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The Mission Statement:

The Western North Carolina Green Building Council is a non-profit organization whose mission is to promote environmentally sustainable and health conscious building practices through community education.



The Greener Side

Building a Sustainable Community
Volume 4, Issue 2, Fall 2005

the quarterly
newsletter of the
Western North
Carolina Green
Building Council

Greening Goes Gold at Warren Wilson College

The Warren Wilson Admission/College Relations Center, nearing completion, will be one of the first buildings on a college or university campus to rate the Gold LEED certification for new construction. Nationwide, fewer than 60 newly constructed buildings of any type have achieved the Gold LEED designation.

LEED (Leadership in Energy and Environmental Design) is the rating system developed by the U.S. Green Building Council. To achieve a Gold LEED certification, buildings must meet 39 of 51 standards under the categories of site sustainability, water efficiency, energy and atmosphere, materials and resources, indoor environmental quality, and innovation.

The Arts and Crafts-style building, using stone from nearby mountains and wood siding and trim from the college forests, is a blend of what architect Steve Farrell calls “the poetic with the practical.” Paul Braese, Director of the college’s Facilities Management and Technical Services, praised LEED for that practicality: “Efficiency has more to do with operations than with conserving,” he said, “which leans heavily on human behavior. Conservation won’t do well in the real world if people won’t buy it. LEED has helped by instituting standards and systems that set comfort alongside sustainability. We have built a structure that is beautiful, livable, and will use 50 percent less energy than a conventional building of the same size.”

Although the recent history of green building at Warren Wilson includes its flagship EcoDorm, completed in 2003, the Admission/College Relations Center is the first “in-house” project. In June 2004 the college received its unlimited commercial contractor’s license, allowing FNITS to oversee the design and to manage and perform the construction.

For Warren Wilson College, where work shares the program triad with academics and service, this new construction was the ultimate in on-the-job learning. Biagio Scibetta, a recent WWU graduate and project coordinator, said, “Student crews worked extensively on this project, and there’s very little that they did not do. Crews included Building Services, Purchasing, Natural Resources, Campus Support, Carpentry, Electric, Plumbing, HVAC, Paint, AutoShop, Locksmith, Housekeeping. And these were just FNITS crews. There were also crews from Forestry, Recycling, and Landscaping who played important roles.”

Part of the mandate of sustainability is economic. Paul Braese hopes the Admission/College Relations Center will model the marriage of green-building and fiscal responsibility. He said, “The Green Building Council has gathered together people who are becoming the gears of the system, the ones saying ‘We can do this—this isn’t more expensive; it’s smart.’ The movement is growing exponentially. I see it when the state of North Carolina has its first energy conference ever, for sharing information and measuring the performance of institutions. I see it when individuals, contractors, managers seek LEED certification. People are seeing connections, possibilities.

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Any questions or comments about the newsletter should be sent to newsletter@wncgbc.org.

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Warren Wilson College- continued from page 1

Green Highlights of the new Admissions/College Relations Center

Outside

The site is reused, built on ground where the Early Learning Center (relocated) formerly stood. In addition, to offset the construction and development, the school has pledged not to build on an adjacent green space equal to the development footprint for the life of the building. The orientation of the building takes advantage of soft east light and minimizes harsh west light. It also takes advantage of sweeping views of the Swannanoa River Valley that include 300 acres of college farm fields, 600 acres of college forests, and the verdant mountains beyond.

A bio-retention trench collects and filters stormwater on-site. Another water-collection feature is the installation of non-clogging French drains.

The tight building envelope includes elements such as a radiant barrier, spray-foam insulation (Icynene), and a ground-source heat pump that allow the building to operate with half the energy of a conventional structure of the same size. “California Corners” were installed in the exterior wall corners to accommodate insulation. The posts were installed where interior walls intersected with the exterior walls, allowing for more insulation to be blown in behind walls. Insulation strips were installed over all exterior walls to create a thermal break between the studs and the sheetrock.

Light pollution reduction is effected by outdoor low-level lighting that does not light up the sky. The lighting design also prevents interior lights from projecting out windows, thus ensuring that this essential element of nocturnal wildlife remains undisturbed.

The use of local or regional materials includes all of the wood siding, which comes from Warren Wilson forests, sustainably harvested and milled by the Natural Resources Crew. The tree timber columns that support the front portico are also from the college forests. The boulder wall, steps, and terrace are all native stone, with much of the masonry performed by a college alumnus. Other materials from local-regional sources include the heat pump loop pipe, concrete, gravel, drywall, shingles, upper level front door, foundation drain material, insulation, stucco, floor and roof trusses.

