

## **Blue is the New Green: An Economic Analysis of Water/Energy-Friendly Building**

By Margo Farnsworth and Jeff Gowdy

Talk of sustainable building is everywhere these days. It's in the paper, on T.V., on the lips of Hollywood starlets and the minds of developers. So, why hasn't everyone leaped aboard the *Green Building Express*? Money.

Some are worried about the cost of sustainable building while others are concerned about the pay-back. Some are just confused. That's why the Cumberland River Compact, World Wildlife Fund and J. Gowdy Consulting decided to perform an in-depth economic analysis on a sustainable building project in Nashville, Tennessee; and why they're looking at analyzing more sustainable building sites even now. They're seeking the economic, water quality and efficiency truth.

### **How Did We Get Here?**

The Cumberland River Compact (The Compact) is a non-government organization recognizing that one of the most efficient ways to enhance water quality is to work wisely on land. Almost a decade ago they began working with developers and local officials to do so. At the beginning of the new Millennium, they gathered those groups together for two conferences entitled: Conservation and Common Sense Development. In the first conference participants were taught primarily Best Management Practices in neighborhood and site layout plus some about water and energy efficiency. The next year's conference focused on how money could be made and saved building water-friendly sites and communities. Clearly the speakers were convinced they were saving money but just how much was not clear. What was clear was the potential for these new building practices to slow or halt degradation to rivers in certain areas – especially if applied to large numbers of houses.

This was happening at the beginning of what turned into a rapid evolution in the modern green building movement. LEED had begun development in the mid-90's but by 1999 when the first Conservation and Common Sense Development conference was being planned, it was still just a whisper in the Mid-South. However, by the time they were ready to plan the third conference, others were holding similar conferences there and all across the country. In the Mid-South, it was time to move forward. It was time to work with developers and build green.

### **In the Beginning**

The first third-party green building certification program The Compact became acquainted with was EarthCraft House. They were impressed with the program because not only did it have some of the water components staff were looking for; it holistically addressed energy, indoor air quality and resource efficient building materials – creating a basis for “The Compact's Continuum of Care”. However, many developers were skeptical of the “green” title. Because the practices The Compact embraced were even more holistic, they started speaking not just in terms of “green” building, but of “sustainable” building.

Having settled on the program, they began looking for their first developer. Early in the process, The Compact and a large group of partners approached the Environmental Protection Agency, applied for and were awarded one of the first national EPA Targeted Watershed Initiative Grants. In this grant, The Compact and partners agreed to work with developers on building water/energy-friendly sites in urban, suburban, and rural watersheds with impaired streams. They also wanted to show that sustainable building could be done for the wealthy and poor alike. They called their program Building Outside the Box (BOB). The door and the vistas were both wide open.

One day, into a BOB meeting strode two businessmen. At the time, team members were happy to see new faces. Little did they know that these two brothers, Skip and Bill Lawrence (and later, brother Fred) were soon to become their most prolific sustainable building partners and one would later become a Board Member of The Compact.

They were interested in building water and energy-friendly houses on water/energy-friendly sites but were at the very first steps of learning how to manage that feat and weren't sure if their interest would match up with The Compact's array of practices. By now, those included not only the EarthCraft House program, but a growing array of tools, practices and techniques for sustainable building in the Mid-South. After trying out EarthCraft on a single house, they decided to apply it to Morgan Park Place, their condominium development.

### **The Color of Money**

As time was passing, The Compact, and in fact the whole development community was learning more about sustainable building. However, one area which still remained in the shadows was the area of the economics of sustainable building. Not that many numbers hadn't already been floated; they had. Skeptics would illustrate how sustainable building cost 3%, 7%, 23% more than traditional building and would certainly break any builder's financial back. At the same time, proponents were swooning about the large, long-term savings to be had. One could save 5%, 13% and even more by building sustainably.

The Compact's question was 3%, 5%, 13% or 23% more or less than what? There was no *uniform* way of measuring economic impact.

