvd., Suite 140
 Asheville, NC 28803
 828.275-6170
 bholland@beverly-hanks.com
 beverly-hanks.com/agents/bholland
NAR Green Realtor helping buyers and sellers make their real estate dreams come true in Western North Carolina. Working hard and smart for you every step of the way.

Carolina Mountain Sales
 Tracy McCormack
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 Asheville, NC 28803
 828.277.5551
 Tracy@carolinamountainsales.com
 carolinamountainsales.com



Jackie Rocks Green at Dawn Wilson Realty
 Jackie Tatelman
 PO Box 1596
 Black Mountain, NC 28711
 828.713.5193
 jtatelman@gmail.com
 dawnwilsonrealty.com
Jackie Rocks Green! A realtor who is customer focus and knows how to navigate the complexities of real estate transactions. Eco-Certified. Jackie lives in a gold certified green home that is solar PV and thermal. She has built 2 green homes. Jackie lives with her wife Nancy and their rescue dog, Lulu. A trained chef who loves the bounty of our local markets. Find her hiking the trails and exploring large tracts of land. Jackie works with both buyers and sellers in the Asheville area including Black Mountain and Marshall.



Jody Whitehurst, Realtor - Town and Mountain Realty
 Jody Whitehurst
 261 Asheland Ave, Suite 103
 Asheville, NC 28801
 828.215.3981
 jody@jodywhitehurst.com
 jodywhitehurst.com
Buying or selling real estate in Western North Carolina can be a complex journey. Let me simplify your experience through hard work, thorough research, and thoughtful communication.

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 John Senechal
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 Asheville, NC 28802
 828.230.4021
 johnsenechal.kw@gmail.com
 johnsenechal.kwrealty.com

Kellers Williams Elite Realty
 Millicent Woodward
 16 Sourwood Lane
 Fletcher, NC 28732
 828.230.7929
 mwoodward@kw.com
 mwoodward.kw.com

DURING SUMMER MONTHS, gardens and landscaping can account for 50 to 70 percent of a home's water usage. Installing a rainwater-harvesting barrel could take care of your watering needs for the summer.



Love The Green Team
 Mary Love
 22 Archery Lane
 Asheville, NC 28806
 828.279.6723
 marylovethegreen@gmail.com
 lovethethegreen.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.

Mary Ellen Brown - United Real Estate Asheville
 Mary Ellen Brown
 1238 Hendersonville Road
 Asheville, NC 28803
 828.280.7254
 mebrown@ureasheville.com
 unitedrealestateasheville.com



MOSAIC Community Lifestyle Realty
 Mike Figura
 60 Biltmore Ave, Suite 3H
 Asheville, NC 28801
 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.



Nest Realty
 Amanda Boren
 394 Merrimon Ave Suite A
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 amanda.boren@nestrealty.com
 nestrealty.com/amandaboren

New Earth AVL Realty
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 828.515.1771
 jmartini@kw.com
 newearthavl.com
Full-service green real estate company committed to turning dreams into reality with integrity, gratitude, and community.

Robbie McLucas, Realtor - Town and Mountain Realty
 Robbie McLucas
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 Asheville, NC 28801
 828.335.2515
 robbie@townandmountain.com
 townandmountain.com

Robbie provides clients with in-depth knowledge of Asheville, and works as listing agent for several of this city's green builders.



Robin Cape - Agent, Town and Mountain Realty
 Robin Cape
 45 Sunnycrest Drive
 Asheville, NC 28805
 828.216.4009
 robincape@gmail.com
 robincape.com

The Real Estate Center of Asheville Inc.
 Scott Carter
 159 South Lexington Avenue
 Asheville, NC 28806
 828.231.5076
 scottcarter@recenter.com
 recenter.com

Recycling



Asheville Area Habitat for Humanity ReStore
 Paul Reeves
 31 Meadow Road
 Asheville, NC 28803
 828.254.6706
 preeves@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.

Griffin Waste Services LLC
 Chad Griffin
 402 Old Leicester Hwy
 Asheville, NC 28806
 828.281.4549
 chad@griffinwaste.com
 griffinwaste.com



Junk Recyclers Inc
 Phillip Stoltz
 26 Glendale Ave
 Asheville, NC 28803
 828.707.2407
 junkrecyclers1@gmail.com
 junkrecyclers.net

Renewable Energy



Asheville Solar Company
 Nate Pembleton
 4 Mosers Place
 Candler, NC 28715
 828.808.4153
 nate@ashevillesolarcompany.com
 ashevillesolarcompany.com



Blue Ridge Biofuels
 Woodrow Eaton
 PO Box 2896
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 828.253.1034
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 blueridgebiofuels.com

Convert Solar
 Tim Wilkins
 2245 Leeward Shore Court
 Virginia Beach, VA 23451
 703.966.9408
 chad@convert-solar.com
 convert-solar.com