Exterior paint contains “Insuladd,” a ceramic powder that lengthens the life of the paint.

The windows – casement, double-paned, and low-e for low air-infiltration – are also larger to allow more natural light into the building. Exterior shading is being installed over the lower level windows.

Native landscaping, a “given” at Warren Wilson but not required by LEED, will include drought-resistant plants as a water-saving device.

Approximately 90 percent (25+ tons) of construction waste was diverted from the landfill. All construction waste was monitored.

Inside

Daylighting is a design emphasis, resulting in 90 percent of the interior areas receiving daylight and views of the campus. Both the upper and lower levels use antique, recycled doors with glass panes that allow light to penetrate from the exterior offices to the interior space. A light shelf, to allow for further light penetration into the building, was also installed in the lower level exterior offices.

All lighting is energy-efficient compact fluorescent – electronic ballasts and T-8 lamps. To simulate natural daylight and minimize light levels, 5000 degree Kelvin lamps are being used. The majority of the light fixtures are indirect cove lights, or 80 percent indirect/20 percent direct fixtures to provide the best quality lighting. Motion detectors were installed for all conference rooms, bathrooms, and storage rooms for automatic shutoff when those spaces are not in use.

All interior paints, clear-coats, glues, and carpeting are low-VOC. Additional attention was paid to indoor air quality (IAQ) during construction by covering duct openings to prevent dust and dirt from collecting inside. This also protected the entire system prior to start-up.

Water use reduction exceeds the 1992 Energy Policy (which dictates amounts of water flow for certain types of fixtures) by 30 percent, by using dual flush toilets and low-flow, motion-activated bathroom faucets.

Energy efficiency, in addition to the building envelope mentioned above, include the forced-air geothermal heat pump that circulates water 400 feet below, where the earth’s temperature is a constant 55 degrees. The water moves through mechanical systems to heat or cool the building as needed and creates a cost-cutting

2005 SEE Expo a huge success

This year’s Southern Energy and Environment Expo was a real boost for sustainable living and building construction. There were thousands of interested folks who attended the Expo’s workshops and spoke with sustainable businesses. For the WNCGBC, it was a great opportunity to network with regional businesses and build our presence in the community. The positive energy and enthusiasm generated from bringing so many people together who care about creating solutions to the world’s problems lasts far beyond the weekend. There’s almost nothing that serves our mission of educating the community about sustainable building better than the SEE Expo.

The annual Green Building tour highlighted 4 homes with a variety of green characteristics. From the Rastra block home built by Jason Holt to the Baums’ Japanese-style inspired abode full with radiant floor heat fed by 6 solar panels, the tour gave its 36 attendees the opportunity to view the wide range of technologies and products that can be used to build a better home. Mountain Housing Opportunity’s Prospect Terrace once again showed how green and affordable housing can indeed thrive together. By using the Smart Growth philosophy of in-fill development near downtown and higher density living spaces, not to mention many other green highlights, Prospect Terrace is a great model for sustainable development resulting in homes that are truly affordable over time.

Special Thanks to Maggie Carnevale, Duncan McPherson, Christopher Dorin, Emily Coleman, Boone Guyton, Claudia Cady and the rest of the volunteers that helped make this a success. And of course Ned Doyle for making it all happen yet again. Very special thanks also go to Evergreen Community Charter school for the use of their bus for our Green Home tour.

We hope to SEE you all next year!



News Briefs...

We are looking for someone to lay out our newsletter four times a year. If you or someone you know might be interested please contact Matt Siegel as soon as possible at 828-232-5080 or info@wncgbc.org.

WNCGBC t-shirts are now available! They will sell for \$25 a piece. Send your size and a check made out to WNCGBC to WNCGBC, attention Maggie, PO Box 17026, Asheville, NC, 28816.

Our website has been revamped. Please check it out at www.wncgbc.org!

2006-2007 Green Building directory listings and advertising opportunities have begun! Please email directory@wncgbc.org if you are interested in being in our next directory.

2006 - 2007 Green Building Directory needs articles on any aspects of Green Building. Please see WNCGBC News for more details. Email directory@wncgbc.org with any articles or questions.

If you have a house using solar panels for hot water and/or other applications please register your home at NC Renewable Energy Registry to be counted in the Million Solar Roofs Initiative. The goal is to register 500 homes in western North Carolina by 2010!