Enter World Wildlife Fund's Southeast Rivers and Streams project. Wendy Smith, an early WWF partner in the BOB program, saw the potential impact from sustainable building to the reduction of dirt into Southern rivers.

"Sediment is our number one pollutant in the Southeast and across most of the nation. It destroys habitat including food sources, breeding areas, and shelter for species like the Smoky Madtom, native minnows and larger inhabitants like Paddlefish. If we can limit sedimentation through sustainable building, we'll all be richer for it," stated Smith.

So, with WWF's financial backing, Smith worked with The Compact's Senior Fellow, Margo Farnsworth, to hire economist Jeff Gowdy to measure the economic impacts of specific "sustainable" elements of building practices and compare them to traditional ways of building – both in cost and environmental effect. The three gathered to design a study which would address all the things they felt were not being addressed adequately in sustainable building economic figures to date. They worked to devise a plan which could serve as a better and more accurate way to measure the differences. The plan took into account specific practices and included an equation which, although not available at the start of the BOB project, had become vital to how The Compact did business.

"At first we were just including energy-friendly practices because we thought it was the right thing to do and we intuitively felt there was a water connection. But then we learned about the Energy/Water Nexus being pursued by the National Laboratory System including our partners at Oak Ridge and we were rewarded with an equation that made it all work," said Farnsworth.

That equation was this. In Tennessee and Kentucky where 60% of energy is provided by coal, it requires 25 gallons of water to produce 1 Kilowatt hour's worth of electricity. So, not only would the study measure the water-saving aspects of the building components; it would also take into account the water required to create the electricity running the home.



**Lawrence Brothers first built to EarthCraft House standards, later moving to LEED Silver.**

## The Report

This report contains analyses of eight development and building activities - Irrigation Systems, Water Runoff Control, Sediment Control, Stormwater Control, Kitchen Equipment, Laundry Equipment, Plumbing, and Efficient Energy Sources. In examining these, the analysis ultimate purpose was two-fold: to analyze the economic and ecological benefits of sustainable building in the Middle Tennessee region.

The study was comprised of six distinct phases including an initial questionnaire, follow up for additional contacts, outside research on industry and government standards and statistics, price comparisons between “standard” and “sustainable” practices, calculating pay-back rates and finally, seeking peer review by professionals in the development business.

“We see the development community as bankers to brick layers so Jeff utilized everyone from architects to bankers to stormwater managers for peer review,” said Farnsworth.

To compare standard building and development practices and the practices done at Morgan Park Place, estimations were needed in some of the calculations. For each of the estimations made, Gowdy highlighted the range of possible choices and numeric values using the most conservative figures. This was done to remove the risk of overstatement. Thus, data in the report is at the lower limit of actual outcomes - the cost savings, water savings, and the water quality improvements presented are likely even greater than the outcomes presented in the report.

## The Findings

The irrigation system was the first component to undergo scrutiny. At Morgan Park Place drip irrigation was put in place with a moisture sensor so that the system shuts down if there is rain. This reduces the amount of water lost through evaporation and runoff. This was an ecological goal of the team but also underscores the builder’s attention to detail since few things look less professional than excess water from unattended sprinkler systems running across the sidewalk and down the street. The only thing that might look (and be) worse is irrigation systems operating in the rain.

The price premium including labor was \$5,994. The cost for a standard irrigation system is \$4,800. Since the developers passed all costs onto the homebuyer, the difference of \$1,194 was divided by the 40 condominium units for a per condo cost of \$29.85. In each of the other eight components, similar calculations were made with costs or savings computed.

Then in each case, direct and indirect water savings and energy savings were calculated. In the case of the irrigation system, the U.S. Environmental Protection Agency (EPA) states that the average family of four uses 400 gallons of water a day, 30% of which is devoted to outdoor use. Since Morgan Park Place’s average occupancy is closer to two people per unit, Gowdy adjusted down to accommodate that figure. With standard irrigation practices in such a scenario, 876,000 gallons of water would be used. However, with the more efficient irrigation only 364,854 gallons would be needed – a savings estimation of 511,146 gallons.