Ferguson Well Drilling LLC
 Joe Ferguson
 2829 New Leicester Hwy
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Geothermal Design Center Inc.
 Rick Clemenzi, PE, CGD
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 Asheville, NC 28814
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 geothermaldesigncenter.com



Hannah Solar
 Evan Becka
 13 S Main Street
 Marshall, NC 28753
 828.206.4780
 evan.becka@hannahsolar.com
 hannahsolar.com
 Hannah Solar is a full-service solar integrator dedicated to providing the very best in engineering, products, installation and operations and maintenance of solar arrays, electric vehicle (EV) charging stations, Tesla storage systems and Generac backup generators.

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 Tracy Tippin
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Solar Dynamics Inc.
 Ole Sorensen
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 Asheville, NC 28806
 828.665.8507
 ole@soldynamicsnc.com
 soldynamicsnc.com



Solfarm Solar Co.
 Mike Diethelm
 70 Woodfin Place, Suite 133
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 828.332.3003
 office@solfarm.com
 solfarm.com



Sugar Hollow Solar, Inc.
 Phelps Clarke
 16 Sugar Hollow Lane
 Fairview, NC 28730
 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
 11 Salem Hill Road
 Weaverville, NC 28787
 828.645.2080
 info@sundancepower.com
 sundancepower.com
 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.



Sunstore Solar Energy Solutions
 Ashley Edwards
 8 Distribution Ct.
 Greenville, SC 29650
 864.901.7387
 community@sunstoresolar.com
 sunstoresolar.com
 For more than 40 years, Sunstore Solar's employees have been leading the way, providing outstanding solar consultation and installation in the Carolina's. When you need solar panel installation Sunstore Solar can help you bring clean, cost-efficient, renewable energy to your home or business.

Renovators & Remodelers



A & B Construction and Development, Inc.
 Jeremy Bonner
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 Asheville, NC 28813
 828.258.2000
 jeremybonner@a-b-construction.com
 a-b-construction.com
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BuiltSmart by Bob
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 Asheville, NC 28804
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Burdett Building and Remodeling LLC
 Bill Burdett
 PO Box 381
 Zirconia, NC 28790
 828.693.6036
 burdettbuilding@gmail.com



Continuous Improvement Construction LLC
 Duane Honeycutt
 125 Walker Cove Road
 Black Mountain, NC 28711
 828.551.7573
 cicllc.duane@gmail.com
 cic-llc.squarespace.com



Earthtone Builders
 Greg McGuffey
 12 Rich Street
 Asheville, NC 28806
 828.230.4469
 earthtonebuilders@gmail.com
 earthtonebuilders.com
 We are a leading green building company committed to the highest standards in construction quality and sustainable, healthy living.



Evergreen Construct Inc.
 Darren Henegar
 12 Moonrise Ridge
 Leicester, NC 28748
 828.779.4077
 evergreenconstructinc@gmail.com
 Evergreen Construct specializes in custom-built homes and renovations, using your inspiration to create mindfully crafted structures through a collaborative process.



Falcon Development of NC
 David Ross
 30 Hendersonville Road
 Asheville, NC 28803
 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

TIP: Use a battery charger and rechargeable batteries instead of buying new ones.



Forward Construction Inc.

Jim Forward
24 Smokey Road
Asheville, NC 28803
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.



Green Built Environments

Victoria Schomer
25 Saint Dunstons Circle
Asheville, NC 28803
828.707.2919
vschomer@greenbuilt-e.com
greenbuilt-e.com
Whether designing new homes, remodeling existing spaces, or helping people to buy or sell property, I strive to help create places that support us and our families to be safe, healthy, and to live gently on the earth



Hewn Inc

Matt Parks
59 Gracelyn Road
Asheville, NC 28804
828.595.4396
matt@hewn.co
hewn.co
Hewn Inc is a full-service residential and commercial renovation and construction company serving the Asheville area. We love working with recycled, local and re-purposed materials to create spaces that are unique, functional and more ecologically appropriate.



HomeSource Real Estate & Construction, Inc

Tim Alexander
172 Charlotte Street
Asheville, NC 28801
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.

SAVE: Using a programmable thermostat that adjusts the temperature when you're not home saves you money on your energy bill and uses less energy.



Jade Mountain Builders

Hans Doellgast
85 B&B Stables Drive
Fairview, NC 28730
828.216.3948
hans@jademountainbuilders.com
jademountainbuilders.com
Jade Mountain Builders is a team of 31 Craftsmen who pride themselves on taking an ecologically sensitive approach to building homes.



JAG & Assoc. Construction, Inc.

Jody Guokas
33 Mineral Springs Road
Asheville, NC 28805
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 houses 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.