We are looking for Case Studies of green, off grid, alternative energy homes. Please email webmaster@wncgbc.org with any case studies or questions about what is needed for a case study.





W N C G B C C A L E N D A R

November 4, 2005 NC Healthy Built Homes Orientation

Wilmington, NC @ Cape Fear Community College
8:30-2:00, more info at www.healthylbhlhohomes.org

November 4, 2005 PV Installation Workshop

Raleigh, NC @ NCSU, McKimmon Center
More info at <http://continuingeducation.ncsu.edu/RenewableEnergy.html>

November 9-11, 2005 Greenbuild International Conference and Expo

Atlanta, GA @ Georgia World Congress Center
More info at www.greenbuildexpo.org

November 28, 2005 Energy in Transition: How Do We Dig Out of Our

Energy Hole?
Durham, NC @ Schiciano Auditorium, Duke University
6:00-7:30, more info at www.rnicholas.duke.edu/robertson

December 8, 2005 North Carolina Energy Star Conference

Research Triangle Park, NC @ Hilton Raleigh Durham Airport
Contact Laurel Elam at 828-262-7289 or go to www.rec.apstate.edu/construction/energy_stat_conf/05%20conference.htm for more information.

Links to more upcoming events and lots of useful information. . . .

- **ASU SOLAR ENERGY SOCIETY free workshop series:** www.apstate.edu/www_docs/student/clubs/solar/workshops.html
- **CAROLINA RECYCLING ASSOCIATION:** www.cra-recycle.org
- **NC SOLAR ENERGY ASSOCIATION:** www.ncsustainableenergy.org
- **NC SOLAR CENTER:** www.ncsc.ncsu.edu
- **SOUTHERN ALLIANCE FOR CLEAN ENERGY:** www.cleanenergy.org
- **SOUTH FACE ENERGY INSTITUTE:** www.southface.org
- **WNC ALLIANCE:** www.wnca.org

& of course the **WNCGBC:** www.wncgbc.org

UPCOMING EVENTS

system that is 70 to 80 percent more efficient than minimum code requirements.

An energy recovery ventilator is used to provide fresh outside air.

Wind power credits purchased from a Green-e certified vendor will offset 100 percent of the building's energy usage for the first two years of its occupancy.

Monitoring equipment reveals how well energy systems are working.

The controls are fully digital, and the lighting, equipment, and outlet loads are all independently monitored for consumption. The wall envelope is thermally monitored to determine the wall temperatures outside the radiant barrier, and at various locations within the insulation. Carbon dioxide is also monitored.

Use of rapidly renewable materials includes formaldehyde-free wheatboard, from which all interior cabinets, lower level desks, and shelving are built. Wheat is a rapidly renewable resource (harvested within 10 years) and is cost-comparable to plywood.

Use of local materials: the wainscoting and window trim consists of hard and soft woods harvested from college forests. Some of the wood was salvaged from local trees felled by a cyclical pine bark beetle infestation. Also from local/regional sources are the carpet tiles and hardwood flooring.

Waste reduction: Floor to ceiling heights were utilized that minimized wood waste. Recycled materials include floor tile (consisting of high-volume recycled products), 80 antique interior doors, upper level desks and other furniture either reused or purchased from vendors specializing in refurbishing used furniture.

Green housekeeping involves the use of only those cleaning chemicals that are Green Seal-approved.

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Asheville City Council Candidate Statements

WNCGBC asked Asheville City Council candidates to submit statements for publication. The responses we received follow.

Bryan Freeborn

We can expect and encourage Asheville to grow without compromising environmental and cultural quality of life. City Council has the responsibility for enacting policies that make this possible. Specifically we can further our support for organizations like the Green Building Council, whose members are providing positive examples for building and environmental stewardship. The WNC Regional Air Quality Agency's 2003-2004 annual report points to automobiles as our top source of pollution. To combat this, we need to increase the use of cleaner fuels, provide more comprehensive transportation options, and support neighborhood planning that eliminates the need to drive. My experience on the Transportation Commission has given me the opportunity to work toward using cleaner fuels in our transportation fleet. My goal on Council is to take the next steps: Expand transit operations; Fully fund the Greenways Master Plan to allow more options and support; and Encourage the growth of small businesses within neighborhoods so people don't have to drive to get what they need. Pursuing development partnerships with organizations like RiverLink combines environmental responsibility and continued growth by turning underdeveloped and neglected areas into opportunities for economic exchange. Likewise, we need to support revitalization and redevelopment within neighborhoods. City Council needs to provide clear and consistent guidelines that are routinely enforced. We need to reward developers who act responsibly and hold those who don't accountable. People are interested in preserving the environment and the character of Asheville into the future. The key to making it work is embracing these goals as the cornerstone of every decision rather than considering them separately from the planning, growth and development the city needs to continue moving forward.

