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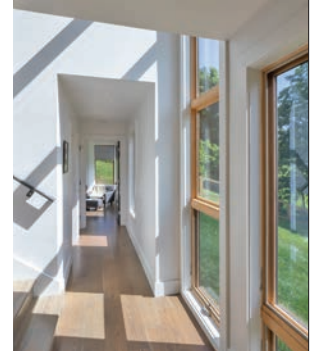
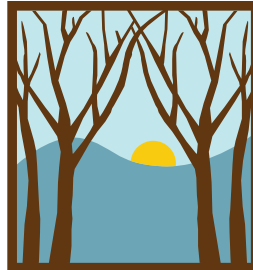
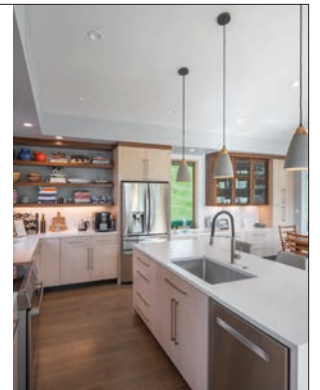


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Building Net-Zero Homes, like the one pictured here in Asheville, is good for the planet and can actually save homeowners money. (Story on Page 28)

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Green Built Alliance is an Asheville-based environmental non-profit organization that aims to transform the building industry in western North Carolina by supporting sustainable design, construction, and renewable energy. We are proud of our long track record of success in this industry and region.

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Welcome to the Green Guide

All Hands on Deck

We have been awestruck by the wellspring of community action following Hurricane Helene. The storm was a bitter reminder of just how important our homes are. We grieve for anyone who lost loved ones, their home, or both. We are reminded of the precious nature of water and the destructive force it can wield. Most poignantly, we are reminded of this organization's role in creating a resilient and site specific built environment.

We dedicate this 2025 issue of the Green Living Guide to all those lost to the wrath of Hurricane Helene. Rainfall should be measured in inches rather than feet. Homes should be a refuge. For all those who suffered loss, know that we are working hard to change the conditions necessary for such a storm.

Water calls the shots. All of our intentions should recognize the role of water on our building sites. From simple decisions regarding downspouts, to fundamental design choices with the foundation, materials, etc. Nature bats last.

Like everyone in our region, Green Built Alliance has done some soul searching. We have reconsidered our day-to-day operations and asked ourselves if we are doing the best we can. We realize that our highest and best purpose is to serve those in the construction industry who are pushing the envelope of what it means to build green. "Appropriate Building" has and always will be a proactive and potent solution to a whole host of ills. To this end, we have determined to focus specifically on advancing our Green Built Homes certification program, expanding our educational offerings that satisfy Continuing Education for Contractors and others, and promoting Green Building practices in the community. In other words, we are re-focusing our efforts on constructing the buildings of tomorrow.

Our region is nothing if not strong of mind and creative of spirit. As we build back from the hurri-



cane, let's build back the best that we can. Crazy weather extremes will continue to test us. Humanity will still want to live and work and travel near our waterways. We must thread that needle with humility. We should take very seriously the need to limit impervious surfaces, the opportunity to use rainwater on site, the potential for wildlife habitat in every construction project, the need to build up-and-out of harm's way. These are all qualities GBA has incentivized through our Green Built Homes certification program for 20 years.

The extreme weather behavior exhibited through Helene reminds

us to take seriously the embodied carbon in our building projects. No longer is 'operating efficiency' the exclusive yardstick of a Green Home. Check out page 20 for perspective on this from the Rocky Mountain Institute.

Lastly, to really meet the potential of building projects we promote, we need a team effort from so many more people than just builders and tradespeople. Every member of our community could have a role advancing Green Building. Fostering wider recognition of this fact is vitally important. Every Realtor should be able to explain a home's HERS Score. Every loan

officer should be familiar with a Green Addendum. Every barber, school teacher, and paralegal should know the benefits of living in a Certified Green Home. No matter where you find yourself in this fight, you have a role to play. Building Green takes a village. We don't need to debate the "why's" anymore. The reasons are too numerous and we can all name a few that are important to each of us.




At GBA, we're concerned with the "what", and the "how" more than the "why". If you're reading this, you probably have a place to call home. Let's be grateful for that and make certain to pay it forward. We believe as Dr. King did that 'The arc of the moral universe is long, but it bends toward justice'. Using our highest and best skill sets to build homes appropriate for our grandchildren is not just the way of the future but what we've been advocating for the past 24 years. When we face the storms of adversity, we rise as one. Stay strong and carry on.

By Dan Clere, on behalf of the WNC Greenbuilt Alliance Team



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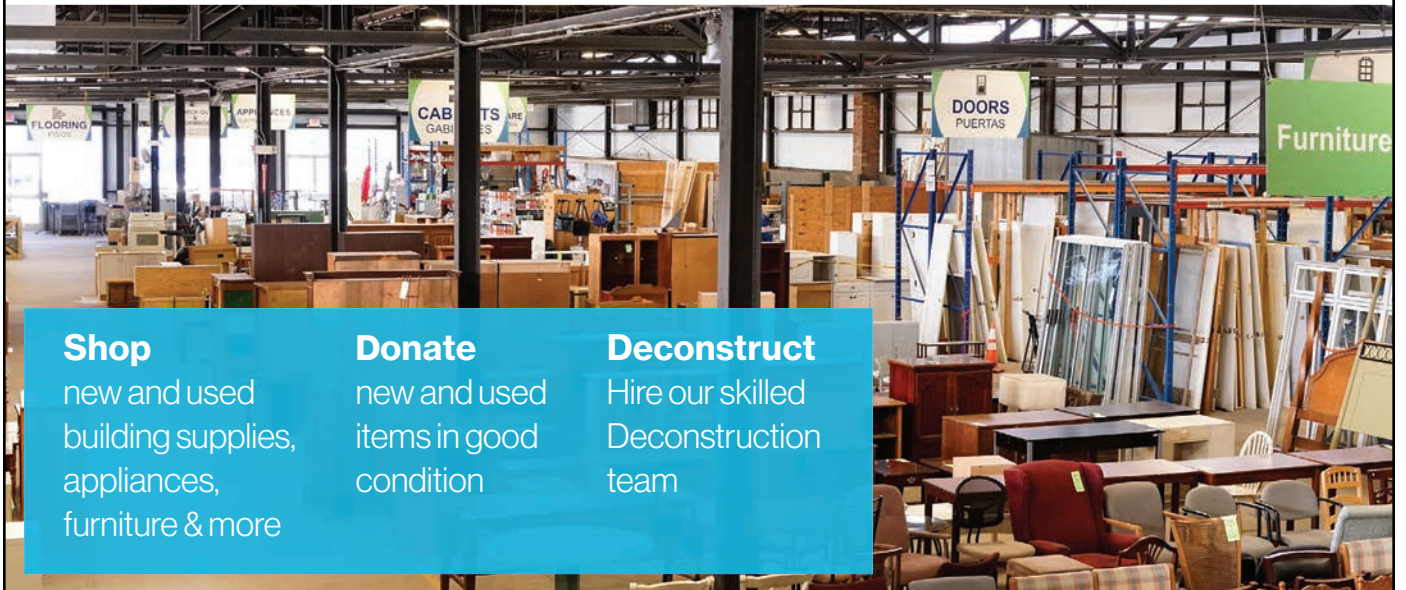
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Asheville's Dining Scene Going Green

Akin to the Green Building Certification, an Effort is Underway to Green Certify Asheville Restaurants

BY MELISSA REARDON

We're lucky to live in a place that embraces green living, which goes beyond green building; it's a lifestyle that involves making conscious choices to reduce your environmental impact. Individuals, businesses, organizations and municipalities can all choose to adopt a green living ethos, which has many cost saving and other great benefits. One of Asheville's other big industries that is making a shift in this direction is the restaurant industry.

Environmental Impact

Restaurants generate enormous quantities of food waste, plastic waste, and are big contributors to energy and water consumption. The numbers are staggering. A single restaurant:



- Can produce 25,000 to 75,000 pounds of food waste a year (much of that food traveling 1,500 miles before it ever reaches our plates).
- Uses 5 to 7 times more energy per square foot than other commercial buildings.
- Averages 300,000 gallons of water every year.

- Produces 100,000 pounds of garbage per year.

Additionally, when you think about the amount of plastic disposables and styrofoam containers that come with your takeout (multiplied many times over), consider this: by 2050, there will be more plastic in the ocean than fish.

That is all according to the Green Restaurant Association (GRA), the nation's leading non-profit that provides certification for restaurants to become more environmentally responsible. Akin to the Green Built Alliance's green building certification, the GRA provides a transparent way to measure a restaurant's environmental accomplishments and provides a pathway for improvements. Restaurants must certify annually, earning "GreenPoints" in eight categories that in turn qualify them for one of four certification levels. The Association has certified thousands of restaurants in the U.S. and Canada since its inception in 1990.

The Green Way

Asheville is currently home to six Certified Green Restaurants, including Strada Italiano, which has been certified since 2012.

"It was a no-brainer," says Strada chef/owner Anthony Cerrato and a long-time AIR board member. "We want to do what's right for the environment, for our future. And the bonus is that we're able to save on our energy and water costs."

Back in 2011, the Asheville Independent Restaurant Association and the now defunct Blue Ridge Sustainability Institute were early adopters of the green restaurant certification. Carly Reese, Strada's current financial & ad-



ministrative director, was a recent environmental studies graduate waiting tables for Anthony at that time. She took up the torch to certify Strada and wound up spending a year interning with the GRA, helping sign up other local restaurants, including Joe Scully and Kevin Westmoreland's long-time Asheville establishments The Corner Kitchen and Chestnut. Other current certified restaurants include Green Sage Cafe, Home-Grown, and Posana.

"For me it's the principle," says Carly. "Restaurants use so much energy and so much water and we produce so much waste. But if you make conscious choices and tweaks in your operations, we in the restaurant industry have the ability to make a noticeable difference in our environmental impact."

Carly admits it can be a challenge to maintain the standards for certification, because "in the restaurant industry, you're making

choices on the fly," she says. "It's about caring enough to take that extra moment to think about, for instance, what spray valve you need to save water."

For its part, Strada has focused heavily on reducing its energy consumption. They've taken measures to install LED lighting and occupancy sensors in restrooms and purchased energy efficient HVAC, refrigeration, dishwashing, and cooking equipment. Waste reduction through dedicated recycling and composting is another area that earns them high GreenPoints. Other things like using salvaged construction materials, bamboo flooring, and no-VOC paints, sourcing food locally where possible and offering vegan and vegetarian options, as well as using recycled paperboard takeout containers also helped earn points toward their Level 1 certification.

Carly says they are just shy of reinstating their 2 Star status, but they are trying to have in resinstated.

"We switched from a high temp dishwasher in 2022 to a larger chemical machine due to increased volume," says Carly, "but sourcing the appropriate chemicals at the right price has been difficult, causing us to recertify at the one star level."

The Perks

As for the payoff, Carly admits the financial side is tough to weigh. Since Strada started green, there's no baseline to measure energy costs and such against. But she knows they do benefit from reduced utility bills, and it's helped increase staff morale. "I think our team feels good about working for a business that cares



about the environment and is willing to go the extra mile to prove it," she explains.

Becoming greener and greener is ever a work in progress, just as reviving the effort to recruit and certify more Asheville-area restaurants, even breweries, is evolving. As of fall 2024, the Green Built Alliance, AIR, and the Green Restaurant Association are teaming up to get more local restaurants on board.

"There are probably quite a

number of local restaurants and breweries that would easily already qualify for the certification," says Carly. "It's not especially hard. You're assigned a rep who holds your hand the entire time. You just have to care enough to take the extra steps to prove it."

Melissa Reardon is a freelance writer and communications professional in Asheville, NC. Learn more at MelissaReardon.com.

Photos by Andy Lukacs-Ormond



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Green, Smart and Healthy

Values that Drive WNC Home Buyer Decisions

BY RICK BAYLESS

In 2024, here's what you need to know about home health buyer behaviors, and why a standard home inspection doesn't cover the bases on your home's environmental health status.

The healthy homes movement has evolved, changed, and grown over the past 15 years. Since 2011, I've worked as a home health examiner to WNC families who today choose green, smart and healthy at home. Let's look at the factors that define a healthy home in 2024. Then, we'll consider ways that green, smart and healthy values drive home buyer decisions.

What Factors Define a Healthy Home?

The National Environmental and Health Association identifies eight, widely accepted foundations of home healthiness. These include:

1. Safe
2. Dry
3. Clean
4. Maintained
5. Ventilated
6. Pest-Free
7. Toxin-Free
8. Temperature Control

Active exploration of these factors can help a potential home buyer identify a house which may pose health risks.

How Do Green, Smart and Healthy Values Drive Home Buyer Decisions?

Last year, Home Innovations Insights, a digital publication, connected the dots between the growing interest between green, smart and healthy in an article titled "What Homeowners Want Today."

A 2023 Green Builder Media survey of 2,200



home buyers backs this claim. Here are some important takeaways related to green, smart and healthy home buyer behaviors.

"Healthy Home Buyers" select for homes that support their best health now and over time.

- 82% are concerned about the health and safety of their home.

- 65% are willing to pay more for a home that has been certified as healthy or green.

"Healthy and Sustainability" buyers want to minimize their impact on the planet.

- 68% are concerned about the environmental impact of their home.





- 52% are willing to pay more for a home that is sustainable.

“Healthy and Resilient” buyers are preparing now for the future of climate change.

- 72% are concerned about the impact of climate change on their homes.
- 58% are willing to pay more for a home that is built to withstand extreme weather events.

Weather-related changes such as those caused by climate change or severe weather are increasing in frequency, often resulting in chronic sick house conditions. Plus, “healthy, green and smart” buyers are familiar with smart technologies like these:

- 82% smart thermostats
- 75% smart refrigerators
- 68% induction cooktops

Technologies such as solar and photovoltaic energy options, are also trending upward. “Healthy and Natural” home buyers trend toward the new post-pandemic norms for a healthy lifestyle at home.

- 75% across generations said outdoor living areas play an essential role in maintaining peace of mind and a sense of normalcy.
- “Ideal” lifestyle is natural, back to the earth, simple and minimalist.

Post-COVID, more individuals perceive a higher health risk personally and collectively. In some families, there’s been a general decline in health over time, or a family member has been diagnosed with a serious illness. Multi-generational families may include infants or elderly who are vulnerable to environmental illness.

In WNC, indoor air quality continues to top the list of new homeowner concerns. In 2024, the negative effects of mold or mildew overgrowth was by far and away the most pressing concern in our region.

Rick Bayless, CIEC, BBEC, HHS, JS, is the owner and founder of A Healthier Home, LLC, www.ahealthierhomenc.com, Western North Carolina’s leading environmental home health exam provider. A pioneer in the healthy homes movement, Rick empowers people to take charge of their health by healing their sick homes.

Why Isn’t Health Covered by a Standard Home Inspection?

Too often, WNC’s unique home buyers are shocked when they realize their new home has health-based problems not covered in a standard home inspection.

According to the World Health Organization in 1983, as many as 20 percent of homes may have “sick house syndrome,” a situation in which the home makes its occupants sick. This occurs when the conditions in the house cause chronic and acute health problems.

Therefore, it’s important to understand the role of a home inspector, and how that role differs from that of an environmental home health pro. Step by step, let’s unpack what the home buyer needs to achieve. Those needs make it clear when you need a standard home inspector versus an environmental home health examiner.

Below, simply choose A or B to determine which type of professional best meets your needs.

Step 1: Get Clear About the Situation

I need someone who can ...

- A.** investigate existing environmental conditions and compile information about health or safety.
- B.** review plans or check out a structure to make sure it’s up to code, ordinance or zoning.

Step 2: What Job is Performed?

I need someone who can ...