Pioneer Construction and Development Inc.

Duane Liming
31 Post Rd
Asheville, NC 28806
828.768.8771
duane@pioneerashville.com
pioneerashville.com
With over 25 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



R-Squared Construction

Joel Barto
46 Windy Hill Drive
Clyde, NC 28721
828.582.3933
r2carpentry@gmail.com
r-squaredconstruction.com
R-Squared Construction has been crafting high-quality custom homes in the Asheville area since 2003. With an experienced team of career carpenters, it is their mission to collaborate with clients, architects and designers to provide you with a beautiful home that you'll continue to fall in love with for a lifetime.



Rare Earth Builders

Mark Bondurant
105 Creative Cove
Canton, NC 28716
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
3 Von Ruck Terrace
Asheville, NC 28801
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
30 Stewart Street
Asheville, NC 28806
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
6 Fairview Road
Asheville, NC 28803
828.505.2137
george@rockstarmarble.com
rockstarmarble.com
RockStar Marble and Granite is a leading counter top 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.



The Brigman Group

Tim Brigman
PO Box 683
Weaverville, NC 28787
828.273.1185
timbrigman@gmail.com
thebrigmangroup.com
The Brigman Group is a team of collective thinkers dedicated to high quality construction through custom, investment, and renovated home building in Western North Carolina.

Residential Designer



Earthtone Builders

Greg McGuffey
12 Rich Street
Asheville, NC 28806
828.230.4469
earthtonebuilders@gmail.com
earthtonebuilders.com
We are a leading green building company committed to the highest standards in construction quality and sustainable, healthy living.



HomeSource Real Estate & Construction, Inc

Tim Alexander
172 Charlotte Street
Asheville, NC 28801
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

Emily Boyd
48 Beaverdam Knoll Road
Asheville, NC 28804
828.713.0549
emily@mountainsunbuilding.com
mountainsunbuilding.com
As both a land developer and a Design/Build firm, MS&D 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.



Timberframe Horizons, LLC

Tom Rouse
PO Box 1921
Fairview, NC 28730
828.222.2555
Tom@TimberFrameHorizons.com
TimberFrameHorizons.com
We are your local design-build firm that specializes in creating energy-efficient custom artisan homes utilizing timber frame construction.

Reuse Retail Salvage



Asheville Area Habitat for Humanity ReStore

Paul Reeves
31 Meadow Road
Asheville, NC 28803
828.254.6706
preeves@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 Deconstructions service.

Roofers

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Emilio Ancaya
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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.

REDUCE: Use a clothesline when possible to save energy and reduce carbon emissions.

Salvage



Asheville Area Habitat for Humanity ReStore
Paul Reeves
31 Meadow Road
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828.254.6706
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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.



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Zirconia, NC 28790
828.697.0357
info@wholeloglumber.com
wholeloglumber.com
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Site Work



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105 Creative Cove
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828.492.0534
rareearthblldr@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
101 Old Mars Hill Highway
Weaverville, NC 28787
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.

Structural Materials



84 Lumber
Matt Pocta
75 Montgomery Street
Asheville, NC 28806
828.665.3815
pocmat@2306.84lumber.com
84lumber.com
At GreenEdge Supply, 84 Lumber Company's green initiative, we can help you integrate energy, water and resource efficiency along with improved indoor air quality with our sustainable products.



High Country Timberframe & Gallery Woodworking Co.
Tom Owens
PO Box 1858
Boone, NC 28607
828.264.8971
tomo@highcountrytimberframe.com
highcountrytimberframe.com
We are a fully insured, licensed general contractor specializing in high-performance homes. Our homes are designed and constructed to meet Green Built Homes and NC Energy Star 3 Standards. We offer design and build services for fully customized homes, and are experienced with a range of architectural styles and sizes. High value building options include our proprietary ShopBuilt High Performance Panelized Wall Systems, Structural Insulated Panels, Timber Frame and Insulated Concrete Form Construction.



Jennings Builders Supply & Hardware
Ali Mangkang
215 Howard Gap Rd.
Fletcher, NC 28732
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
PO Box 1921
Fairview, NC 28730
828.222.2555
Tom@TimberFrameHorizons.com
TimberFrameHorizons.com
We are your local design-build firm that provides structural trusses and complete house timber frames perfect for your specific project.

Supporting Members



AB Tech
Heath Moody
340 Victoria Road
Asheville, NC 28801
828.254.1921
hmoody@abtech.edu
abtech.edu
Our programs focus on a variety of teaching techniques, including live projects. Students acquire skills in energy efficiency, renewable-energy technologies, and construction materials and methods associated with high-performance buildings. We are Asheville's training center for renewable energy, advanced framing methods, green building, energy-auditing techniques, and software associated with building-energy analysis.