Robin Cape

Asheville can become the model of sustainability for WNC by adopting policies and programs that will nurture the environment, stimulate the local economy and support the quality of life for all of the community. The city can create a green building program modeled on successful ones other local governments are implementing throughout the US. Require green building (LEED Silver) standards for all new city/public buildings. Establish support at the Planning and Building Department to provide Green building, education and consulting for city staff, and public and private projects. Retrofit existing city facilities to be models of energy efficiency. Analyze development code for barriers to sustainability. Asheville faces critical stress upon its air quality exacerbated by the reliance on the automobile as the only effective mode of transportation. We must address this in a multi modal response.

continued on page 4





Asheville City Council- continued from page 3

Develop an innovative transportation system that supports buses, bikes, pedestrians, car shares, and van pools. Use locally produced, alternative fuels in the City Fleet. Enhance the frequency and efficiency and hours of bus service. Fund the pedestrian and bike ways task force recommendations. We need to support affordable work force housing within the city in order to reduce city employees having to drive further and further each day in order to find affordable places to live. And we must protect and encourage the city wide green space via private and public projects designed to reduce the impact of density and simultaneously support quality of life.

Chris Pelly

As WNCGBC members know, the Asheville area has been “discovered.” As more people choose to live in Asheville, development pressures are increasing. More and more, residential growth is occurring on our hillsides and ridgetops and commercial growth is intruding on our neighborhoods. I believe this city council election is a referendum on how we grow and how we choose to protect the assets that make Asheville unique. I am running as a candidate committed to preservation of our natural and built assets by using incentives to encourage growth near existing city services, mixed use development, ridgetop preservation and improving amenities such as sidewalks, greenways and parks. As current president of the Coalition of Asheville Neighborhoods (CAN) and former president of Haw Creek Community Association, I have a track record of success in addressing growth and development concerns. I helped lead the effort to create Haw Creek Park in east Asheville. I worked with the community, city and state to put together a sidewalk funding package for east Asheville. I led CAN as we have challenged proposed planning review changes designed to cut out public input on controversial projects. I have been a long-time advocate for open, transparent local government. I appreciate being a member of the WNCGBC because our organization is committed to sustainable development. Our members understand this is the smart way to grow if we are to preserve that which makes Asheville and Buncombe unique. I look forward to using my position on Asheville City Council to be an advocate for sustainable development on behalf of the WNCGBC.

Carl Mumpower

I appreciate the opportunity to share my perspective on the issues of sustainability, community, and the future of the City of Asheville. Although political expediency would command attention to such words as green, environment, and conservation, I would more honestly share my interest in three other words - balance, fairness, and jobs. In these three words like the keys to a sustainable future for Asheville. Balance quickly comes to the forefront of any responsible struggle to insure our future. There is an important place between no development (which artificially increases the value of land and homes and drives out low and middle income people) and too much development (which impedes quality of life) that merits persistent attention. Fairness comes strongly into play by working to assure that we play by the rules, give consideration to all points of view, and resist the temptations of pandering to personal or political preferences. It is not fair to allow a neighborhood to be trampled by rezoning and indifferent development – nor is it fair for that same neighborhood to control property they do not own or attempt to close the door to new people wishing to come here. Jobs of all sorts are our best social service and a crucial key to a sustainable future for Asheville. By insuring policies that support a diverse foundation of jobs in enterprise, service, industry, retail, and all other opportunities for personal advancement and self-sufficiency, we best sustain the future of our people and our City. Thanks for the opportunity.

P.S. I have been on the waiting list for several years to purchase an office condo in one of the first “green” building projects in Asheville. Green building just makes sense.

Engineered wall systems; another option for your home.

Most homes today are built using a method called Western platform framing; you may know it as two by four or stick framing. Stick framing is a time and cost efficient way to build a home, but by no means the only one. During the last half century other wall systems have been developed and tested that have considerable advantages to our current form of building. These systems are also accepted by the building code officials in most areas of the country. Let's explore a few...