- A.** Analyze air, soil, water, or the built environment to answer my questions about health.
- B.** Inspect residential construction to assure it’s up to code to protect my interests as a buyer.

Step 3: What Type of Approach?

I need someone who can ...

- A.** Use scientific method and testing to collect data needed to identify and assess threats to the health of the house or its occupants.
- B.** Use logistic tools such as instruments, metering devices, and measurements to be sure a building meets local codes and zoning.

Step 4: Before Buying a House

I need someone who can ...

- A.** Identify any environmental or health risks that a standard home inspection does not cover.

- B.** Inspect the building’s electrical, plumbing, and other systems to ensure they’re up to code.

Step 5: Fact Finding Mission

I need someone who can ...

- A.** Conduct a research-based analysis of whether the structure supports my best health.
- B.** Verify whether the structure is in compliance with ordinances for purposes of cost analysis.

Step 6: What Are the Results I Need to See

I need to see a report that ...

- A.** Shows evidence and analysis of the problems, shares findings photographs, and written or oral feedback related to the findings, develops solutions to protect or restore health to the home and the people who live there.
- B.** Includes a final, comprehensive inspection, photographs, and written or oral feedback related to the findings of whether the systems or features meet code.

Step 7: Before Selling A House

I need to check whether or not ...

- A.** My home’s health enhances its potential appeal and sale price.
- B.** My home’s condition prior to disclosure before putting it on the market.

Step 8: What Type of Credentials Should I Look for?

I need ...

- A.** A consultant who is nationally and/or board certified in accordance with private sector industry standards for environmental science specialists in home health, indoor air quality, mold, building biology, etc., with the scientific training and field experience to mitigate risk.
- B.** A contractor who is state licensed as a home inspector in North Carolina, and who has the education, experience, and licensure to ensure the legal disclosure of any non-compliance with codes, zoning or ordinances.

Here’s Your Diagnosis

If you answered mostly As, you need a home health examiner.

If you answered mostly Bs, you need a standard home inspector.

If you’re buying a house, you really need both. The standard home inspector provides you with essential information about the house that few others can. However, when it’s your health that matters, it is essential that you also get the view of the house that only a home health examiner can provide. Not only are dollars at stake — your health is at stake, too.



Trinity Presbyterian Church

A Journey to Environmental Stewardship and Cost Savings

Illuminating Change: Trinity's Path to Solar Energy

In 2018, Enrique Sánchez, a new member of Trinity Presbyterian Church in Hendersonville, along with Tom Karvonen, who served as the Church Treasurer at that time, found themselves participating in a Sunday school class that centered on the sobering realities of climate change.

This educational session became the catalyst for a profound shift in perspective, propelling them and their church into a journey toward embracing solar energy. Despite being newcomers, their shared passion for environmental stewardship quickly bonded them with the congregation.

Motivated by a group of 15 congregation members, led by Bob Forsythe, Trinity Church embarked on a mission driven by their shared dedication to environmental stewardship. Under Forsythe's leadership, the group remained united, energized, and focused on their goal.

Recognizing the importance of fiscal responsibility alongside environmental commitment, Trinity Church sought to first minimize its carbon footprint and inspire its community to join it in its sustainable journey with the reduced operational costs being an additional benefit of the process.

Partnering with Sugar Hollow Solar, Trinity embarked on this transformative endeavor. Initially apprehensive about the complexities of

Key Highlights:

- **Reduction in Carbon Emissions:** By 2023, Trinity had reduced their yearly grid dependency by 90% compared to 2018, resulting in a remarkable carbon offset. This reduction not only demonstrates Trinity's commitment to environmental responsibility but also highlights the tangible impact of their actions in combating climate change.
- **CO2 Emission Savings Impact:** Since installing solar panels, Trinity has experienced CO2 emission savings equivalent to planting 2 trees a day. This statistic underscores the significant environmental benefits of transitioning to renewable energy sources and showcases Trinity's contribution to sustainability efforts.
- **Financial Savings:** After installing solar panels, Trinity experienced a significant decrease in costs, amounting to a 67% reduction from their pre-solar average electric bill of \$870. This demonstrates both the financial feasibility of solar energy and the substantial long-term savings achieved by the church.

such a significant undertaking, their concerns were swiftly addressed by Sugar Hollow's responsive and expert guidance. Enrique recalls,

"Our transition to solar was truly remarkable. Sugar Hollow's timely assistance proved invaluable, from our initial inquiries to the seamless installation process. We couldn't have been more pleased."

Driven by their shared vision, Trinity launched a successful fundraising campaign and strategically timed their installation in two phases to maximize rebates and savings with congregation members donating in honor of loved ones and future generations. By late 2019, both phases and all 129 solar panels were installed. With each phase of installation, the church continued to see a significant decline in its power bills, ultimately leading to an average reduction of 67% in its electricity expenses.

Today, Trinity Presbyterian Church stands as a shining example of environmental stewardship and community leadership. Their journey toward solar energy not only reduced their environmental impact but also demonstrated the tangible benefits of renewable energy adoption. Through dedication, collaboration, and a steadfast commitment to their values, Trinity has paved the way for a greener, more sustainable future for generations to come.

Sugar Hollow Solar Partnership Highlights

■ Trinity selected Sugar Hollow Solar after evaluating 12 options from three companies. Trinity cited reasons for choosing Sugar Hollow

Solar including competitive pricing, beating competitors by 11.6% when the Duke rebate available at the time was considered.

■ Trinity reported Sugar Hollow Solar's proposal projected a 5% higher annual savings.

■ Trinity has reported that their panels are consistently overproducing energy above our proposal projections.

Outcomes and Benefits

■ Since 2020, the church has consistently achieved a remarkable yearly carbon offset, with emissions reduced by approximately 90% compared to their levels in 2018 and prior. This substantial reduction in environmental impact equates to planting 2 trees a day, totaling over 3,000 trees and continuing to grow.

■ Substantial and long-term financial savings, coupled with heightened sustainability, have been realized by the church. Since 2020, they have accrued over \$30,000 in cost savings on electricity bills, attributed to the significant 67% reduction in expenses, with average monthly bills plummeting from \$870 to \$287.

environment for all.

• **Enhancing grid reliability:** Decreasing the strain on the grid and bolstering its reliability by reducing the demand for grid energy through the adoption of solar power.

Conclusion

In conclusion, Trinity Presbyterian Church's journey to embrace solar energy stands as an inspiring testament to the power of collective action and unwavering dedication to environmental stewardship. Through their partnership with us at Sugar Hollow Solar and the commitment of their congregation, Trinity has not only reduced their carbon emissions by an impressive 90%, equivalent to planting over 3,000 trees, but also achieved substantial long-term financial savings, totaling over \$30,000 since 2020.

As Tom noted, "The price has really come down to the point where I think more and more people probably can consider affording it," highlighting the increasing accessibility of solar energy solutions not only for churches and nonprofits but



Trinity Presbyterian Church's embrace of solar energy brings about tangible benefits, including:

• **Raising congregation awareness:** Increasing awareness among congregants about alternative energy sources and methods to reduce carbon footprints, fostering a culture of sustainability within the community.

• **Promoting public health:** Contributing to cleaner air, resulting in improved public health outcomes by mitigating the impacts of air pollution and creating a healthier

businesses and homeowners too. Trinity Presbyterian Church's transition to solar energy not only demonstrates the feasibility of renewable energy adoption, but also highlights the tangible benefits of cleaner air, enhanced grid reliability, and a more sustainable future for generations to come. Trinity's path illuminates the way forward for communities seeking to lead by example in combating climate change and promoting environmental stewardship.

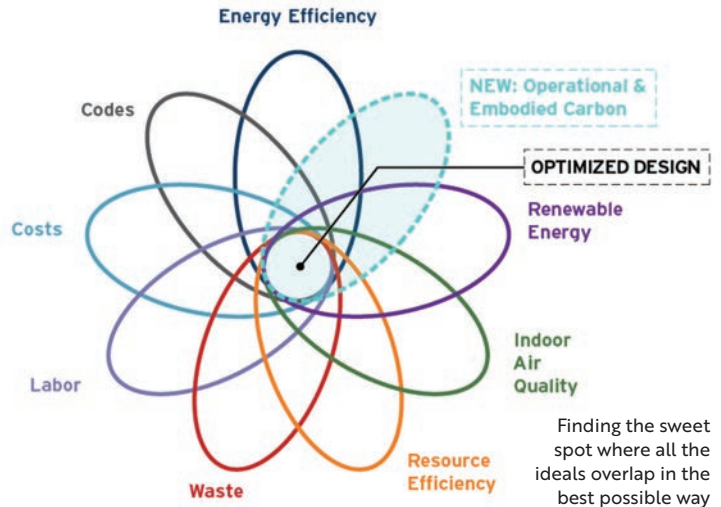


 GREEN LIGHT
HOME BUILDERS

The Evolving Venn Diagram for Building Green Homes



Passive solar house in Asheville, optimizing multiple green building criteria.



BY CHRIS MAGWOOD AND TRACY HUYNH

From its earliest iterations, the green building movement has attempted to establish a more holistic set of criteria for green homes that go beyond the simple “cost and availability” approach that the industrialization of building products has been known for. This broader range of criteria includes energy efficiency, indoor environment quality and waste reduction as the hallmarks of a greener home.

As the urgency to tackle climate change has risen along with record-smashing heat and extreme weather events, the residential sector is well poised to be a part of the solution — greener buildings reduce energy costs, make the power grid more resilient and cut the pollution that overheats the planet. Two primary actions have risen to the top over the past

decade to get the job done: reducing operational and embodied greenhouse gas emissions (GHGs). Operational GHGs come from heating, cooling and powering a home over its lifespan, while embodied emissions mostly come from manufacturing, using, and disposing of building materials. Faced with new investor demands, regulations on the horizon, and homebuyers’ increasing appetites for green features, the industry will benefit from widening its aperture to look at both operational and embodied emissions when making everyday business decisions. Doing so will accelerate the market for zero emissions buildings faster to where it needs to be. Fortunately, we have the knowledge, tools and case studies for how to do it cost-effectively while still constructing quality homes that people desire. So, what’s a green builder to do?

A Venn Diagram for Building Green Homes

Fortunately, green builders have a history of responding to new issues and attempting to incorporate an ever-growing list of important criteria into the design and construction process. Good green builders are masters of complex Venn diagrams, finding the sweet spot where all the ideals overlap in the best possible way. This can look different for every building, based on location and climate, budget, timelines, skill sets, codes and standards, and other considerations. However, the effort to combine criteria to have the best overall impact is a common thread among green builders.

The “new” criteria of operational and embodied emissions are not entirely novel. Efforts to improve energy efficiency are directly related to reducing operating emissions. High-



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performing building enclosures — with adequate insulation, air tightness, solar orientation and ventilation — are the foundation for operational emission reductions. An energy-efficient enclosure plus renewable energy supply can reduce operating emissions to near zero today, something that many green builders are already achieving in their regular practice. The existence of standards like EPA's ENERGY STAR, the Department of Energy's Zero Energy Ready Homes, and PHIUS/Passive House provide guidance and performance measurements, and the rising availability of inexpensive clean energy like solar are well understood and employed by green builders everywhere.

Embodied carbon — the emissions arising from the creation, use and disposal of building materials — may seem like a whole new criterion to factor into one's Venn diagram. The term was barely in existence 10 years ago, and now embodied carbon has been shown to have a massive impact on our climate. Industry awareness is growing as well. Low embodied carbon or "Buy Clean" criteria has been adopted both at the federal level and by many state agencies, driving manufacturers of concrete, insulation, and other building materials to create products that excel in reduced embodied emissions.

Embodied Carbon in the US Residential Sector

Today's best estimates show that embodied carbon emissions from new home construction in the US has a larger carbon footprint than the entire economies of some developed countries, and these estimates are conservative as they are missing some large contributors like mechanical, electrical, and plumbing materials for which data has not been as readily available.

But green builders need not despair over the scale of this problem because there are tools and developing standards to provide insights and guidance. The Building Emissions Accounting for Materials (BEAM) tool from Builders for Climate Action (and its Canadian-

focused sister tool, Material Carbon Emission Estimator (MCE2)) is a free tool developed specifically to give home designers and builders quick and easy embodied carbon comparisons for materials, assemblies and whole buildings.

RESNET, the organization behind the HERS rating index, is producing an embodied carbon measurement and reporting standard (Standard 1550) that will be published in 2025 to provide sector-wide guidance and comparability of results necessary for embodied carbon to be adopted by incentive programs and codes. LEED, Built Green and other rating programs are beginning to include embodied carbon points and help low-embodied carbon homes add market differentiation and value. Last year, RMI (founded as Rocky Mountain Institute) and the U.S. Green Building Council (USGBC) jointly released the report Driving Action on Embodied Carbon in Buildings to address challenges around reducing embodied carbon emissions and to outline key strategies and actions.



The CO₂e from construction of new homes in the US is similar to the entire emissions of Denmark.

Embodied Carbon and Non-Toxic Products

Green builders who start to explore embodied carbon will also find that there is a consistently strong overlap with an existing circle on their Venn diagrams: healthy, non-toxic products are most often the low-embodied carbon options. This is because there tends to be a correlation between embodied carbon emissions and chemical- and fossil-fuel dependent manufacturing processes. Those familiar with healthy material resources like the product guidance from Informed from Habitable (formerly Healthy Buildings Network) will find that products with favorable ratings will most commonly show up among the lowest in embodied carbon in a tool like BEAM. Green

builders who are familiar with natural building materials will find a similar overlap between locally produced, minimally processed materials and very low embodied carbon.

What About Cost?

Of course, no green building Venn diagram is complete without considerations of cost. A study for the Canadian government concluded that there is "no direct correlation between the cost and MCE of materials," noting that in some cases the lowest cost and lowest embodied carbon did match up, but in some cases the highest cost and lowest embodied carbon overlap. When it comes to cost and embodied carbon, green builders will need to do the work they are used to doing: matching green goals with budget outcomes as best as possible.

HomebuildersCAN

Green builders love a challenge, otherwise we wouldn't be pushing to improve constantly. There is a lot a builder can do to make significant performance improvements on embodied carbon. The case study library at HomebuildersCAN (a community of practice to help builders measure and reduce embodied carbon) shows new homes that have made improvements ranging from 10-88 percent in the overall embodied carbon of real-

world projects. Some of the highest achievers reach their goals by storing carbon in building materials, totaling as much as 37 tons of stored carbon in a single home.

Whether you set your ambitions and targets for embodied carbon improvements at the low end or the high end of what is possible, there is no doubt that embodied carbon is a critical addition to the Venn diagram of every green builder. The green building community has been a driving force for the industry to achieve remarkable levels of operational energy efficiency and net-zero homes. We are optimistic it will continue to find innovative and cost-effective ways to tackle embodied carbon and move it closer to becoming an integral element in the green building Venn diagram.





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There are many people in Western North Carolina doing important work in green building and sustainability. Having so many people doing such meaningful work is one of the reasons our region is a leader in this field. We've chosen 8 of these individuals to highlight in this year's Green Home and Living Guide as a way of thanking them for their contributions.

JULIE MAYFIELD

Julie Mayfield has been a state senator from District 49 since 2020 and senior policy advisor with MountainTrue since 2008. Prior to becoming senior policy advisor, she served as executive director and co-director. Julie's current focus is on healthcare, particularly efforts to codify and strengthen the prohibition on the corporate practice of medicine and to get Mission Health back to a place of providing best in class care throughout Western North Carolina. Julie



Julie Mayfield

says, "Our efforts to mitigate climate change must happen in multiple lanes, including how we eat, how we move, how we build, and how we generate energy. Every new building should be built to higher energy and construction standards that are currently applicable in NC. We need to get current with the international standards, rather than falling farther behind, as we are now."