Boral
Sean Van Buren
175 Circle M Drive
Salisbury, NC 28147
843.998.2773
sean.vanburen@boral.com
boralamerica.com/TruExterior
TruExterior® Siding & Trim addresses both moisture- and movement-related issues. The sustainable properties result from the combination of proprietary polymers and highly refined, recovered coal-combustion products. Endorsed by the U.S. Green Building Council - Cradle to Cradle Certified™ - Minimum 70% recycled content - verified by SCS Global Services

CompostNow
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706 Mountford Avenue
Raleigh, NC 27603
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
330 South Pike West
Sumter, SC 29150
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/mynewhomevnc. For details on our builder program, visit duke-energy.com/newhomes.



Integrative
Terri Morrin
120 Coxie Avenue, Suite 2A
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828.250.0970
terri@integritive.com
integritive.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
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Rockbrook Camp for Girls
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jeff@rockbrookcamp.com
rockbrookcamp.com

The Collider
Megan Robinson
1 Haywood Street, Suite 401
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Surveyors



Blackrock Surveying and Land Design PC
Jamie Brady
PO Box 8302
Asheville, NC 28814
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jbrady@blackrocksurveying.com
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Kee Mapping & Surveying, PA
Brad Kee
88 Central Ave
Asheville, NC 28801
828.575.9021
brad@keemap.com
keemap.com

Sustainable Wood Products



Architectural Woodcraft
Craig Weis
199 Amboy Road
Asheville, NC 28806
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.

Columbia Forest Products
Richard Poindexter
7900 Triad Center Drive
Greensboro, NC 27409
800.637.1609
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Smoky Mountain Log Homes
George Blackburn
3517 Jonathan Creek Road
Waynesville, NC 28785
828.734.7151
george@smokymtnhomes.com
smokymtnhomes.com



Southeastern Hardwoods dba Bee Tree Hardwoods
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734 Bee Tree Road
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 Mountain Brook Inc
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 Asheville, NC 28801
 828.250.0004
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 mountainbrookhomesinc.com



Timberframe Horizons, LLC
 Tom Rouse
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 Asheville, NC 28806
 828.665.3815
 poctam@2306.84lumber.com
 84lumber.com

At GreenEdge Supply, 84 Lumber Company's green initiative, we can help you integrate energy, water and resource efficiency along with improved indoor air quality with our sustainable products.



AB Tech
 Heath Moody
 340 Victoria Road
 Asheville, NC 28801
 828.254.1921
 hmoody@abtech.edu
 abtech.edu

Our programs focus on a variety of teaching techniques, including live projects. Students acquire skills in energy efficiency, renewable-energy technologies, and construction materials and methods associated with high-performance buildings. We are Asheville's training center for renewable energy, advanced framing methods, green building, energy-auditing techniques, and software associated with building-energy analysis.

Green Source Construction Management, Inc
 Josh Scald
 67 Goldmont Street
 Black Mountain, NC 28711
 828.337.0284
 greensourcebuilder@gmail.com
 facebook.com/blackmountain-greenbuilder



Nanostead LLC
 Jeremy Stauffer
 448 Old Farm Road
 Marshall, NC 28753
 828.206.2526
 jsstauff@gmail.com
 nanostead.com

Wall System Installers



K-Wall Poured Walls, LLC
 Rich Kubica
 140 Foundation Way
 Fletcher, NC 28732
 828.654.9255
 rich@k-wall.com
 k-wall.com



Superior Walls of NC
 Bob Bauer
 5045 Hendersonville Road
 Fletcher, NC 28732
 828.606.8371
 bbauer@superiorwallsnc.com
 superiorwallsnc.com

Waterproofing



J Coleman Waterproofing
 Jan Coleman
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 Asheville, NC 28805
 828.299.8506
 jan@jcolemanwaterproofing.com
 jcolemanwaterproofing.com
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Windows, Doors & Awnings



Architectural Woodcraft
 Craig Weis
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 Asheville, NC 28806
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 craig@architecturalwoodcraft.com
 architecturalwoodcraft.com
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Builders FirstSource
 Antonio Grion
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 Asheville, NC 28806
 828.252.2491
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 — Paul Hawken



Morrison Millwork
 Stacy Fields
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 Asheville, NC 28803
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 stacy@morrisonmillwork.com
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BuiltSmart by Bob
 Bob Callahan
 104 Lakeshore Drive
 Asheville, NC 28804
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Columbia Forest Products
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North America's largest manufacturer of decorative hardwood veneer and hardwood plywood (including plant in Old Fort, NC). Panels used for all types of interior casework (commercial and residential). FSC Certified. CARB & LEED Compliant. Innovator of soy-based formaldehyde free PureBond technology.



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 Asheville, NC 28806
 978.501.6954
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Narwhal Design Build LLC
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