First, let's address stick framing and how it can be made better. Engineers studying building science have created a system known as Optimal Value Engineering (OVE). This idea restructures the way a stick framed wall is built. Studs are configured so that more insulation can be added in places that usually don't get insulated well. Inadequate insulation is common at exterior corners, intersections of interior and exterior walls, the area where the roof meets the house, around

Letter From the President

Hello Members!

Greetings from the council, we hope you enjoy this edition of the news letter! Your Green Building Council has been working hard to promote sustainable construction.

I would like to announce that we are no longer an entirely volunteer organization. We have made the move and hired Matt Siegel as the new full time director. Matt has been involved with the council for a long time and has been very instrumental in its current success. His position enables us to address the daily occurrences and opportunities to promote green building. Working closely with the board of directors, Matt is able to have a holistic view of all operations and tasks. We are glad that he accepted the position and have been reaping the rewards ever since he was hired.

The NC Healthy Built Homes program is off and running. Western NC has highest number of certified homes in the state! More and more builders are showing interest and that means that more homes will be sustainably built. To learn more go to www.healthybuilthomes.org

Education, the main goal of the council, has taken a new turn. We are not going to have the forums any longer and instead have created a class series called *Green Building 101*. The series will consist of four hour classes on many sustainable construction topics. It will be aimed at industry professionals and the public. Continuing Education Credits will be offered for architects, engineers and Realtors. We are currently accepting proposals from interested people who would like to teach the different classes that are slated to start in December. For more information go to the website www.wncgbc.org or call the Green Building Hotline at 828-232-5080.

In other news, the Solar Homes Tour was a success. We had over 200 people sign up! The Southern Energy and Environment Expo was also a success, and the home tour associated with it was filled.

Finally, I would like to thank everyone for their memberships. The new business membership fee has really helped us to continue our current work and has allowed us to think of bigger and better ways to promote sustainable building. Please tell a friend or ask other professionals in your industry to become a member. The benefits are great and the cost is minimal.

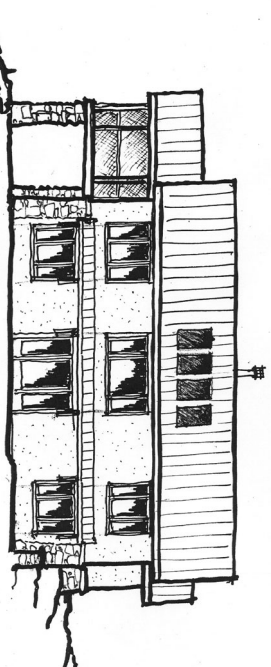
Hope to see you soon,

Your chair

Marcus Renner

abs@buildsustainable.com

P.S. We still have wonderful volunteer opportunities. If interested in volunteering some time to your organization please email volunteer@wncgbc.org



South Elevation
05-04-05
1/8" = 1'-0"





Gray Areas- continued from page 7

One drawback of the stick framing for the walls is the thermal bridging that occurs every 2 feet at each stud. We will have stucco siding and cannot use a rigid foam for the exterior sheathing to eliminate this conduction. The Sips or ICFs would not have that drawback.

The wood frame, using engineered materials and Icynene wall insulation gave us a tight well insulated envelope at a reasonable cost and reduced resource use over traditional methods. It also did not involve a learning curve or coordinating too many different systems.

The daylight basement was made of Superior Walls, which have the same advantage of roof trusses in that they use engineering principles to save on materials. They also combine the footings, the basement walls and their interior framing as well as over half the insulation (R-12) in one step and were set in one day. They are air tight and waterproof (we still used a waterproofing membrane below grade).

These choices looked at cost, energy efficiency and resource efficiency in a way that our company and our clients were comfortable with. I did not find information on the embodied energy or Life Cycle Analysis of each system that would have added more sophistication to the choices.

Having made it over that main hurdle the next vexing choice was windows. The design of the house is passive solar with a long South face with lots of windows. I looked into 4 different manufacturers; Golden, Hurd, Pella and Anderson and tried but failed to get a quote on Marvin windows. The Golden's had the best set up for good U values with high solar heat gain which is what is needed on the South side that is shaded in the summer and accepts the heat gain in the winter. None of these (though I hear Marvin does) was so flexible as to allow good U values and low solar heat gain on the east, north and west sides while retaining the good U values but high solar heat gain on the South. It was impossible to get the same exterior appearance from different manufacturers. In the end balancing cost and efficiency we went with Hurd, which has good insulating values, but in order to get the high solar heat gain we had to use a simple insulated glass for the south walls. The owners warmed up to the idea of using insulated curtains to compensate for the reduced efficiency of the glass. Beach Barrett (Thermacraft Inc) pointed out that radiant heat, which is the heating system, can be controlled by curtains more than a forced air system and the relationship of the occupant with the weather that is involved in closing and opening the curtains is a good one to encourage. Windows are a critical component of the envelope and need to be as efficient as the budget allows.