CARLY REESE

Carly Reese is the financial and administrative director for Strada Italiano and Gemelli restaurants in Asheville. After working briefly for a government environmental agency and a private consulting firm, her passion for hospitality drew her to the restaurant industry. Carly was involved in the opening of Strada in 2012 and the subsequent green certification through the Green Restaurant Association that same year. Along



Carly Reese

with holding a variety of positions at Strada, Carly assisted in the opening of a second restaurant, Gemelli, in 2022. She is currently partnering with Asheville Independent Restaurants (AIR) and GBA to encourage more restaurants to pursue a green certification with the Green Restaurant Association. She says, "The choices we make in our personal lives and the businesses we run matter and have impact on our communities and environment."

KIERA BULAN

Kiera Bulan has served as the sustainability program manager for the City of Asheville for four years. Since 2008, the sustainability department has worked to integrate sustainable design, technology, and practice into municipal operations, infrastructure, and services. Kiera is excited about a new initiative called Elevate AVL, launched in late 2023, which involves the Climate Action Toolkit a community-led movement with the goal of building resilience and connectivity in Asheville neighborhoods. She says, "The environments



Kiera Bulan

where we live, work, and play are the cornerstones of happy, healthy living. Incorporating best practices for efficiency, resource stewardship, and innovation into our built environment is a key element in transitioning to a more sustainable and resilient community."

SARAH FRASER

Sarah Fraser has been the sustainability specialist at New Belgium Brewing for the past seven years. The New Belgium brewery, liquid center and distribution center achieved LEED certification as a result of numerous features that reduce energy, water, waste and GHG emissions. Submitters throughout their brewing and packaging areas provide a granular view of water and electrical consumption, and New Belgium is known for its green-space. Sarah is excited to kick off a project this year to capture and reuse biogas generated at their wastewater treatment plant. She says, "It's been rewarding to experience these tangible examples of New Belgium's human-powered business model that considers our broader impact on the world, our planet and our people."



Sarah Fraser

SOPHIE MULLINAX

Sophie Mullinax has been the chief operating officer at Solar Crowdsourc/Let's Go Electric for almost three years. She's looking forward to working on a new project called Electrify Asheville-Buncombe,






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which is a community-driven program to help connect Buncombe County residents to vetted information and select local contractors to help sustainability electrify their homes. Sophie says, "Striving to live in harmony with the natural world protects our environment for generations to come and promotes a more liveable future. When we build more efficiently, carefully take site conditions into account, promote walkability/bikeability and access to transit, install renewable energy when possible, and live lightly on the land, we are upholding values that have the potential to heal generations of less-thoughtful buildings' impact on the earth."



Sophie Mullinax

CLARY FRANKO

Clary Franko has been the chief operating officer at Sugar Hollow Solar for three years. Sugar Hollow just gained their B Corp certification which is only offered to companies that have voluntarily met the highest standards for social and environmental performance. Clary is energized by Solar Hollow's current work in the commercial space and wants to highlight the fact that there are a number of tax incentives and bonuses for commercial entities going solar. Clary says, "It's as important as ever to lessen the negative impact of growth on the environment and the community. Green building practices, energy efficiency, solar, and more are all part of the equation, and I'm glad to be part of working to find solutions at different price points and to meet different needs."



Clary Franko

EMILY BOYD

Emily Boyd is co-founder of Mountain Sun Building & Design, a design-build firm building net-zero and green-certified homes. She is also a Certified Professional Building Designer and Certified Permaculture Designer. Emily and her teammates just completed construction of their first GreenBuilt NC Regenerative Certified home and are excited to see the landscape fill in around the built environment. They hope to use the project as an example to get more future homeowners interested in building regenerative homes. Emily says, "I love that building more environmentally friendly buildings simultaneously makes them healthier for residents by bringing in natural light, fresh air and natural materials. These seemingly subtle differences from conventional construction can have a huge impact on both the physical and mental health of building occupants."



Emily Boyd

MEGAN CARROLL

Megan Carroll has been the executive officer of the Builders Association of the Blue Ridge Mountains (BABRM) for the past five years. BABRM is a professional trade organization dedicated to protecting and promoting the local housing industry and those who work within residential construction. Megan is excited to see the folks that built our community, rebuild the community. Working together across organizations and creating coalitions to help all members of the community is something she's honored to take part in. Megan says, "I am constantly in awe of the human imagination. Watching people problem-solve environmental issues while considering community connections is our most inspiring and healthy way forward."



Megan Carroll



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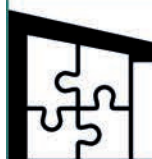
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Concrete foundations and slabs are a big source of embodied carbon. To address this, we have built six zero-concrete foundations based on specially treated lumber. We now are moving toward engineered prefabricated insulated concrete basement walls on a gravel base, but with the typical concrete slab floor replaced by wood. We are always searching for cost-effective methods to improve the attainability of Net-Zero Homes. GBA doesn't take embodied energy into account in its certifications; however, in the future, it will probably need to at least consider concrete. It is impossible to specify every climate action that should be taken and give it a value. This is why we support the carbon fee and dividend approach as proposed by the Citizens' Climate Lobby; their approach rewards people financially in a straightforward way for having small carbon footprints.

BY DON M NICHOLSON

Our mission is to demonstrate that you can and must be able to build Net-Zero Homes at attainable price points. We have an optimistic outlook; we believe that we can show that building Net-Zero homes can truly SAVE homeowners money and offer returns similar to or even better than the stock market. By taking advantage of the many government incentives, continuously advancing state-of-the-art home technology, and the insights of building science, we can tilt the scale of cost efficiency so that all homeowners, regardless of their feelings about climate change, can make a significant impact. The GBA Net-Zero Home program specifically targets the burning of fossil fuel to power new homes in Western North Carolina,

which is why since 2017, our focus has been on building nothing but Net — Net-Zero, that is.

Why are we so passionate about Net-Zero Certification? The other GBA home certifications are based on a wide range of criteria. As a result, two homes that are Gold Certified can have very different carbon footprints. The HERS rating is the most widely accepted measure of home energy efficiency; yet, two homes with the same HERS score can use very different amounts of energy. This is because the HERS score measures the relative energy used compared to an equivalent (size, bedrooms, amenities...) reference home that complies with the 2006 International Energy Conservation Code. There is one exception: homes of any size, shape, or form that have a HERS rating of zero are

all projected to use the same amount of energy over a year; that amount is zero. We can thank the mathematician Brahmagupta for the concept of "zero"; it simplifies everything, including the comparison of home energy use.

I assume you are an adult; you know that things are always complex. If you catch your kid reading the Green Building Directory, take it from them immediately and send them outdoors. Solar panels, heat pumps, and EVs are not made by elves at the North Pole. They are made in factories often far from Asheville. Generally speaking, assume that any carbon-reducing technology requires about two years in operation to compensate for emissions produced during its production. So, if you were planning to be carbon-free in 15 years, reduce that timeline to 13.

Another complexity: GBA Net-Zero Homes are not actually required to have a HERS score of zero; the required HERS score is 15. The reasoning is that the typical homeowner would use zero energy in a home with a HERS score of zero, but an energy-conscious homeowner would use less and would end up giving free energy to Duke. A score of 15 was taken as the point where an energy-conscious family would use zero energy. The HERS certificate for the Net-Zero Home on the cover of this year's directory is informative. It does have a HERS of zero; the yearly heating, cooling, hot water, and lighting/appliances projected costs are \$136, \$12, \$50, and \$388. Duke charges \$168 for the infrastructure and administration. Solar generates \$575 worth of electricity per year. This home will save about \$2,072 per year; the bulk of the



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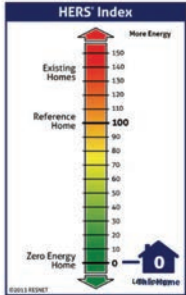
Annual Savings
\$2,072
*Relative to an average U.S. home

Your Home's Estimated Energy Use:

	Use (MBtu)	Annual Cost
Heating	4.1	\$136
Cooling	0.4	\$12
Hot Water	1.5	\$50
Lights/Appliances	11.9	\$388
Service Charges		\$168
Generation (e.g. Solar)	17.8	-\$575
Total:	17.9	\$178

Home Feature Summary:

Home Type:	Single family detached
Model:	Custom
Community:	Custom 28806 Emma Rd
Conditioned Floor Area:	1,114 ft ²
Number of Bedrooms:	2
Primary Heating System:	Air Source Heat Pump • Electric • 13.4 HSPF2
Primary Cooling System:	Air Source Heat Pump • Electric • 33.1 SEER2
Primary Water Heating:	Residential Water Heater • Electric • 3.88 UEF
House Tightness:	147.2 CFM50 (0.83 ACH50)
Ventilation:	49 CFM • 26 Watts • HRV
Duct Leakage to Outside:	Forced Air Ductless
Above Grade Walls:	R-30
Ceiling:	Vaulted Roof, R-58
Window Type:	U-Value: 0.24, SHGC: 0.21
Foundation Walls:	R-20
Framed Floor:	N/A




savings result from the efficient heat pumps used for heating, cooling, hot water, refrigeration, and clothes drying as well as a home envelope that is well insulated and airtight (ACH50 of 0.83).

Despite our optimism and belief in the Net-Zero standard, the journey has been anything but easy. Back in 2016, as we grappled with how to embrace and pioneer this new standard, we realized that we needed to take a "Field of Dreams" approach — if we built it, they would come. Becoming land developers wasn't something we had planned. Our focus was on constructing Net-Zero homes, but we quickly understood that to make our vision a reality, we needed a laboratory of lots to work on our methods.

So, we took a leap into the unknown, investing in land without

knowing whether anyone would be interested in buying our homes. To our amazement, as the homes took shape, they began attracting like-minded individuals who shared our commitment to sustainability. The buyers of our homes were more than just clients; they became a vibrant community united by a shared purpose. They became passionate advocates for the Net-Zero movement, spreading the word and inspiring others. Though the path has been fraught with challenges, seeing our Net-Zero community thrive and knowing that we've helped people make smart, sustainable financial choices has made it all worthwhile. What began as a risky venture is now gaining momentum, proving that Net-Zero homes are not only a vision for the future — they're a practical, savvy choice for today.

Is the climate situation really so urgent that we have to give it this level of priority? Well, yes, it is! You may have heard that the world needs to be zero carbon by 2042 or 2050; these estimates only have validity if we take immediate action to steadily reduce our carbon footprint. We can't wait until 2042 or 2050 are about to arrive; it will be too late. Of the tons of carbon that our homes have avoided, the big benefits come from the first homes we built because they have been avoiding carbon every year since they were built. Installing a cold-climate heat pump right now packs a punch; planning to install one later is a wimpy tap. To strike a blow for the climate, move into a Net-Zero Home or get to work on your current residence. Start by contacting Electrify Asheville Buncombe County or Energy Savers

Network through the GBA website.

In basketball, "Nothin' but Net" means perfection — a clean shot that hits its mark. In our work, it means achieving Net-Zero, and just like in the game, the more shots we make, the closer we get to winning. Every Net-Zero home we build is another perfect shot for the planet, and together, we're aiming for development where every neighborhood is a victory for the future.

(Don Nicholson co-founded Nicholson and Sun with his son Donald with the goal of impacting climate change. He advocates for climate action locally and specifically at UNC Asheville where he is a Research Professor of Physics. Don is retired from Oak Ridge National Lab where he was a Senior Research Scientist.)

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Aging in Place

Our House and Us

Boone and Claudia's house and shed in 2024.



BY BOONE GUYTON

Claudia and I built our current home in 2000. It was our fourth passive solar designed house for ourselves. We also built a woodshop and a greenhouse at the same time. It is a great lot for the design as it is a south facing slope that allowed for a bermed daylight basement with good solar exposure on both floors. The upper or main floor is about 1,100 square feet of living area and we have about 390 square feet downstairs as well as mechanical and storage.

Passive solar design

We have 12 percent of window area that is directly connected to the living room, kitchen and dining area that totals about 800 square feet. That has worked, though if we were building now and knew how the increased insulation and better windows and air tightness would reduce the heating demand, we would figure more like 8 percent or 64 square feet of glazing on the south. We do have insulated night

curtains that we lower during cold nights. During hot days in the late summer/early fall, when the sun is getting lower and will contribute to overheating the space, we use reflective shades.

We use a wood stove for the majority of our winter heating with trees that have died on our property, giving us all the wood we have needed for the last 10 years. Some oak and ash have literally dropped in our front yard. The ash, due to the emerald bore, has been the most prolific lately and are a result of the bore being accidentally imported from Asia in the 1990s.

We have radiant floor heat in 3 zones though we mostly only use the one that heats the back bedroom on the northeast. That hot water is preheated via solar hot water system that circulates through panels on our greenhouse. The greenhouse is also passive solar with six 55 gallon drums of water along the insulated north wall as well as a raised bed made of brick. It needs supplemental heat on very few nights in the winter.

Renewable energy

In 2005 we added more cellulose insulation to our attic to get to R-50.


In 2009, we added a 3.9 kw solar system on our roof which took care of our electrical demand though we were using propane for hot water for domestic use and radiant floors and also for a cook stove. We have since bought an induction cook top and an electric oven which is cleaner but also more of a demand on our electricity.

In 2015 we decided to get an electric car and to add enough solar PV to cover the daily driving as well as different new loads like the stove. We built a garden shed with a roof to handle the 9 panels for another 3kw of solar. Claudia filled in the post and beam structure with stuccoed

sand bags and a bottle wall. We also added lead acid batteries to store the solar and allow us to charge the car at night as well as be back up during power outages. It worked OK until we traded that Nissan Leaf for a Chevy Bolt. The Bolt had a higher draw while



charging and more energy overall so the batteries would drain too much. Now they take care of a lot of the main functions of the house overnight and during blackouts but we charge the car via the grid.



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Possible upgrades

We are now trying to figure out how to increase our solar system again. There are a lot of variables to sort out. The original 18 panels are 210 watts each. New panels can be 400 watts or close to double and there are places to recycle or reuse the old panels. That would do it, but the roof is now 24 years old with 45-year architectural shingles so probably still has some years left. It would make sense to upgrade the solar when re-roofing. Not sure how to handle this yet.

cover it all. With our current 7kw system we use an average of 150kwh per month or around \$40 billed by Duke. Being all electric is a good goal but replacing all of our propane and gas energy with electricity will take some good timing and adaptations to be financially acceptable.

The shop we built has a living roof that has done well though we did miss a flashing detail at the lower end that led to a repair need on the bottom 16 inches where the water exited the roof in 2018. The



Solar hot water



There are drawbacks to replacing the inverter and having to negotiate with Duke about the "new" connection. That would be necessary if we increase our solar output and need a larger inverter. The new Duke billing is not as good as our present net metering where we are paid the same as we pay Duke for Kwh supplied to the grid. It is a conundrum.

We imagine adding a heat pump water heater as well as a second electric car so we will need approximately 10-12 kw total to

bermed east side and two ends are made with Faswall insulated concrete form blocks. They are made with recycled wood and have held up with 8 feet of backfill. It has been really good at keeping the shop cool in the summers without any conditioning and for keeping heat in the winter manageable with a small wood stove.

Intelligent green gardening

We added three 250 gallon cisterns on various roofs that gravity feed water to 3 different garden

areas. It works really well in 2 gardens but could use another in our main vegetable garden.

And one recent addition we, actually Claudia, made is the creation of an aging in place garden on the east side of the house. It has 4 raised beds that make it easier to work and are all hugelkultur with aged wood in the bottoms. Made with recycled materials for the most part, the beds are all also vole proof with the help of some hardware cloth. Being able to grow carrots and beets without feeding the voles is a welcome addition.

Looking to the future

If we were starting from scratch,

it would be a lot clearer now how to be all electric and net zero but remodeling to be net zero including our transportation is taking some research. If vehicle to grid house back up becomes available, it could change some of the choices.