In terms of payback, the cost of water in Nashville equates to \$0.0025 per gallon. Applying the water savings above to the development and dividing by the total number of units, the cost savings for each unit would be \$31.95 per year on their water bill.



**Drip irrigation at Morgan Park Place Condominiums created a water-friendly, economical landscape.**

For each of the practices, similar calculations were made with attendant costs and savings calculated for the homeowner. However each of the sustainable building components had its own unique attributes of interest such as the following.

- In the case of the water runoff control, four practices were used: removal of construction debris and rocks in planting beds, use of high quality compost, application of compost tea and planting of native species. Of the four practices mentioned, only one is linked to water savings. However, used in combination the four increase the likelihood of initial landscaping surviving and indeed thriving. This yields an undocumented but still important savings to the builder or homeowners' association who take over care of the properties in many cases.
- Green infrastructure stormwater controls not only saved developers at this site an estimated \$2,687 compared to a traditional detention pond *and* met new stormwater requirements of infiltration and reuse (as water from here was also used to water rain gardens) but could, on some sites save enough room from smaller detention pond requirements, to build additional residential units.
- Utilizing a higher SEER (Seasonal Energy Efficiency Ratio) HVAC (Heating, Ventilation & Air Conditioning) system saved a calculated 551,000 gallons of water per year in indirect water use through energy savings alone.



**Impervious surfaces transition to pervious parking areas and finally to the rain garden – filtering and infiltrating stormwater.**

In total, the premium paid by the developer was estimated at \$77,682 which was divided among 40 condo units for a cost per condo owner of \$1942.05. Cost savings were gained immediately on utility bills in six of eight components thus increasing the homeowners' cash flow each year by an estimated \$399.00. In the other two components upfront costs were saved which lowered premiums paid. With this in mind, the payback period for each resident will be only 4.87 years with utility savings continuing into the future. Even adjusting for expected life spans of appliances, the net return on investment over twenty years would be \$5,285.

More importantly to The Compact:

- Zero synthetic fertilizer was used and therefore none was added to rivers, lakes or streams.
- There was an 80-90% reduction in sediment particulate runoff.
- And the total estimated water supply savings equaled 2,954,366 gallons per year!

Utilizing specific components from which to base economic and ecological differences in sustainable housing compared to traditional building costs works – as does sustainable building itself. Builders can approach sustainable building on a “Continuum of Care”. They can get started with simpler practices and certifications and as they gain experience can move up into more stringent and holistic approaches and programs as they see benefits emerge.

Sustainable building yields specific benefits to our water – but also to our wallets! Imagine saving almost 3 million gallons of water a year in 40 units of one condominium development. Imagine a payback of less than five years to the consumer at no extra cost to the developer. Now imagine these concepts applied across a city, a state, or our nation. Knowledge and data like this, changes minds and can keep the green in our pockets and the blue in our rivers.

*To see the full economic study, please visit [www.CumberlandRiverCompact.org](http://www.CumberlandRiverCompact.org).*

Margo Farnsworth works as a consultant in strategic development for organizations, businesses and individuals. She served as Senior Fellow and past Executive Director for the Cumberland River Compact and has also worked as a Naturalist, Science Teacher from Middle School to University levels, Mammalogist and Park Ranger. With degrees in Science Education and Parks Administration her professional accomplishments include research in environmental education, qualitative mammal studies and service on numerous local and state environmental boards and committees. Recognition of her work has come from various disciplines including a State Resource Management Award of Excellence, the "Friend of Fisheries" award and the Freeman Tilden Award for Outstanding Interpretation.

Jeff Gowdy Due to many factors including increased transparency in the markets, the growing concern for sustainable natural resources, and rising energy costs, environmental sustainability and social responsibility are no longer merely corporate rhetoric. Today, both can provide profitable business strategies and a myriad of brand enhancing opportunities and competitive advantages. J. Gowdy Consulting works with clients to achieve those advantages finding profitable environmental sustainability and social responsibility solutions.