The other energy related choices, heating system, solar water heating, Heat recovery Ventilator, appliances, etc. were not as hard to make, often because the homeowners were clear about what they wanted and the cost was acceptable.

In the future it would be nice to see more easily available Life Cycle Analysis of the different products to more easily fine tune these decisions.



Top 10 Reasons NOT to build or own a green home:

- 10. You hate clean air.**
- 9. Future generations aren't that important anyway.**
- 8. You like spending hours in your car each day and hope WNC will be like LA soon.**
- 7. Can't stand all those trees blocking your view.**
- 6. Global climate change is just a rumor, right?**
- 5. You are excited about that new landfill needing to be sited next to your house.**
- 4. You like sending a non-tax deductible donation to your utilities every month.**
- 3. You like replacing non-durable building materials in your house every few years.**
- 2. You have stock in asthma treatment drug companies.**
- 1. You've been living in a hole and think energy is not going to get any more expensive.**

We encourage you to visit our website:

www.wncgbc.org

and become a member of the WNC Green Building Council.

envelope penetrations and behind shower stalls, just to name a few! Ridged insulation can also be used as the exterior sheathing, providing a continuous layer of insulation. OVE also addresses wood use, minimizing the amount used in a home by not overbuilding and placing support wisely. If constructed using the OVE approach a stick framed home can achieve substantial energy savings.

Structural insulated panels (SIPs) are the most popular form of construction after stick framing. They are comprised of foam insulation sandwiched between a "skin" of oriented strand board (OSB). Together the foam and wood create a strong wall section that provides a continuous layer of insulation. Few if any structural members divide the insulation. The layer of OSB on the two sides also provides a continuous nailing surface for drywall and siding.

There are two different types of foam insulation that are used between the wood, the most popular and least expensive is extruded polystyrene (EPS). You know it as bead board or by the brand name Styrofoam. It has an R-value of about 3.5 per inch and the OSB is glued to the foam. Individual panels can be factory cut to the specifications of the plans or can be cut on site. An average home can be erected within a few days, which is an advantage in our rainy climate.

Polyurethane foam SIPs have insulating foam that is injected into a mold, adhering the OSB to the foam. The foam hardens and has an R-value of about 7 per inch. Although this diminishes slightly over time, polyurethane panels are better insulators. Being stronger, there is no need for structural wood in the panel such as in EPS SIPs. This creates an unbroken layer of insulation around the envelope of the home.

Insulated concrete form (ICF) construction uses foam blocks to create a form to pour concrete into. Unlike conventional concrete work, the form stays in place providing a layer of insulation on either side of the wall. This interesting configuration creates a layer of thermal mass that essentially becomes energy storage since it is insulated on both sides. ICF homes can be 50% more efficient and much quieter than a common stick framed home. Having concrete walls also makes the home stronger, allowing it to better survive severe storms and earthquakes.

There are as many as fifty manufactures of ICF form systems. Most use EPS foam to create the form walls, and plastic to separate the foam creating space for the concrete. The blocks are stacked like Lego's, reinforced with rebar and then filled with concrete. Some ICFs are made with recycled materials such as mineralized wood chips and recycled EPS foam and cement.

Another engineered wall system that is gaining in popularity is a pre-cast concrete wall. Keep a lookout on the highway for wall sections as long as twelve feet that are made at a factory and trucked to the site. They are then placed with a crane and bolted together, creating the exterior wall of the home. Pre-cast concrete is mostly used for Earth bermed basements and lower floors, although they can be stacked three stories high.

The concrete wall is usually 2-3" thick and the interior of the wall is insulated with ridged insulation that has an R-value of 12.5. Pre-cast walls typically don't need a concrete footer as most below grade walls do. All that is needed is a gravel trench that allows water to drain away. A slab floor is poured and drywall can easily be attached to special ribs on the interior. The exterior comes finished to look somewhat like stucco, and can be painted. This wall system can be installed in a less than a day and provides an insulated concrete wall with a small amount of concrete use.

Autoclaved aerated concrete (AAC) is a product that uses cement to create a lightweight material that is filled with tiny air bubbles. The material comes pre-cut into blocks or panels. For residential construction blocks that are from eight to twelve inches thick are used for the walls. AAC provides both structure and insulation, one product that does both! Any type of interior and exterior finish can be used, but plaster and stucco are the most popular and easiest.