Boone is a retired residential contractor who has built houses since 1981 with Claudia Cady, who is also a retired contractor and woodworker and longtime Habitat for Humanity volunteer and Tool Library volunteer. We were part of the early formation of the Green Built Alliance formally known as Healthy Built Homes.

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3,000 and Counting

Green Built Alliance Celebrates Sustainable Building Milestone

BY DANNY HARVEY

Green Built Alliance has certified the 3,000th house in the Green Built Homes program.

Originating in 2001 as NC HealthyBuilt Homes and today known as Green Built Homes, the program has provided valuable information to both contractors and homeowners who wanted to build healthier, safer, and more energy-efficient homes. The series of green-building guidelines was developed in 2001 through a joint grant from the State Energy Office with the North Carolina Solar Center, Mountain Housing Opportunities, and Waste Reduction Partners. During the 2007 recession, the North Carolina Solar Center closed, and the Western North Carolina Green Building Council took over the statewide program, rebranding it as Green Built NC and then as Green Built Homes. Through the addition of other sustainability programs and processes the WNCGBC later became the Green Built Alliance.

In 2021, the Green Built Alliance celebrated its 20-year anniversary, and the Green Built Homes program marked the milestone of 2,000 projects certified. Now, just three years later, the next thousand homes have achieved certification.

"I am deeply grateful that the Green Built program has been and continues to be such a major influence in how homes are built in our area and in North Carolina," said Cindy Meehan-Patton, one of the original concept founders.

A ribbon-cutting event in the early 2000s at Prospect Terrace, the first certification project in the state, which included single-family homes, low-income homes, a six-unit multifamily building and one historical duplex renovation.

Pictured among the crowd are many of the early volunteers and members of Western North Carolina Green Building Council, which became Green Built Alliance. GREEN BUILT ALLIANCE PHOTO



New Heights, located off in West Asheville, is Asheville Habitat's most diverse neighborhood to date and includes single-family homes, single-level Aging in Place homes, and two-level townhomes. The first phase of New Heights was completed in late 2023 and 38 families now call this community home. ASHEVILLE AREA HABITAT FOR HUMANITY PHOTO

Green Built Homes is grateful for their ongoing collaboration with community partners including Asheville Area Habitat for Humanity, Mountain Housing Opportunities, Advanced Energy, Duke Energy, Builders Association of the Blue Ridge Mountains (formerly the Asheville Home Builders Association), Land of the Sky Association of Realtors, Land of Sky Regional Council, Buncombe County, the City of Asheville, and the Town of Black Mountain. Special thanks also goes out to several of the original creators and volunteers:

Boone Guyton, Cindy Meehan-Patton, Bobbi Tousey, Duncan McPherson, Ashley Featherstone, Terry Albrecht, John Senechal, Sam Zimmerman, David Tuch, Claudia Cady, Traci Kearns, Isaac Savage, Matt Siegel, Mary Love, and Maggie Leslie.

Maggie, who directed the Green Built Homes program from 2006 to 2021, had this statement to share: "Green Built Homes was designed to serve our local community by providing a roadmap for homes that could save energy and money while improving comfort,

To learn more about the Green Built Homes program, go to www.greenbuilthomes.org.

health, and durability — the program is a win for everyone. When the program first began, many features that are now mainstream were extremely rare. With that success, the program continues to evolve, creating new challenges and educational opportunities for our community, building a more sustainable future one home at a time."

Following up on the important groundwork of Maggie and others, the Green Built Homes program was continued by Josh Littlejohn and later Leigha Dickens, who each made contributions particularly in providing certification processes for student housing at Appalachian State University, and by developing the Green Built Homes Multifamily certification checklist. Now, in 2024, the first Green Built Homes multifamily projects are underway in Buncombe County. The current Green Building Pro-





Asheville Habitat staff and volunteers install roof trusses at the jobsite in Mars Hill. The construction of this home was completed in December of last year. ASHEVILLE AREA HABITAT FOR HUMANITY PHOTO

gram Manager, Danny Harvey, was involved in the early 2000's during construction of the first certified NC HealthyBuilt Homes in Western North Carolina. He is proud to have continued the advancement of the program in reaching this new milestone of 3,000 certified Green Built Homes.

During these two and a half decades over three hundred North Carolina builders and individuals have participated in Green Built Homes, with many builders certifying hundreds of homes in the region. The involvement of local affordable housing organizations has been particularly important to the program's success, with these partners demonstrating that green building practices can be implemented at any budget level and

create lasting economic impact for families through improved health and reduced operating costs. This participation has been instrumental in achieving remarkable rates of nearly 15% of all new single-family homes in Buncombe County and over 30% of all new single-family homes in the City of Asheville achieving certification annually.

The Green Built Homes program continues to touch the lives of countless people in the greater Asheville area, as well as across the state of North Carolina, and beyond. Thank you for your participation in the Green Built Alliance, which enables the organization to continue inspiring action to promote sustainability in our communities.



Asheville Habitat is currently building their Glenn Bridge neighborhood, located in South Buncombe. When completed, this community will be a total of 34 homes and features a mixture of housing products including single family homes, townhomes, and Aging in Place homes. ASHEVILLE AREA HABITAT FOR HUMANITY PHOTO

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Comfort Amid the Devastation

A Journey of Love, Community, and Sustainable Living

BY MARY LOVE

Western North Carolina has faced unimaginable challenges recently, and it's incredible to see how we've come together, supporting each other through such immense hardship. To everyone still enduring profound loss, please know that you're surrounded by love, and we all care deeply for you. This story of resilience speaks not only to my own journey but also to the strength we can find in planning and community.

My grandmother always told me to prepare for the worst while hoping for the best, advice that has shaped much of my life. Years ago, I set a goal to build a certified green home, driven by the vision to create a place of resilience. It took nearly 15 years to bring this to life, choosing a site with care and ultimately finding an agrihood in Asheville. I waited another two years to select the perfect lot along the farm's edge, knowing that thoughtful planning would be key to making our home sustainable.

Through years of careful choices, we created a house certified as Green Built, Energy Star, and Pearl. Every aspect was thoughtfully chosen — from site placement to energy-efficient products, indoor air quality, water management, and permaculture landscaping. Our home is a living system, designed with high performance building principals. So, when Helene hit, we were as prepared as we could be, even though no one could have anticipated the extent of devastation. Our solar panels, backup batteries, and decision to stay on a well instead of city water gave us some security during the storm's aftermath.

Initially, we had little idea of the true extent of the storm's destruction. On our small ridge with no cell service, we assumed the damage was similar to previous storms. We saw trees downed and some flooding, and our neighbors came together to clear debris, pooling resources to make sure

everyone was okay. We shared our electricity, water, and refrigerators, inviting everyone to store their food with us. That night, we gathered for a meal — a moment of comfort amid the unknown.

As the days passed and we were finally able to see the damage beyond our ridge, the scale of the devastation was beyond belief. Lives, homes, and communities

as a safe haven. A place to take showers, get fresh water, charge phones, eat fresh vegetables and wash dishes. Our hub became known as the Love Café.

More than a month later, our region is still recovering; entire towns are rebuilding, roads and utilities are slowly being restored. Yet, with each step forward, we're seeing a shared commitment to

This experience has shown me something profound: people are good. When faced with adversity, we come together and support one another. I hope we can hold onto this spirit of unity as we rebuild. It's a chance to rethink how we approach building, to embrace sustainable practices that consider the needs of our neighbors and the environment.



were profoundly impacted. Deb and I continued to offer our home

rebuilding thoughtfully, with love and connection.

For over 20 years, we've had the knowledge and tools to build better, more resilient homes. If we had embraced these practices more widely, perhaps the level of devastation in places like Western North Carolina, wildfire-stricken California, and heat-battered Arizona could have been mitigated. So, I encourage everyone to consider how we can build in ways that protect each other and our shared world.

I overheard one of my chosen children, tell his children, "this is a safe house and as long as Deb and Mary are here then you are safe."

Together, we can create places that are not just safe but are truly life-affirming for us all.



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Green roofs integrate this Madison County home into the surrounding environment.

Living Roofs

Living Roofs Inc. (LRI) was founded in 2006 by Emilio and Kate Ancaya and was the first company in North Carolina dedicated to vegetated roofs and landscape on structure. The Ancayas created the company to explore the potential of green roofs to bring nature into cities and increase resilience in the Southeast region. For this year's magazine, GBA sat down with the team at Living Roofs to learn more about this innovative and captivating concept.

GBA: Can you offer some background as to the evolution of the company's founding and how it has evolved over the last two decades?

Living Roofs: Our original goals involved exploring the potential of green roofs to bring nature into cities and increase resilience in the Southeast region. We envision green roofs as natural infrastructure unfurling across the built environment and stitching nature back into the urban fabric.

Over the years we've tested

new systems, created new approaches to planting green roofs in the region, grown our team from two employees (founders Kate and Emilio!) to twenty, and established LRI as a company with an impactful regional reach.

GBA: Are you the only company of your type in the region?

Living Roofs: Other companies install green roofs in the region, and there are product companies that serve the southeast, but as far as we know Living Roofs, Inc. is the only company that provides a full suite of specialized services including design, construction, and care & maintenance.

GBA: What are some of the benefits of installing a living roof?

Living Roofs: Living roofs, also known as green roofs or vegetated roofs, are a type of nature-based infrastructure and a tool for building regional resilience and helping meet the challenges of climate change. A living roof provides a powerful pop of nature, bringing beauty and life to underutilized spaces in the built environment—turning barren, overlooked areas into living stormwater infrastructure that offers a cascade of community-wide social and environmental benefits.

Vegetated roofs address climate challenges impacting our region by reducing rooftop temperatures, minimizing stormwater runoff, and promoting biodiversity

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— all while creating an extraordinary visual amenity for people to enjoy. Vegetated roofs are the first line of stormwater capture in urban areas and play a vital role in reducing storm runoff that surges onto our streets, flooding communities and eroding our creeks, streams, and rivers. By significantly reducing the amount and rate of stormwater runoff, green roofs protect and alleviate the stress on our existing stormwater infrastructure, which helps prevent sanitary sewer overflows and reduces costs associated with maintaining and expanding infrastructure.



Penstemon and coreopsis blooming in spring on a green roof in downtown Asheville.

ible from the street and driveway, creating a welcoming and unexpected entrance. Living Roofs Design Studio collaborated with the homeowners to explore various materials, planting styles, and plant species, resulting in a simple yet refined garden with a pathway and seating area for gatherings and quiet reflection. Attention was paid to ensuring the materials and layout integrated the garden with the architecture, providing a seamless connection between the home and landscape. A path meanders through the garden to a seating area immersed in a sea of

The green roof at the AC Marriott Chapel Hill improves the view while acting as natural infrastructure.



Conventional, exposed roof membranes cause intense glare and require cleaning to avoid discoloration and staining over time. Covering the roof with vegetation improves the view while also protecting the membrane, extending the life expectancy of the roofing by 2-3 times and lowering cooling costs! That's a lot of savings over a building's lifecycle, all while im-

proving the view and use of the roof for humans and non-humans alike.

GBA: Tell us about the Hamburg Mountain project in Weaverville.

Living Roofs: The Hamburg Mountain project is situated to take in expansive mountain views. Living Roofs, Inc. worked closely with the client and ASSEMBLY Ar-

A rooftop transformed into an elevated garden in the heart of the city.



chitecture + Build to design a restorative rooftop garden for lounging and enjoying the surrounding mountain views. Located over the garage and accessible from the second floor, the roof garden provides a seamless connection to the outdoors, offering a true inside-outside experience.

Due to the site's topography, the garden roof is prominently vis-

flowering perennials and grasses.

Once the design was complete, the Living Roofs construction team installed the green roof system, irrigation, and plantings before handing it off to our Care & Maintenance team, who will care for the system and small plants as they flourish and ensure this elevated garden thrives and brings joy, year after year.



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Tips to Save Energy At Home

Simple, Low-Budget Ways to Save on Electricity Bills

BY KELVIN BONILLA

In these times when everything feels expensive, we all try to find ways to save money on our energy bills and keep our homes comfortable.

The first step to saving money in your home is learning about how your home uses energy. There are many small things you can do to save. Here are some cheap and easy tips that have proven effective for putting a couple of bucks back into your pocket:

Change your bulbs to LEDs —

Do you remember how your parents always told you to turn off the light when you left the room? With the new technology of LEDs, that is not such a big problem anymore. The amount of energy these bulbs use compared to their counterparts is minuscule. An LED bulb costs about \$1 or \$2 a year and can last up to two decades. Although the original price of an LED may be a little higher than an incandescent bulb or the spiral CFLs, they pay for themselves in a couple of months. Change them all!

Wash with cold water —

Nowadays, the temperature of the water does now affect how clean your laundry gets, since the detergents you buy at the store are powerful and effective. Cold water is best, not only because it will save you the expense of hot water, but it also keeps the colors on your clothes vibrant without fading and reduces the risk of your clothes shrinking.

Use the solar dryer —

If possible, air dry your clothes. The sun is a free source of energy that can also dry your clothes. And when you do have to use your electric dryer, be sure to clean the lint trap after every wash.

Use ceiling fans — Ceiling fans are great for saving energy as they use a fraction of energy compared to air conditioning. The most important thing to remember is that fans only cool people, not rooms. If the fan is on and no one is in the room, energy is being wasted. Ceiling fans also have different functions for hot and cold seasons. In the summer, the direction should



Beverly works on a door to seal air leaks. The doors are one of the places where the most air escapes from the house.

be counterclockwise and vice versa in the winter.

Clean under the refrigerator —

We all know that gutters need to be cleaned at least once a year, but how often should you clean under the fridge? Most new refrigerators have the condenser on the bottom. This pulls in air to make the conversion from hot to cold. By pulling the air, it also takes everything that is on the floor — dust, dog hair, etc. When the condenser is dirty, it works harder, gets hotter, and works less efficiently. That's why it's important to clean under the refrigerator at least 2 times a year.

Heating and AC filters —

It is important that your heating and air conditioning filters are kept clean. When these are dirty, the

unit has a harder time heating or cooling the air because the airflow is obstructed. This makes it consume more energy and the life of the device becomes shorter. We recommend that the filters be changed or cleaned every month or month and a half.

Phantom loads —

In your home, any appliance that is plugged into an outlet is drawing some electricity. Even when the appliance is turned off, electricity is always collected. To avoid this, we recommend unplugging the devices or connecting them to a power strip with a switch that cuts off electricity.

Change your bathroom shower head —

Have you ever run out of hot water after another family member has taken a shower? One

of the ways to prevent this from happening is to change your shower head to one with lower flow. There are many options that still offer the same pressure but use less water! We recommend that shower heads be rated at no more than 1.5GPM (gallons per minute). We also recommend changing the bathroom aerators to 0.5GPM and the kitchen aerators to 1.0GPM. You can also save by lowering your water tank temperature to 120 F.

Hot water insulation —

If you touch the hot and cold water pipes coming out of the tank, you will notice that they both feel hot. The reason is because the water inside these pipes is pulling the heat inside the tank out. This therefore wastes the energy that was used to heat the water inside the tank. We recommend that the first 5 feet of accessible hot and cold water piping be installed. And we also recommend insulating the tank from hot water, especially if it is located outside the conditioned space of the home.

These tips are a great way to start your journey to save on your energy bills, but you can find further info on these and much more at energysaversnetwork.org. And if you live in Buncombe County and qualify based on your income, Energy Savers Network can come to your home to make energy efficiency improvements at no cost. Connect with us through the website or call us at 828-585-4492 ext. 3.

Kelvin joined Green Built Alliance in the spring of 2020 as the project manager for the Energy Savers Network program.