AAC construction is fast and easy. Common carpentry tools can be used and the process is quickly learned. The material is easy to sculpt and architectural details can be adhered anywhere with the glue like mortar. AAC walls are also very sound proof since the tiny air bubbles act as thermal and sound insulation. AAC has been found to perform best in climates that require more cooling than heating however, your location may affect the walls performance.

These are a few of the most popular forms of engineered wall systems. Each has advantages and disadvantages and each needs to be studied and understood by the builder before the decision is made to use them. Today's engineered wall systems are usually designed to provide more insulation and a stronger wall than a stick framed building. We should utilize these products and methods in order to save money and the environment.

Helpful Websites

www.icfweb.com

www.sips.org

www.new-technologies.org/ECT/Civil/autoclaved.htm

Marvus Renner works with Appropriate Building Solutions. Inc a sustainable construction company in Western NC. He also teaches Sustainable Building classes at Appalachian State University. He can be reached at marvus@abuildingsolution.com



Help do your part to support renewable energy by purchasing NC Green Power.

Sign up Today!
www.ncgreepower.org



I want to tighten up my house for winter. How do I find drafts and what is the best way to fix them?

Tightening up your house is a great retrofit project that will benefit your home, your wallet, and your health this winter.

We receive many questions about the pros and cons of having a “tight” house. This leads me to believe that the general public isn’t sure what to think of the concept. Most people immediately voice concerns about indoor air quality and the need for a house to breathe.

People intuitively know there’s something not *right* about sealing ourselves up in a box and breathing the same air over and over and over again. It just doesn’t make sense. This would, without a doubt, decrease the overall air quality of the living environment and the health of the occupants.

With fresh air being so important to people, why would anyone want to create a tight house? The answer can be summed up with the catchy phrase: “Build it tight, ventilate it right!” In order to create a healthy living environment we need to know that the “fresh air” coming into the house truly is fresh. If we rely on holes in the building envelope to supply “fresh air” then the air frequently comes from *not-so-fresh* places like crawlspaces, basements, attics, and attached garages.

It’s important to define the difference between *tight* and *leaky*, so we’re all on the same page. A tight house is one that does not allow outside air into the living environment through *unintentional* holes, cracks, and gaps in the building envelope. A leaky house *does* allow outside air to enter into the living space through unintentional holes, cracks, and gaps in the envelope.

Studies indicate that the majority of air infiltration originates from the basement or the crawlspace – the bottom of the house. Since we heat our homes in the winter, this warm air wants to rise to the top of the house, often leaking out through small holes into the attic. When this air leaks out, other air leaks in to replace it. Basically, houses become huge chimneys in the wintertime. In fact, houses become TWO chimneys. One in the living space and one within the wall cavities - each of which are working hard to waste your hard-earned-money all winter long. The larger the opening in the top of your chimney (your house), the greater the suction is at the bottom of your house – increased leakage. This natural suction created by the unintentional holes in the building envelope is what introduces the not-so-fresh air into the living space and creates an unhealthy environment.

People know they want a healthy environment, but they also intuitively know that it is not a good idea to waste things... especially their money. Through the years, we have found that the average house “leaks” its entire volume of air *15 times per day*. Doesn’t this seem wasteful? What if you could cut that down to 6 or 7 times a day? You could cut your heating bills in half! I think most people would agree that the less money sent to the utility company, the better.

So how do we achieve a home with good indoor air quality that is efficient and inexpensive to maintain? Well, I’m happy to say that you can have your cake and eat it too! By introducing fresh air (that you know is actually fresh) through your mechanical system’s ductwork, you can tighten-up your house as much as you wish - the more the merrier!

The major holes in houses are in the top and bottom of the house. Beginning in the basement or crawlspace, seal electrical and plumbing penetrations with caulk, foam, or any other material that will stop airflow. If you live in a home with diagonal 1-by sub flooring, it may be in your best interest to have a foam insulation professionally installed, as it will save you a lot of time and caulk.

In the attic, seal around electrical boxes, duct registers, and exhaust fans that penetrate the upper-level ceiling. It is also a good idea to pull back the insulation that covers the top-plates of interior walls, air-seal the gaps along the edge of this top plate, and then re-insulate. These interior walls leak a tremendous amount of air into the attic. If you see any chaseways, or openings traveling between floors, cover them with a rigid material, air-seal the perimeter of this piece, and then insulate.