A native of Honduras, Kelvin brings more than a decade of experience in the building science industry to the team. In his work, Kelvin continues his passion for climate justice by working to reduce the energy consumption of homes in marginalized communities, which are often the most affected by climate change.

Connect with Kelvin at Kelvin@greenbuilt.org.



Red Five and Rouge One are the vehicles the Energy Savers Network team uses to bring savings to Buncombe County residents.



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Climate Action Now

Decarbonizing Working Lands at Warren Wilson College

BY PETER L. ERB

Decarbonization, the process of reducing or eliminating carbon dioxide emissions, is crucial for mitigating climate change and increasing climate resilience. While we often think of decarbonization within our built environment, managing carbon in rural landscapes is essential.

Agricultural production alone contributes approximately 12% of greenhouse gas emissions in the US, placing a significant responsibility on producers to mitigate climate on their own working lands.

"This is not only about offsetting carbon emissions from land management, it is also about protecting rural livelihoods by demonstrating energy independence and alternative revenue streams" says Dr. Dave Ellum, Dean and Director of the Center for Working Lands at Warren Wilson College (CWL).

The need for energy independence and climate resilience on working lands has never been more apparent than in the aftermath of Hurricane Helene.

"While our own working lands were not immune to the devastation, it's abundantly clear that the regenerative and decarbonized land practices that we utilize had a positive effect on the land's resilience and our ability to have limited electricity despite major interruptions in the power supply," said Ellum.

In 2023, the Center for Working Lands initiated major decarbonization efforts by beginning the process of transitioning all of its land operations away from fossil fuel use. The college's campus in the Swannanoa Valley includes 290 acres of agricultural land, including a working farm and garden, as well as 650 acres of forest and campus greenspaces. This transition aims to reduce their an-

nual greenhouse gas emissions by approximately 73 metric tons of CO₂ equivalent through the development of alternative energy sources. Beyond emissions reduction and creating energy independence, CWL serves as a demonstration and training facility for students and regional landowners seeking to manage land in ways that mitigate climate impacts and create resilience while ensuring economic viability.

For small landowners, a persistent barrier to agricultural innovation is the risk involved in adopting new technologies. The CWL addresses this by assuming the risk of testing new innovations, equipment, and practices, providing a platform where land managers can experiment before committing to full-scale implementation. "For us, risk is defined as research and education. We are able to address risk through our student-powered land management programs that

combine academics and work for a robust experiential learning environment," Dr. Ellum explains.

As part of Warren Wilson College's Work Program, CWL employs 135 students (18% of the total student body) across its land management operations. Many students, like Natalie Kloss, gain hands-on training in cutting-edge climate mitigation technologies such as electric tractors and equipment. Reflecting on her experience, Natalie says, "I feel prepared to enter the world equipped not only with the necessary green skills and experience but also with the Warren Wilson community's spirit of innovation, action, and commitment to positive change. There is much more work and care needed for our Earth and its people, but at Warren Wilson, it feels tangible." Students like Natalie can plug into decarbonization via a diverse range of campus projects.

These include:

Mobile Microgrid Work Vehicle Fleet (MMWV)

The Mobile Microgrid Work Vehicle (MMWV) Initiative was created as a joint venture between Warren Wilson College, UNCA/NC State Mechatronics Program and The Critical Services Microgrid Group. Mobile microgrids were developed by upscaling 10 decommissioned golf carts and converting them from lead acid batteries to lithium iron phosphate batteries. These Mobile Microgrid Work Vehicles carry their own solar panels so they never need to be plugged into the grid to recharge. Not only do they move people, they also incorporate AC inverters, giving them the ability to run devices such as power tools, AV equipment and air compressors at remote work or educational sites and event venues.



Solar Microgrid

The solar microgrid is a completely off-grid system used to charge two Solectrac all electric tractors and the WWC Garden's electric equipment. The system is internet connected allowing students and professors to access and download real time data to be used in teaching and research activities. The microgrid is housed in a converted horse barn with modified stalls for tractor charging and a secure control room for infrastructure protection. The horse barn was chosen to demonstrate a feasible and realistic system for farmers who are wanting to integrate climate friendly technology into currently available agricultural infrastructure. The microgrid was installed by WWC alumni-owned SolFarm Solar Company, a local Asheville company. SolFarm agreed to partner with the CWL on making the in-

stallation a learning opportunity by allowing students to participate in the process where appropriate.

No-Till Drill

Agricultural soils can be carbon sources or sinks depending on how they are managed over the long-term. Traditional tilling disturbs organic matter in the soil and carbon is released into the atmosphere as carbon dioxide, contributing to climate change. The WWC Farm has started using a No-Till Grain Drill to seed its winter barley and other forage crops. This tool allows them to seed the soils without the intensive bed prep that would normally proceed planting. Doing so cuts down dramatically on trips over the field with the tractor, greatly reducing diesel usage, soil compaction and soil disturbance from tillage.

exist. The importance of creating more resilient working lands has never been more important. Continuing to learn from their current resilience work and investing in decarbonization will be among the CWL's biggest emphasis mov-

be testing the collocation of crops and solar production, essentially farming the sun twice. A feasibility study has been completed through generous gifts from the band Pearl Jam and other climate minded donors.



ing forward. Innovations on the horizon include photovoltaic greenhouse films, solar cattle waterers, rechargeable power tools, modified electric work bikes and battery storage. These innovations will be powered through the implementation of an agrivoltaics research and demonstration facility on the college farm. The CWL will

Peter L. Erb is the Communications Coordinator for the Center for Working Lands at Warren Wilson College. He has been working in conservation and science communications since 2012. For more information on the Center for Working Lands visit cwl.warren-wilson.edu.

Ferguson Soil Carbon Study

The Ferguson Soil Carbon Study is a multiyear project focused on inventorying soil carbon across all of the Farm's cropping fields and pastures. The data that are collected is analyzed and will be compared to future measurements to quantify the efficacy of management practices such as no-till and silvopasture in building soil carbon stores and mitigating the effects of agriculture on climate change. This project has provided research opportunities for three undergraduate students already and will play an important role in understanding how scale-appropriate agriculture can provide a livelihood for farmers while reducing atmospheric CO₂ emissions from farming operations.

Looking Ahead

As recent tragic events have shown, climate havens no longer



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The New “Green” Yard

Sustainable Landscaping Practices

BY AMY SMITH

For decades, the picture-perfect American front yard consisted of turf grass, ornamental shrubbery, and perhaps an assortment of annual or perennial flowers. Not only have design plans shifted over time, but these resource-intensive lawns are now shifting toward more sustainable and environmentally friendly landscapes. Sustainable landscaping not only enhances the aesthetic appeal of our surroundings but also contributes significantly to environmental conservation, resource efficiency, and biodiversity.

Sustainable landscaping provides a variety of benefits to homeowners and the community. Eco-conscious landscape choices promote water conservation, soil health and biodiversity. A properly planned and established green yard can reduce maintenance time and costs, while increasing property values and reducing utility costs. Finally, sustainable landscaping gives us positive for mental health, access to green spaces, is positive for mental health, and promotes cleaner air, water, and soil.

While moving toward a sustainable home landscape plan could include a complete overhaul, you can also begin by implementing

sustainable landscape practices into your existing yard. Some key ideas to consider include:

Native Plant Selection

Choosing native plants is fundamental to sustainable landscaping. Native species are well-adapted to the local climate, soil, and ecosystem, requiring less water, fertilizer, and pest control. They also provide essential habitats for local wildlife, promoting biodiversity and ecological balance.

Efficient Irrigation

Implementing efficient irrigation systems, such as drip irrigation or soaker hoses, ensures that water is delivered directly to the plant roots, minimizing evaporation and runoff. Rainwater harvesting systems can also be installed to collect and store rainwater for landscape use, further reducing reliance on municipal water supplies.

Soil Management

Healthy soil is critical for plant growth and water retention. Practices such as composting, mulching, and reduced tillage help maintain soil structure and fertility. Cover crops can be used to prevent soil erosion and improve soil health during the off-season.

Organic Practices

Avoiding chemical fertilizers and pesticides is essential for sustainable landscaping. Organic alternatives, such as compost, manure, and natural pest control

methods, protect soil health and beneficial organisms. Integrated Pest Management (IPM) strategies can also be employed to manage pests in an environmentally friendly manner.

Water-Wise Planting

Grouping plants with similar water needs together and using drought-tolerant species reduces water consumption. Mulching around plants helps retain soil moisture and suppress weeds, further conserving water. Implementing rain gardens or bioswales can manage stormwater runoff, filtering pollutants and replenishing groundwater supplies.

Consider Trees

If you are lucky enough to have mature native trees on your property, keep them! Consult with a local certified arborist to keep your trees healthy and beautiful. Mature trees provide shade, clean the air, provide bird and wildlife habitat, and increase property values. You can also add trees, preferably native species, to your ongoing landscape plan to enhance these benefits.

Reduce Fuel Emissions

Traditional gasoline-powered lawn equipment emits considerable amounts of pollution and greenhouse gasses into the environment. Consider switching to electric tools, or even better, use manual options. Mow less frequently and consider reducing the amount of turf grass that requires intensive maintenance.

Recycle Yard Waste

Reduce landfill waste by recycling yard waste such as grass clippings, twigs, leaves, and non-invasive weeds. You can compost these materials to create your own nutrient-rich soil amendment or take advantage of local brush recycling opportunities. Organic matter sent to a landfill can create methane gas emissions which contribute to climate change, but this is avoided by composting.

Sustainable landscaping offers a multitude of benefits, from conserving water and enhancing soil health to promoting biodiversity and improving human well-being. By adopting key practices such as native plant selection, efficient irrigation, soil management, organic practices, and water-wise planting, homeowners and landscapers can create beautiful, eco-friendly outdoor spaces that contribute to a healthier planet. Embracing sustainable landscaping is not just a trend but a vital step towards ensuring a greener, more sustainable future for generations to come.

Amy Smith is a Professor of Science at Purdue University Global and a REALTOR® with CENTURY 21 Connected in Asheville. She is a GREEN certified real estate agent, is LEED AP accredited, and holds an MS in Forest Ecology and Management as well as an MS in Environmental Policy. Amy formerly served as the Chair of the Asheville Urban Forestry Commission and is a volunteer member of the Asheville Tree Protection Taskforce.

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BY ANNIE MCGEHRIN

Green Built Alliance and United Way of Asheville and Buncombe County (UWABC) are proud to announce the celebration of their collaborative efforts in advancing clean energy and community support through the Appalachian Offsets program and the UWABC Solar Project.

Thanks to the incredible generosity of Appalachian Offsets donors and community partners a full solar array has been installed at the UWABC Community Services building located at 50 S. French Broad Avenue.

The system was switched on in May, and April Lambert, United Way Vice President of Finance and Operations, has already seen results. "In September 2023, our building consumed 21,260 kWh. This September, that number is down to 13,350. This is very encouraging," said Lambert.

This achievement underscores the power of collaboration in driving sustainable solutions. Cash and in-kind contributions from Asheville-based Blue Ridge Power, as well as a Duke Energy rebate specifically for nonprofit organizations, were instrumental in making this project a reality. The installation of this solar array reduces the building's energy needs by sixty

percent, resulting in nearly \$20,000 in annual savings which will be reinvested in UWABC's community partners who serve youth and families across Buncombe County.

Centrally located in downtown Asheville, United Way's building is the home to 13 nonprofit organizations and a hub for our network of hundreds of local businesses and community partners. The UWABC building's purpose and downtown location create a powerful opportunity for the organization to serve as a model for businesses and other nonprofits, encouraging more widespread adoption of clean energy in our community.



UWABC Building.
UWABC PHOTO

The Appalachian Offsets program is a local carbon offset program of Green Built Alliance that allows businesses and individuals to calculate and offset their carbon footprint while investing directly in local energy efficiency and renewable energy projects. The partner-

ship with United Way of Asheville and Buncombe County as the first nonprofit in a series of renewable energy projects is noteworthy, as it demonstrates UWABC's commitment to sustainability and nonprofit leadership in the fight against climate change.

United Way of Asheville and Buncombe County's building is west-facing with no tree cover, making it an excellent candidate for an efficient solar energy system for years to come.

"We are thrilled to celebrate the success of our partnership with United Way of Asheville and Buncombe County," said Amber Gilot,

of Green Built Alliance and the broader community in making the UWABC Solar Project a reality," said Dan Leroy, CEO of United Way of Asheville and Buncombe County. "This project exemplifies our shared commitment to environmental stewardship and community empowerment."

Green Built Alliance and United Way of Asheville and Buncombe County extend their sincerest gratitude to the individuals and organizations whose generosity and support have made the Appalachian Offsets program and the UWABC Solar Project possible.

United Way of Asheville and Buncombe

Established in 1921, United Way of Asheville and Buncombe County believes that together we can co-create a united and resilient community where everyone belongs and everyone thrives. This vision also serves as a call to action for those who are committed to ensuring every person in our community lives free from poverty and injustice.

For more information about United Way of Asheville and Buncombe County, visit united-wayabc.org.

Annie McGehrin was previously the Development & Marketing Manager at Green Built Alliance. After moving to North Carolina in 2016, Annie received her bachelor's degree in Sustainable Development from Appalachian State University. Connect with Annie at annie@greenbuilt.org.

Electrify Asheville-Buncombe

An All-Electric Future for Our Community

Electrify Asheville-Buncombe is here to drive our community's transition to clean, all-electric living! Launched in 2024, this community-led pilot program empowers Asheville and Buncombe County residents to swap out fossil fuel-based systems and appliances for clean, electric solutions. With our region committed to achieving 100% renewable energy by 2042,

the most efficient furnace on the market. Have a gas water heater? Learn about heat pump water heaters that move heat instead of generating it.

Electrify Asheville-Buncombe makes the switch to an all-electric home easy and affordable, with information on financial incentives like a \$2,000 federal tax credit for heat pumps and a 30% tax credit for solar and battery storage. And with new Inflation Reduction Act state-level rebates launching in early 2025, the cost of going electric is dropping even more, ensuring those with limited incomes can access the benefits of home electrification.

support, residents can get expert advice, find financial incentives, and access financing to make electrification simple and affordable. According to Rewiring America, electrifying homes could save the average household up to \$3,000 a year, making energy bills more predictable and eco-friendly. Plus, electric systems are typically more energy-efficient than fossil fuel-based ones, meaning more power for less.

Homeowners and Contractors Needed

Ready to electrify? Visit our website to assess your home's energy needs, discover upgrade opportunities and recommendations, and explore resources to make your journey to an all-electric home simple and affordable. Contractors, too, are vital in this movement. As the demand for clean energy grows, local HVAC specialists,

electricians, and plumbers can be part of the frontlines, leading Asheville and Buncombe County toward a renewable-powered future. Visit ElectrifyABC.com to get started.



Together, we can support Asheville and Buncombe County's renewable energy goals, cut emissions, and make our community a model of sustainability. Join Electrify Asheville-Buncombe — help us build a cleaner, healthier, and more resilient future for all.



Electrify Asheville-Buncombe is the spark to get us there. Electrify Asheville-Buncombe is part of a national movement to electrify the built environment and is designed to provide educational resources to the community about the benefits of electrification and provide a forum through which participating homeowners can find local contractors offering electrification products and services.

Going electric is a game-changer. As our grid increasingly relies on renewable energy and moves away from fossil fuels like coal and natural gas, transitioning to electric systems means cleaner, more efficient power for everyone. Got a gas furnace? Consider a heat pump, which is three to four times more efficient than

The program also provides exclusive financing for home electrification projects through the North Carolina Clean Energy Fund (NCCEF), made possible by Buncombe County's \$100,000 loan loss reserve, helping more residents access financing, even those with limited credit history. Administered by Self-Help Credit Union, this loan product offers low rates and straightforward terms, making electrification possible for more community members.

Why Go Electric?

Electric systems don't just reduce emissions — they can lower energy bills, improve indoor air quality, and support a cleaner, more resilient power grid. With Electrify Asheville-Buncombe's

Largest Local Solar Installer

Proudly Powering WNC Since 2010



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Overcoming Jargon

Clarification of Building Terminology

BY MARY LOVE

The building industry has its own jargon, and building science adds even more terminology that often confuses home owners, realtors, and appraisers. Builders may interpret words differently, so it's no wonder people are confused.

Let's review the most frequently confusing terms about green building with some simple definitions. Hopefully, this article will be used as a reference and we can all improve our communication.

Green Building, Sustainable Building, and High-Performance Homes are often used interchangeably. These terms refer to the design, construction, and operation of buildings that prioritize environmental sustainability and resource efficiency. The goal of such homes is to minimize the negative impact of the built environment



on the natural environment, human health, and the economy, while maximizing the positive impact. Green, sustainable high-performance homes have common building science features such as: advanced framing, extra insulation, high performance HVAC systems, and water saving equipment. Unless the home is certified by a third-party rater or the builder has documentation of products used, it is challenging to know if it is a green building, sustainable building, and high-performance home.

Advanced Framing

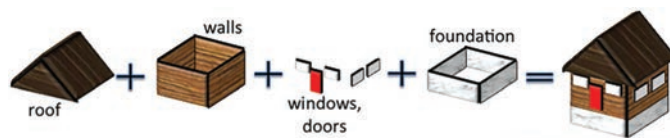
Advanced Framing is a technique that aims to optimize the use of building materials and minimize waste. The technique involves using engineered lumber products, such as laminated veneer lumber (LVL) or parallel strand lumber (PSL), instead of traditional dimensional lumber.

Advanced framing also involves designing building structures with fewer studs, headers, and other framing members, which reduces lumber needed and allows for more insulation in walls and ceilings. This technique can result in more energy-efficient buildings with lower construction costs and reduced environmental impact.

Blower Door Test

Blower Door Test is a diagnostic tool to determine how much air is entering or escaping from your home. Professional energy assessors use blower door tests to help determine a home's airtightness.

between the interior and exterior environments of a building. It includes all the components of the building's exterior that protect the interior from the elements, such as the roof, walls, windows, doors, and foundation. The building envelope plays a critical role in determining a building's energy efficiency, indoor air quality, and overall comfort for its occupants. A well-designed building envelope can help reduce energy consumption, prevent moisture and air leakage, improve thermal insulation, and enhance the durability and longevity of a building.



The components of the building envelope. SOURCE: AUGUSTINE MUSA.

Building Envelope

Building Envelope refers to the physical barrier or separation

Building Science

Building Science is a body of knowledge that draws upon the

disciplines of engineering, architecture, chemistry, physics, biology and the life sciences to understand the physical behavior of a building as a system. Building Science is utilized to make buildings more sustainable and efficient.

Certified Homes

are certified by a Third-Party Rater. There are numerous certification programs throughout the nation. The most common programs used in Western North Carolina are Energy Star and Green Built Homes, a program administered by the nonprofit Green Built Alliance. Certified Homes usually take into consideration the entire building process. This includes the site, materials, building envelope, indoor air quality, heating and cooling, water, appliances, lighting and renewables. The added value of certified homes is that a third-party rater is trained and certified to inspect and evaluate the entire building process. With the use of technical tools, they verify that the work is done correctly.

The terms Energy Audit and Energy Evaluation are often used interchangeably, but there are some differences between the two.

Energy Audit

An Energy Audit is a comprehensive assessment of a building's energy consumption and identifies opportunities to improve energy efficiency. It involves a detailed analysis of the building's systems, including heating and cooling, lighting, and appliances, to determine where energy is being wasted and how it can be saved. An energy audit typically includes a physical inspection of the building, the collection of energy use data, and the use of various tools and techniques to analyze the data and identify potential energy-saving opportunities.

Energy Evaluation

An Energy Evaluation is a more general review of a building's energy use, which can be less detailed and less comprehensive than an energy audit. It may involve a walkthrough inspection of the building to identify obvious areas for energy savings, such as the replacement of inefficient lighting or appliances. An energy evaluation may also include a review of energy bills and an assessment of the building's energy usage patterns to identify potential energy-saving opportunities.

Heat Pumps

Heat Pumps move heat from one area to another. They also use a reversing valve to reverse the flow of refrigerant and circulate

warm air during cold months. Heat pumps do not generate heat – they move heat from one place to another, but heat pumps absorb heat energy from the outside air (even in cold temperatures) and transfer it to the indoor air. When in cooling mode, a heat pump absorbs heat from the indoor air and releases it outdoors.

Heat-Pump Hot Water Systems

Heat-Pump Hot Water Systems use a refrigeration cycle to extract heat from the surrounding air. They then use a heat exchanger to heat water in an insulated storage cylinder. These systems typically use around 60 to 75% less electricity than a conventional electric hot water system.



Home Energy Rating System

HERS stands for Home Energy Rating System. It is a national program developed by the Residential Energy Services Network (RESNET) that provides a standardized way to measure a home's energy efficiency. The HERS Index is used to rate the energy efficiency of a home on a scale from 0 to 150, with a lower number indicating a more energy-efficient home. The HERS

rating takes into account factors such as insulation, air sealing, windows, doors, heating and cooling systems, and the orientation of the home. A HERS rating can help homeowners and buyers make informed decisions about energy-efficient upgrades and can also be used by builders to verify compliance with energy codes and standards.

HVAC, which stands for Heating, Ventilation, and Air Conditioning, is an all-encompassing term that describes heating and cooling systems in their entirety.

Indoor Air Quality

Indoor Air Quality (IAQ) refers to the air quality within and around buildings and structures, especially as it relates to the health and comfort of building occupants. Indoor pollution sources that release gasses or particles into the air are the primary cause of indoor air quality problems. Appropriate ventilation and clean filters improve IAQ.

Net-Zero Energy Home

Net-Zero Energy Home produces as much energy on an annual basis as it consumes.

Sealed Crawl Space

Sealed Crawl Space is a type of crawl space

in which the ground surface and walls are covered with a vapor barrier, and all vents and openings are sealed to prevent air and moisture from entering or exiting the space.

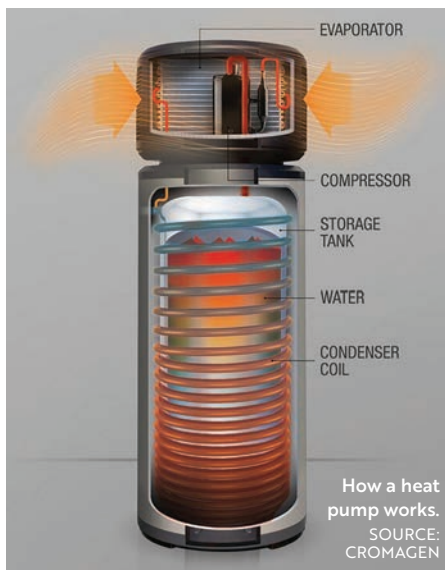
Smart Homes

Smart Homes may or may not be green, high-performance homes. A smart home typically includes a combination of smart devices such as thermostats, lighting, locks, security cameras, appliances, and entertainment systems, among others. These devices are interconnected and can communicate with each other, allowing homeowners to monitor and control them remotely through a central hub or a mobile app.

In order for a building project to move smoothly it is important to make sure that there is a mutual understanding when discussing building terms. Be sure to ask questions and clarify the meanings of any terms you don't understand.

Mary Love has been in the green building industry for over 30 years. She provides coaching and consulting to builders, and Realtors. She also offers consulting services to homeowners. Mary's real estate company works with all who are looking to buy or sell a house.

*Love The Green Real Estate Consulting Firm
www.lovethegreen.org
Mary Love Consulting
maryloveconsulting.com*





GREEN BUILT ALLIANCE

Inspired Action for Sustainable Communities

Since 2001, we have worked to advance sustainability, grow green building, and provide climate justice through community education, inspired action, and collaborative partnerships in WNC.

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Alternative & Natural Building

deltec homes



Deltec Homes
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deltechomes.com

Deltec Homes is an award-winning pre-fabricated homebuilder. Offering round and modern styles, our homes are best known for energy efficiency, great views, and resilience. We pride ourselves on manufacturing homes sustainably in a facility powered with 100



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Jade Mountain Builders & Co. Inc
Hans Doellgast
Fairview • 828.216.3948
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jademountainbuilders.com
Jade Mountain Builders is a team of 39 craftsmen who pride themselves on taking an ecologically sensitive approach to building homes.



MudStrawLove LLC
Steve Kemble
Asheville • 828.775.4823
connect@mudstrawlove.com
mudstrawlove.com

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

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



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

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



Steel Root Builders
Bob Koplos
Asheville • 830.832.7610
bob@steelrootbuilders.com
steelrootbuilders.com

Specializing in modern luxury homes, complete renovations, and commercial upfits, we bring expertise and a touch of elegance to every project.



Sure Foot Builders Inc.
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raymond@surefootbuilders.com
surefootbuilders.com

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



Timberframe Horizons LLC
Tom Rouse
Swannanoa • 828.222.2555
tom@timberframehorizons.com
www.timberframehorizons.com

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

Appraisers

Concept to Completion Construction Company, LLC
Joseph Oxford
Asheville • 828.242.1852
C2C.Construction.Co@gmail.com

We are appraisers, Realtor/Brokers, and builders with a keen interest in sustainable, grid-down resilient homes for ourselves and the community.

Architects

ACM Design PA
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accounting@acmdesign.net
acmdesignarchitects.com

ACM Design is a full service boutique architectural design and interior design firm based in Asheville, North Carolina.

SUPPORTING farmers markets, community-supported agriculture, and buying local greatly reduces carbon emissions needed for transportation of food and other goods.



Alice Dodson Architect, PA
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alice@alicedodsonarchitect.com
AliceDodsonArchitect.com

Integrated and affordable residential architectural design, long-time experience with alternative energy use and various energy-efficient, high-performing construction.



Altura Architects
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tyler@alturaarchitects.com
alturaarchitects.com



Altura Architects, P.A.
Altura Architects
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alturaarchitects.com

Altura Architects was founded in 1985 with a strong sense of stewardship for the environment and our community.



Arcisan, Inc.
Benjamin Settle
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ben@arcisandesign.com
arcisandesign.com

Asheville-based architectural firm specializing in custom residential designs, blending creativity, functionality, and environmental sensitivity to enhance living spaces.

Carleton Collins Architecture
Carleton Collins
Asheville • 828.552.5415
ccollins@carletoncollins.com
carletoncollins.com

We work with a variety of public and private clientele to explore how architecture enriches and sustains community life.



Legerton Architecture, P.A.
Wendy Legerton
Asheville • 828.251.9125
info@legertonarchitecture.com
legertonarchitecture.com
Local architectural firm



Narwhal Design Build, PLLC
Joe Archibald
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narwhalbuilt.com

Narwhal Design Build specializes in custom home construction, offering personalized service, quality craftsmanship, and innovative design solutions for clients.

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Robert Todd
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Stephens Farrell
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calder@w2arch.com
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Wittehaus

Toby Witte
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Builders

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Matthew Agrella-Sevila
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anneighborhoodcarpenter.com

We are a handmade and hand crafted company specializing in timber framing and unique residential/commercial projects. Our company aims to be environmentally, socially.

**"WHEN THE FOREST
and the city are
functionally
indistinguishable, then we
know we've reached
sustainability."**

— Janine Benyus



Altitude Builders Inc

Jason Waldrup
Asheville • 828.273.8192
jason@abiasheville.com
abiasheville.com

We provide clients with the highest level of service by providing quality construction services at fair and market competitive prices.

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Beach Hensley Homes provides sensibly crafted, urban-infill homes that are affordable, responsibly built designs with a focus on efficiency and attention to detail. To us, it's bigger than home building - we want to foster.



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Asheville • 828.575.4168
bhwickertlc@gmail.com

BH Wickers LLC is an experienced and reliable general contractor assisting with quality constructions and remodels.

Bostic Builders

Mike Bostic
Fairview • 828.606.6122
mikebosticbuilders@gmail.com
bosticbuilders.com

Building custom homes with integrity and attention to detail, exceeding client expectations with superior craftsmanship and personalized service.

Bracken Mountain Design Build

Rob Skeen
Brevard • 828.589.9646
office@brackermountaindesign-build.com
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Dedicated to building high-quality custom homes with integrity, craftsmanship, and attention to detail, exceeding client expectations with personalized service.



Brock Builders, Inc.

Chris Brock
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brockbuildersinc.com

We're a team of custom home builders and renovators working in the Asheville and Hendersonville, NC area.

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Rick Buchanan
Asheville • 828.650.6565
rick@buchananconstruction.com
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A green home is healthier to live in and healthier for our planet. It is our mission to build green homes that bring together the features of an environmentally-friendly structure, while maintaining the function and design of a custom built, up-scale home



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evergreenconstruct.com

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Falcon Construction renovates commercial property, develops new projects, retrofits historic buildings, and builds new residential homes and developments.

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



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 Jon Sloop
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 greenlightcustomhomes.com
Green Light is a custom home builder based in the mountains of Asheville, NC specializing in modern, new construction and renovations.

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 Kat McReynolds
 Asheville • 910.389.7373
 kat.mcreynolds@gmail.com
 Green Room Builders, LLC focuses on crafting compact, eco-friendly projects, including small multi-family rental homes, prioritizing durability, sustainability, and aesthetics.

High Country Timberframe & Gallery Woodworking Co.
 Tom Owens
 Boone • 828.264.8971
 tomo@highcountrytimberframe.com
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We specialize in design/construction of high-performance homes that meet Green Built Homes and NC Energy Star 3 standards.



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 Rob Howard
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 cazkern@aol.com
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McMaster Real Estate Group
 Matthew McMaster
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 WNC Property Solutions offers real estate solutions, aiding homeowners facing foreclosure, burdensome properties, or needing to sell quickly with personalized options.

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 Fairview • 828.342.8211
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Modernest Homes
 Steve Eisenstein
 modernesthomes@gmail.com

Mountain Sound Builders
 Corey Black
 Arden • 202.815.4192
 corey@mountainsoundbuilders.com
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We are a custom home builder crafting extraordinary homes, valuing each client relationship, and delivering an accurate, timely build experience.



Mountain Sun Building & Design
 Emily Boyd
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 emily@mountainsunbuilding.com
 mountainsunbuilding.com
We specialize in site-specific design and zero-energy homes, guiding clients from lot selection to move-in and landscaping, crafting connected spaces.



Multi Construction
 Kiril Nikolov
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 ashevillecustombuilders.com
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Myers Building and Design
 Kyle Myers
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 Myers Building and Design in Asheville is a trusted general contractor and builder, renowned for custom builds, renovations, and exceptional craftsmanship.

Mystic Builders
 Christopher Wilson
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 Mystic Builders in Asheville delivers quality construction services, specializing in custom homes and renovations with superior craftsmanship and attention to detail.



Nicholson and Sun LLC
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Using a foundation of science, aptness for innovation, and passion for arresting climate change, we specialize in building Net-Zero energy true green homes.

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 James Dose
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 oldnorthstatebuildingcompany.com
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Osada Construction, LLC
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Crafting bespoke homes with attention to detail and client collaboration, delivering exceptional quality and timeless design for lasting enjoyment.

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 Patrick Conner
 Asheville • 828.215.7368
 patrick@paintedbuckeyebuilders.com
 paintedbuckeyebuilders.com
Dedicated builders creating unique homes with craftsmanship and artistic flair, focusing on quality and client collaboration for stunning results.

Rare Earth Builders, Inc.
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 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.



RCJ Building Inc.
 Robert Jacobelly
 Asheville • 828.216.4433
 rcjbuilding@yahoo.com
 rcjbuilding.net/
RCJ Building crafts energy-efficient homes, designed to last for generations, pioneering the homes of tomorrow with timeless quality.