Sealing around baseboards and window trim may also prove beneficial. But you’ll get more bang for your buck by starting in the attic and basement/crawlspace.

Leaky ductwork is often times more detrimental to the efficiency of a home than air leakage through the building envelope. When duct leakage is present, it either sucks air into your house from unconditioned spaces (i.e. attics or crawlspaces/basements), it blows conditioned air into these unconditioned spaces, or it does both. Return leakage (the type that sucks air into your house) is the most prominent of the two types. Think of your duct system as a huge central vacuum. Regardless of which type of duct leakage you have, it’s bad for your health and your wallet.

Mastic should be used to seal up the duct system. By sealing these duct connections with mastic, this leakage is eliminated. Tape should never be used on ductwork. It simply won’t last. While you’re at it, take the opportunity to ensure that all of your ductwork is properly insulated.

Now that your house and ductwork are tight, it’s time to introduce air that is truly fresh. You have a few options here. The most cost effective way is to run a 4 or 6 inch duct from outside (the farther away from the ground, the better) to your return plenum. Ideally, this air supply would be filtered and this connection would be accessible from the inside of the house. Filters get changed more when it’s convenient. Now, every time your air handler turns on, it pulls in some outside air. The drawback to this scenario is that you get *exactly* what’s outside: hot, cold, wet, or dry.

The best option is to use an *energy recovery ventilation* machine. This machine brings air into your house and also pulls stale air out of your house. It has a heat exchanger which passes about 70% of the outgoing heat (wintertime) to the incoming air, thus preconditioning it. It also runs the incoming air through a HEPA filter to remove particulates. These models also pass moisture from one air stream to the other, assisting in humidity control and mold prevention.

Both of these options allow your fresh air to be distributed to every room in the house, as they typically use your existing duct system for distribution. With either of these methods, you know where your fresh air comes from, where it goes, how much you’re getting, and you’re able to pre-filter and pre-condition it.

Now that you understand how to tighten your house *and* improve your indoor air quality, it’s time to get to work! Regardless of how macho you may be, don’t forget your respiratory mask...you’ll need it. Old insulation in the attic and who-knows-what in the crawlspace will certainly be much easier to work around when you protect your lungs and your sniffer.

Contributed by Isaac Savage of Home Energy Partners.



The Gray Areas of Building Green

by Boone Guyton

Building requires huge numbers of decisions. Green building adds more variables to those decisions. Usually there is some compromise to get a good balance of what is important for the people who will occupy the building. Aesthetics and cost have always played a role and green building adds to the complexities by considering efficient design, the source of the materials used, the health impact of materials in a building and in their production, the protection and use of resources on the site and both energy efficiency and water efficiency.

There are many new systems of providing the envelope for a house that will be efficient, healthy and sustainable in its production.

In the latest project that I am involved with we have chosen a mix of new and old technologies. In deciding what to use and recommend to the homeowners I came across a few choices that were hard to make and seem to highlight the process of deciding which way to go.

First there was the envelope. I compared cost and time and energy efficiency of SPSs, Insulated Concrete Forms and more traditional stick building. All had their good points and drawbacks. Insulated Concrete forms looked to be very efficient, a little more expensive and involved a lot of embodied energy with the concrete and steel involved. SPSs seem to do the most with the least amount of materials. They were strong, well insulated and cost less than the ICFs but still more than a stick frame structure. I considered combining ICF’s for the daylight basement and a stick frame main floor but in the end decided on precast concrete walls with an engineered floor system (I joists with Maxxfloor subflooring) stick framed walls and a trussed roof system. We also included Icynene spray in foam insulation for the wood walls to make the envelope tight but breakable and with no off gassing after installation. We chose dry blown in cellulose for the ceilings where we can blow in R-40 easily and at the lowest cost using a recycled product. The I-joists and roof trusses are engineered products that save enough in labor to repay the extra material costs and use less wood, especially old growth, to do the structural work required. The Maxxfloor sub floor says it meets the highest formaldehyde standards and comes from sustainable wood.

We looked into buying FSC certified framing for the main floor walls, but could not get enough people to go in on an order to defray shipping costs enough to make it a good economic choice. The lumber itself was in the same price range as available framing. A larger order would reduce shipping costs but would require some coordination among builders. According to Alyx Perry of Southern Forests Network (www.SouthernSustainableForests.org) there are some North and South Carolina forests that will likely have FSC wood in production by next year.

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