Red Tree Builders, Inc.
 Brandon Bryant
 Asheville • 828.202.5131
 Brandon@redtreebuilders.com
 redtreebuilders.com
Red Tree Builders masterfully imagines, designs and creates each of their remarkable, eco-luxury mountain homes.

Robert Roepnack
 Robert Roepnack
 ASHEVILLE • 828.545.5363
 Bob@roepnack.com
 jrdesigns.net
Offering comprehensive interior design services, transforming spaces with creativity, functionality, and personalized style, enhancing clients' lifestyles and environments.

RS Motley Construction
 Rob Motley
 Asheville • 828.776.7470
 rsmotleyconstruction@gmail.com
 robmotleybuilder.com
We distinguish ourselves through communication, honesty, transparency, attention to detail, and building each home as if it were our own.



Sage Builders
 Doug Keefer
 Asheville • 828.713.7208
 info@thesagebuilders.com
 thesagebuilders.com
SAGE uses Sustainable, Appropriate, Green and Efficient building techniques to create beautifully hand-crafted homes with passive and active solar amenities.

Scroggs Construction Services
 Nicholas Scroggs
 Swannanoa • 828.552.3222
 office@scroggsconstruction.com
 ScroggsConstruction.com
Scroggs Construction Services is a locally owned construction firm that specializes in home remodeling and custom home construction.

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



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



Solid Rock Builders LLC
Travis Meinck
Asheville • 828.712.3280
travis@solidrockbuilders.com
solidrockbuilders.com
We focus on providing our customers with a wonderful building experience, and a beautiful efficient custom home.

Solstice Construction Co., Inc.
Aaron Burdett
Saluda • 828.290.9596
aaron@solsticeconstruction.net
solsticeconstruction.net
Custom efficient homes builder in Saluda and surrounding areas since 2005

Soufl Construction LLC
Matt Soufl
Asheville • 530.416.2202
Souflconst@yahoo.com
Building strong homes since 2004



SouthLight Builders
Jamie Shelton
Asheville • 828.775.8665
southlightbuilders@gmail.com
southlightbuilders.com
Pioneering green building since 1979, constructing energy-efficient homes. Our turn-key approach ensures quality while keeping construction costs low.

Spoke Building Arts
Micah Goldfarb
Asheville • 828.585.7545
spokebuilt@gmail.com

Standing Stone Builders, Inc.
David Ulrichs
Asheville • 828.713.2771
daveulrichs@gmail.com
standingstonebuilders.com
Offering superior craftsmanship and personalized service for custom home construction and renovation projects, delivering exceptional quality and client satisfaction.



Steel Root Builders
Bob Koplos
Asheville • 830.832.7610
bob@steelrootbuilders.com
steelrootbuilders.com
Specializing in modern luxury homes, complete renovations, and commercial upfits, we bring expertise and a touch of elegance to every project.

Stillwell Carpentry LLC
Nick Stillwell
Black Mountain • 828.273.6425
nickstillwell@gmail.com
Crafting custom, high-quality woodworking projects, Stillwell Carpentry LLC excels in detailed craftsmanship and personalized service for unique home improvements.



Sundog Homes
David Earley
Asheville • 828.774.5720
info@sundoghomes.com
sundoghomes.com
Sundog Homes is a division of Sundog Development Company LLC, an unlimited general contractor with projects in NC and SC



Sure Foot Builders Inc.
Raymond Thompson
Asheville • 828.242.0925
raymond@surefootbuilders.com
surefootbuilders.com
We are a green home building company working in the greater Asheville area. It is our passion to build beautiful and creative homes that add value and comfort to the lives of our owners and community.

The William Baxter Co.
William Baxter
Almond • 828.506.8759
thewmbaxterco@aol.com
General contractor/builder crafting high-quality homes in WNC, combining quality work with personalized service with clients



THINK BUILD + design
Travis McKay
Asheville • 828.209.8855
think.build.design@gmail.com
thinkbuilddesign.com
Eco-friendly build+design and remodeling firm focused on providing superior quality and workmanship for aesthetically pleasing construction of modern homes.

Thompson & Brown Custom Builders
Gavin Brown
Fletcher • 828.684.7750
ap.tbcustombuilders@gmail.com
tbcustombuilders.com
Crafting custom homes with precision and dedication, ensuring exceptional quality and personalized service for every client at TB Custom Builders.



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

Timberline Custom Homes, LLC
Mark Montini
Asheville • 828.776.1511
timberlinehomes@att.net
timberlinecustoms.com
Award-winning engineers building with attention to detail and personalized service, ensuring client satisfaction, with over 30 years of experience.

Town Mountain Builders LLC
Kirk Johnson
Asheville • 828.231.7379
townmountainbuilders@gmail.com
townmountainbuilders.com
Specializing in custom home construction and renovations, offering personalized service, quality craftsmanship, and sustainable building practices for client satisfaction.

Tricob Custom Building and Remodeling
Mary Cobzaru
Fairview • 828.989.3532
Tricobcustom@gmail.com
A family-owned business specializing in custom home remodeling, catering to families valuing quality. Expertise includes bathrooms, kitchens, tile, carpentry, and shelving.

Tyner Construction
Marc Tyner
Burnsville • 828.682.7421
marc@tynerconstruction.com
tynerconstruction.com
Delivering high-quality construction services with integrity and professionalism, exceeding client expectations with superior craftsmanship and attention to detail.



Virant Design Inc.
Tom Virant
Asheville • 828.231.0092
info@virantdesign.com
virantdesign.com
Specializing in innovative design solutions, creating functional and aesthetic products for various industries and applications with expertise and creativity.

Wanoca Builders
Chris Mriscin
Asheville • 828.707.0586
chris@wanocabuilders.com
wanocabuilders.com
Specializing in sustainable construction, creating eco-friendly homes with innovative design and meticulous craftsmanship at Wanoca Builders.



Ward Enterprises & Ventures
Hunter Ward
Candler • 828.712.4076
Hunter@buildwithward.com
www.buildwithward.com
Luxury Green Home Custom Builder

Wells Construction Group
David Wells
Asheville • 828.712.2669
dfwells@bellsouth.net
Offering comprehensive construction services, Wells Construction Group specializes in residential and commercial projects, delivering quality craftsmanship and client satisfaction.



Wild Abundance
Natalie Nicklett
Asheville • 828.755.7052
bookkeeper.wildabundance@gmail.com
wildabundance.net
Wild Abundance is a permaculture and carpentry school nestled in the mountains of Western North Carolina, just outside Asheville.

Wright Family Custom Homes
Timothy Wright
Asheville • 828.779.1697
twright@wrightfamilycustomhomes.com
wrightfamilycustomhomes.com
Designing bespoke homes with meticulous attention to detail and client collaboration, delivering exceptional quality and timeless elegance for lasting satisfaction.



WSM Craft
Smith McAulay
Asheville • 828.337.1957
smcaulay@wsmcraft.com
wsmcraft.com
Tailoring high-quality, custom woodwork and cabinetry with precision, elevating spaces with timeless beauty and functionality.

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

Certified Green Restaurant



Strada Italiano
Carly Reese
Asheville
carly@stradaasheville.com
stradaasheville.com

Commercial Builders



Buchanan Construction
Rick Buchanan
Asheville • 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, up-scale home



Living Stone Design + Build
Mitchell Metz
Asheville • 828.214.5093
mmetz@thesfc.co
livingstoneconstruction.com
Living Stone Design + Build offers an unparalleled luxury building experience for clients seeking to build custom green-built homes. Our team of architects, designers, and trades use the finest quality materials and cutting-edge building techniques while

Consultants

Greenhem Inc.
Joe Vintnell
Aberdeen • 910.757.0075
joe@greenhemusa.com
www.greenhemusa.com
Greenhem Inc. delivers cutting-edge green building materials, emphasizing sustainability, energy efficiency, and advanced eco-friendly construction techniques.



MudStrawLove LLC
Steve Kemble
Asheville • 828.775.4823
connect@mudstrawlove.com
mudstrawlove.com
Promoting sustainable living through alternative natural building techniques, offering workshops, consultation, and construction services.

Crawl Space Sealing



Conservation Pros

Harper Robinson
Asheville • 828.713.3346
info@conservationpros.com
conservationpros.com

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

Developers Communities

Building for Life, L.L.C.

Stuart Zitin
Asheville • 828.230.1424
stuartzitin@gmail.com
buildingforlifefasheville.com
Licensed NC general contractor since 1996, building 18 new Green Built/Energy Star homes on 4 acres in Oakley, Asheville.



Hickory Nut Forest Eco Community

Jane Lawson
Gerton • 828.571.0366
laughingwaterscontact@gmail.com
hickorynutforest.com

Situated in the serenity of Hickory Nut Gorge, Hickory Nut Forest is a vibrant model of sustainable living. Laughing Waters Retreat serves as its hub. An orchard and community garden are accessible from one's doorstep, as is an award-winning trail from Gerton to Bat Cave, Chimney Rock and Lake Lure.



JAG & Assoc. Construction, Inc.

Jody Guokas
Asheville • 828.216.0914
noi@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 envi



Sure Foot Builders Inc.

Raymond Thompson
Asheville • 828.242.0925
raymond@surefootbuilders.com
surefootbuilders.com

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

Terra Futura Farm, LLC

Kelsey Wood
Asheville • 828.712.8862
kelsey@terrafuturafarm.com
www.terrafuturafarm.com
Eco-Community development in West Asheville, including GreenBuilt-certified single family homes and co-housing units centered around Permaculture gardens and an orchard.

Education



AB Tech

Heath Moody
Asheville • 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!



Builders Association of the Blue Ridge Mountains

Megan Carroll
Swannanoa • 828.299.7001
megan@ashevillehba.com
ashevillehba.com

Lenoir-Rhyne University Asheville

Michael Dempsey
Asheville • 828.407.4269
michael.dempsey@lr.edu
lr.edu/asheville

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

NC Sustainable Energy Association

Raleigh • 919.832.7601
info@energync.org
energync.org

The leading nonprofit dedicated to creating clean energy jobs, economic opportunities and affordable energy to benefit all of North Carolina.

Rock Steady at Elk Wallow

Carol Corriveau
Asheville • 828.691.2202
corriveaucottage@gmail.com



Wild Abundance

Natalie Nicklett
Asheville • 828.775.7052
bookkeeper.wildabundance@gmail.com
wildabundance.net

Wild Abundance is a permaculture and carpentry school nestled in the mountains of Western North Carolina, just outside Asheville.

Your Local Solution to Global Pollution

we face climate change we reduce our footprint we support clean energy

To learn more about how you or your business could reduce your carbon footprint go to cutmycarbon.org.

PROUD SUPPORTERS:

CONNECT WITH US AT [FACEBOOK.COM/GREENBUILTORG](https://www.facebook.com/greenbuiltorg)

Energy Efficiency Automation



Conservation Pros
Harper Robinson
Asheville • 828.713.3346
info@conservationpros.com
conservationpros.com

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



Vandemusser Design
Amy Musser
Asheville • 828.348.4723
amy@vandemusser.com
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.

Engineers



Appalachian Landslide Consultants, PLLC
Jennifer Bauer

Asheville • 828.209.8642
jennifer@appalachianlandslide.com
appalachianlandslide.com
A geology consulting firm helping clients with slope stability concerns providing landslide risk assessment and mitigation strategies services in WNC and beyond.

Blue Earth Planning, Engineering & Design, PC
Tim Ormond

Asheville • 828.989.8075
tormond@blueearth.us
blueearth.us/
Offering sustainable design and consulting services to promote environmental stewardship and community resilience.

ECS Southeast, LLP
Matthew Fogleman
Asheville • 828.665.2307
mfogleman@ecslimited.com
ecslimited.com

Offering geotechnical engineering and construction materials testing services to support infrastructure projects and development initiatives.

Geothermal Design Center Inc.
Rick Clemenzi, PE, CGD
Asheville • 828.712.6786
rclemenzi@geothermaldesigncenter.com
geothermaldesigncenter.com
Engineering/Consultation on Decarbonization for Climate Action via Geothermal Heat Pumps and Advanced 5th-6th Generation Thermal Micro District Solutions

USGBC Carolinas
Diane Coleman
Denver • 352.805.9962
dcoleman@usgbc.org
usgbc.org/chapters/usgbc-north-carolina

For more than 25 years, USGBC and its member companies have come together to make our planet stronger, greener and more sustainable. USGBC is a leading worldwide movement that is transforming the building industry through the LEED program.

Finishes Interior and Exterior

WOW 1 Day Painting
Cedric Merrills
cedric.merrills@wow1day.com

Finishes Interior

Deltec Building Company
Tildon Whiteside
Asheville • 828.257.4907
twhiteside@deltecbuilding.com
deltecbuilding.com
We design and build one-of-a-kind homes built right, for the benefit of those alive today and for future generations.

Mountain Marble & Granite, Inc.
Ana Del Longo
Asheville • 828.225.0001
ana@mountainmarble.com
mountainmarble.com
Your trusted local stone fabricator, serving for over 28 years. Count on us for all your stone and hard surface needs.



Square Peg Construction Inc.
Leslie Humphrey
Asheville • 828.277.5164
info@squarepeginc.net
squarepeginc.net

We work with designers, architects, contractors and clients to translate dreams into artfully crafted environments.

The Arch Architectural Finishes, Flooring and More
Catherine Silver
Asheville • 828.253.5455
cmsilver@thearchnc.com
thearchnc.com
Designing and building custom homes with a focus on sustainability, quality craftsmanship, and client collaboration, ensuring lasting satisfaction.

Home Energy Raters



Eco-Sense Design
Hunter Dendy
Asheville • 828.337.7946
hunter@ecosensedesign.com
ecosensedesign.com
Certifying single family and multi-family projects for Green Built Homes, Energy Star for Homes and Duke/Progress rebates.



Energy Home Inspection
Jonathan Gach
Biltmore Forest • 828.222.0620
jgach@energyhomeinspection.com
energyhomeinspection.com

Improve comfort, save money, and increase your home's value. We offer real estate inspections, comprehensive energy audits, certifications, and rebates.

Residential Energy Diagnostics
Elliott Nailen
Fairview • 828.337.1686
elliott@goredforgreen.com

Provides comprehensive energy audits and diagnostics for residential properties, helping homeowners improve energy efficiency and reduce utility costs.



Vandemusser Design
Amy Musser
Asheville • 828.348.4723
amy@vandemusser.com
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.

Home Inspectors



Energy Home Inspection
Jonathan Gach
Biltmore Forest • 828.222.0620
jgach@energyhomeinspection.com
energyhomeinspection.com

Improve comfort, save money, and increase your home's value. We offer real estate inspections, comprehensive energy audits, certifications, and rebates.

Smoky Mountain Home Inspections
Hugh Alexander
Candler • 828.712.6829
halexander@smokymtnhi.com
smokymtnhomeinspections.com

Offering New, Existing and Pre-listing Home Inspections, Radon Testing, Water Testing Services throughout All of WNC.

HVAC Installers

B&R Service, Inc.
Kevin Bauguess
North Wilkesboro • 828.783.1177
kevin@bandrservice.com
bandrservice.com
Building performance based HVAC design, installation, and service. Whole building energy efficiency solutions and diagnostic testing by BPI certified professionals. B&R Service can help you with any heating and air conditioning problems as well as diagnose your whole house.

Sustainable Air Inc.
Tyler Healy
Asheville • 828.691.9221
info@sustainable-air.com
sustainable-air.com

Leading the charge in Asheville for sustainable air solutions, our company offers innovative eco-friendly HVAC systems and services.

Indoor Air Quality



A Healthier Home, LLC
Rick Bayless
Asheville • 828.243.5192
rickbayless@ahealthierhomenc.com
ahealthierhomenc.com
Immune-system challenges, overall body health and wellness can be connected to your home environment. Board-certified indoor environmental consultant; home-health investigator.

Blue Ridge Radon Solutions
Tucker Wilson
Asheville • 828.712.4649
tucker@blueridgeradonsolutions.com
blueridgeradonsolutions.com
Providing radon mitigation solutions for homes and businesses in the Blue Ridge area, ensuring safety and peace of mind.



Green R, Inc.
Ron Pariseau
Mars Hill • 828.680.9615
Ron@GreenRInc.com
Specializing in ventilation products for energy-efficient homes, offering solutions from whole-house fresh air exchange to spot ventilation and dehumidification.

Precision Restoration Services
Anne Bellizio
Weaverville • 828.645.4546
anne@restorewnc.com
prs2restore.com
A Full-Service Restoration Company for Water, Fire, or Smoke Damage, Specializing in Mold Remediation

Insulation



Conservation Pros
Harper Robinson
Asheville • 828.713.3346
info@conservationpros.com
conservationpros.com
Energy-efficiency retrofitting firm specializing in insulation, air sealing, crawlspace encapsulation and duct sealing. Serving WNC since 2007.

The Small Business Energy Saver program through Duke Energy pays up to 80 percent of your costs to make energy-efficiency improvements to your business. On average, 60 percent of project costs are covered through this program. Learn more at bluehorizonsproject.com.

Insurance



Bankers Insurance
Tony Newsome
Asheville • 828.242.5068
tnewsome@bankersinsurance.net
bankersinsurance.net/locations/asheville-nc-insurance-agency
As your trusted advisor, we're committed to protecting sustainable design, construction, and solar projects, including EPC, from start to finish.

Interior Designers

Alchemy Design Studio
Traci Kearns
Asheville • 828.255.5110
info@alchemy-interiors.com
alchemy-interiors.com
Modern day alchemists, we transform ideas into spaces that enhance the human experience and contribute to the health of the planet.

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

A boutique residential interior design firm, offering design and project management services, for high end new construction and home renovation projects.



Carrie Moore Interior Design, LLC
Andrew Gibson
Asheville • 828.545.8529
andrew@carriemooreid.com
www.carriemooreid.com
We design environments with intentionality and a nature-inspired, warm-modern bias, while also reflecting the values and needs of our clients.

Coleone Design Studio
Nicole Sheahan
Arden • 828.490.7148
nicole@coleonedesignstudio.com
coleonedesignstudio.com
Hospitality and residential interior design studio specializing in creating functional, bold and stylistic solutions while protecting people and the planet.

Natureworks Design LLC
Dawn Purpose
Old Fort • 828.490.5100
natureworksdesign@gmail.com
www.natureworksdesign.co and www.dawnfurfur.com
Full-service interior design firm crafting custom homes across the USA, merging feng shui principles with modern lifestyle for well-appointed retreats.

Land Planning

Healing Roots Design

Keri Evjy
Swannanoa • 828.450.1836
keri@healingrootsdesign.com
www.healingrootsdesign.com
We provide full-service regenerative landscape design, installation and Stewardship Maintenance Plans, uplifting land design solutions for people and planet.



V & V Land Management and Resource Recovery LLC

Carrie Vogler
Weaverville • 828.777.6637
carrie@voglerllc.com
voglerllc.com

WNC's leader in technical site preparation, driveways, septic, and structural retention for residential properties. V&V Design Build is a licensed unlimited contractor providing responsive and collaborative modern home designs. We offer complete build services to clients in the Asheville area.

Landscape Architects

BareRoot Designs, PLLC

Jennifer Verprauskus
Weaverville • 980.500.9931
barerootdesignsAVL@gmail.com
barerootdesigns.com
Building sustainable landscapes with creativity and expertise, integrating natural elements to enhance outdoor spaces and promote environmental stewardship.

Blue Mountain Design Studio, PLLC

Lisa Cutshaw
Mars Hill • 828.378.4791
lcutshaw@bmdsla.com
www.bmdsla.com
Providing landscape architectural services with a focus on innovative design, sustainability, and client collaboration, delivering exceptional solutions each project.

ecology by design, LLC

Teresa Rogerson
Alexander • 510.227.7804
tallresa@gmail.com
ecobydesign.net
Creating innovative, eco-friendly landscapes, tailored to individual needs, integrating native plants and sustainable practices to foster biodiversity and environmental resilience.



Equinox

David Tuch
Asheville • 828.253.6856
David@equinoxenvironmental.com
equinoxenvironmental.com
Providing environmental consulting services with expertise and dedication, ensuring regulatory compliance and sustainable solutions.



Fusco Land Planning & Design, PLLC

Matt Fusco
Asheville • 828.243.6604
Matt@FuscoLA.com
FuscoLA.com
For over 19 years, our team in Western North Carolina provides landscape architecture, conservation planning, and environmental design services.

K2 Services, Inc.

Kevin McRae
Enka • 828.633.0536
kmcrae@k2irrigation.com
www.k2irrigation.com
K2 Services specializes in landscape associated services such as irrigation, landscape lighting, outdoor speakers, landscape planting, and water features.

Living Roofs, Inc.

Emilio Ancaya
Asheville • 828.252.4449
emilio@livingroofsinc.com
livingroofsinc.com
Landscape on structure done right. Delivering confident ease through even the most complex projects in the Southeast since 2006.



Osgood Landscape Architecture, Inc.

Joel Osgood
Asheville • 828.337.7496
jo@osgoodla.com
osgoodla.com
At OLA, we cherish and are forever grateful for our natural environment and do everything we can to preserve, protect, and enhance it.

Landscapers

Healing Roots Design

Keri Evjy
Swannanoa • 828.450.1836
keri@healingrootsdesign.com
www.healingrootsdesign.com
We provide full-service regenerative landscape design, installation and Stewardship Maintenance Plans, uplifting land design solutions for people and planet.

Mold & Moisture



Conservation Pros

Harper Robinson
Asheville • 828.713.3346
info@conservationpros.com
conservationpros.com
Energy-efficiency retrofitting firm specializing in insulation, air sealing, crawlspace encapsulation and duct sealing. Serving WNC since 2007.

Pest Control

Economy Services

Wilson Jones
Asheville • 828.254.0691
erica@economy-services.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

Parton's Plumbing LLC

Maxwell Parton III
Asheville • 828.779.7915
Chipparton@gmail.com
P1 Residential and Commercial Licensed plumbing contractor specializing in fine detail homes

Radiant Heat



Sundance Power Systems

James Fisher
Weaverville • 828.776.5349
jfisher@sundancepower.com
SundancePower.com
Solar Electric, Battery Storage, Radiant Heat, with a Full Service Department. Sundance has Empowered People with Solar Since 1995!

Realtors



Amy Smith Realtor

CENTURY 21
Amy Smith
Asheville • 828.333.3235
amy@asmithrealtor.com
asmithrealtor.com
With 20+ years in home improvement, Amy Smith offers personalized service in buying/selling homes, backed by environmental expertise and dedication.



Be Realty Home Brokerage

Bobbi Holland
Asheville • 828.275.6170
bobbi@berealtyavl.com
berealtyavl.com
Personalized, results-driven real estate services for buyers and sellers. We'll help get you where you want to be.

Bold Mountain Team at Nest Realty

Robin Cape
Asheville • 828.216.4009
robin@robincaperealty.com
boldmountainteam.com
40 years of experience in green and regenerative homesteads, climate mitigation, local rules and ordinances, and remodeling.

Kathleen Cook at Mosaic Community Lifestyle Realty

Kathleen Cook
Asheville • 828.280.6839
kathleen@mymosaicrealty.com
mymosaicrealty.com
A NAR GREEN designee and Building Green certified agent helping residents buy, build, and sell their Green Built Asheville homes.

LeAnn Bound at Mosaic Community Lifestyle Realty

LeAnn Bound
Fairview • 828.713.2316
leann@mymosaicrealty.com
mymosaicrealty.com
With construction background, LeAnn Bound is an Asheville realtor with NAR's GREEN designation, specializing in Luxury Marketing and Strategic Pricing.



Love The Green Team Real Estate Consulting Firm

Mary Love
Asheville • 828.279.6723
mary@lovethegreen.org
lovethegreen.org
Love The Green Team is a women/veteran-owned full-service real estate company. Our mission is to create a sustainable world, one home at a time. We provide services to buyers and sellers, and property management services. We are your matchmaker for the ho



MOSAIC Community Lifestyle Realty

Mike Figura
Asheville • 828.707.9556
Mike@mymosaicrealty.com
mymosaicrealty.com
We specialize in green real estate and in-town properties. Our approach is to advance the interests of our clients by being attentive to their needs and to negotiate aggressively on their behalf. Real estate is our job and passion. Call or email for a free consultation over coffee or tea.

Mosaic Realty

Justin Mitchell
Asheville • 828.713.9400
justin@justinasheville.com
mymosaicrealty.com
Green-focused and Green Building Certified RE Broker Since 2010. Proudly Assisting Asheville Builders, Buyers/Sellers with all their Real Estate Needs



National Land Realty

Pat Snyder
Fairview • 828.761.0841
psnyder@nationalland.com
nationalland.com
National Land Realty supports clients looking to buy or sell large land tracts (10+ acres) for homestead, conservation, investment, recreation, agricultural, family estate, and residential purposes. Our team leverages best-in-class technology and partners

Robin Cape - eXp Realty

Robin Cape
Asheville • 828.216.4009
robin@robincaperealty.com
robincaperealty.com
40 years of experience in green and regenerative homesteads, climate mitigation, local rules and ordinances, and remodeling.

Recycling



Asheville Area Habitat for Humanity

Paul Reeves
Asheville • 828.777.0743
preeves@ashevillehabitat.org
ashevillehabitat.org
Partnering with families in need to build affordable homes and strengthen communities through homeownership opportunities.

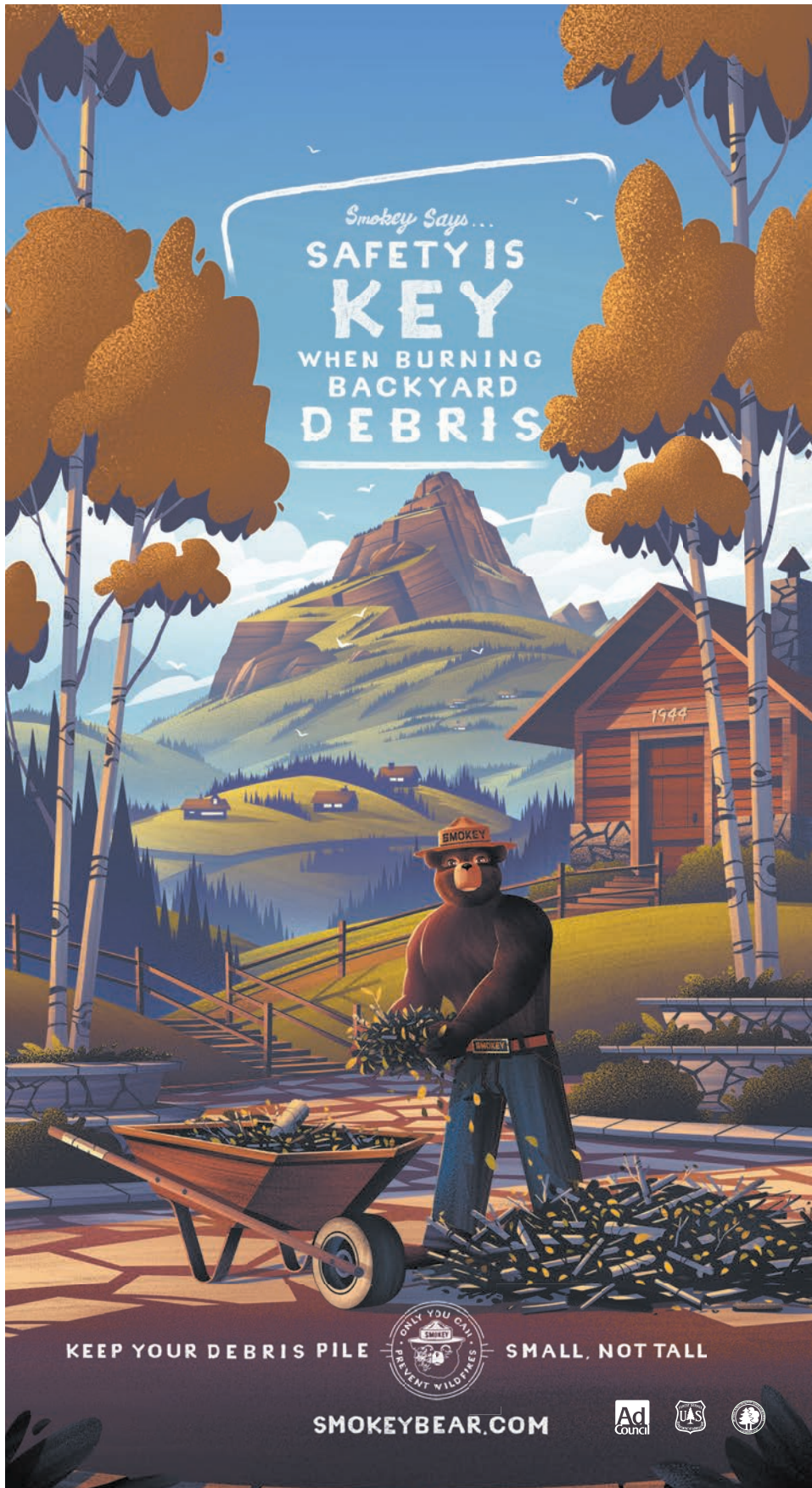
Junk Recyclers Inc

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junkrecyclers1@gmail.com
junkrecyclers.net
To reuse, restore, recycle, and to give a 100% effort to help preserve the Earth for generations to come.

Renewable Energy

Asheville Solar Company

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



Rhino Renewables Solar & Electric

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Sugar Hollow Solar, Inc

Doug Ager
 Asheville • 828.776.9161
 info@sugarhollowsolar.com
 sugarhollowsolar.com
We are a locally owned, full-service renewable energy company focused on great design, installation and maintenance of solar arrays, EV chargers, and battery backup systems to help our community reduce climate change. We are committed to honesty, reliability.



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Sundance Power Systems, Inc.

Dave Hollister
 Weaverville • 828.645.2080
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Renovators & Remodelers

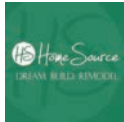


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 Robert Jacobelly
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evergreenconstructinc@gmail.com
evergreenconstruct.com
Evergreen Construct specializes in custom-built homes, large renovations and ADUs. We bring your vision to reality through a collaborative design process



HomeSource Real Estate & Construction Co
Timothy Alexander
Asheville • 828.252.1022
tim@homesourcebuilders.com
homesourcebuilders.com
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Jade Mountain Builders & Co. Inc
Hans Doellgast
Fairview • 828.216.3948
hans@jademountainbuilders.com
jademountainbuilders.com
Jade Mountain Builders is a team of 39 craftsmen who pride themselves on taking an ecologically sensitive approach to building homes.



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Construction, Inc.
Jody Guokas
Asheville • 828.216.0914
noi@jagreen.com
JAGGREEN.com
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Residential Designer



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Mountain Sun Building & Design
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preeves@ashevillehabitat.org
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Partnering with families in need to build affordable homes and strengthen communities through homeownership opportunities.

Roofers

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Duke Energy
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Tiny & Small Homes



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Green Source Construction Management, Inc
Josh Scala
Black Mountain • 828.337.0284
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Sustainable building solutions with a commitment to environmental stewardship and innovation, transforming visions into eco-friendly, energy-efficient homes.



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Woodworkers & Cabinetry



Architectural Woodcraft
Craig Weis
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The EnergyWise Home program through Duke Energy is a way for you to help 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.

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