

# *Veridian Homes, LLC*

## **2007 Green Tier I Performance Report**

### **I. Summary**

### **II. Interested Persons-Performance**

- **Trade Partners-**
- **Government-**
- **NGO's, Communities, Peers and other Developing Partners-2006-2007**

### **III. Environmental Performance**

- **History of Voluntary Improvements**
  - **Awards Chart-Trend Chart 2004-2007**
- **Tangible/Quantifiable Achievements**
  - **Wisconsin Energy Star Program**
  - **Green Built & Leed Program**
  - **Delivery of Materials**
  - **Reuse and Recycle-2005 through 2007**
  - **Outreach**
  - **Education**
- **Conclusion**

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Re: Veridian Homes LLC, Green Tier I 2007 Report

## **2007 Performance Report**

**(With a summary of progress)**

### **I. Summary**

Veridian continues down the path of environmental stewardship by continuously improving its home building systems to more efficiently use materials and to recycle those remaining materials. We improved ventilation to increase energy efficiency and incorporated low VOC coatings, SF woods, and high performance building materials in our ongoing effort to continuously improve the homes energy efficiency, durability and quality. Throughout 2007 we continued to incorporate traditional neighborhood design concepts which provide a balance of green space and density, both being important environmental and social aspects of quality of life and connectivity within a neighborhood. The traditional neighborhood design encourages a mix of people by planning a broad spectrum of affordable and accessible housing types within each neighborhood.

Building our homes and neighborhoods using this philosophy continues to provide us the opportunity to collaborate with trade partners in more ways than a typical “sub-contractor” relationship. By the end of 2007, we had 85 of our 90 trade partners who had participated in Trade Certification Training with 22 of them achieving “Certification” status. In a manner different than the one used with construction Trade Partners but equally as important to our environmental performance, we have built communication bridges with many local and State agencies through our participation in the Clear Waters Charter and our separate outreach efforts with local environmental groups.

In 2007 Veridian was recognized for our Sustained Excellence in energy efficiency by building all of our homes to Energy Star and Green Built requirements. We began measuring the specific energy efficiency of selected home models to determine if there were features that home owners could choose to go beyond the high performance attributes already built into the home. A chart included in the body of this report documents our 2004-2007 continual improvement efforts for innovation and environmental performance.

Finally, Veridian continues to show improvement in erosion prevention from building sites and maintained or improved rates within our materials recycling/reuse programs. For example small lumber scraps are chipped and mulched and placed in the socks that are used to prevent site erosion. As the socks reach the end of their useful life the chip mulch has mixed with the sediment and continued to mulch to

the point it is a very good growth media for establishing grass cover. In this manner the wood is reused twice in a beneficial manner and no landfill waste generation.

This report details year-over-year efforts to show our trend of continuous improvement. It also documents new initiatives started in 2007 to improve environmental performance. Please review the detail of our 2007 report below.

## **II. Interested Persons-Performance**

### **Trade Partners -**

Veridian currently has over 90 trade partners, 85 of them having completed Trade Certification training and 22 of those receiving certification status by the end of 2007. This achievement is evidence of how Veridian integrates our significant aspects with the activities of our trade partners. Our Quality, Environmental, Health and Safety (QEHS) goals become mutual objectives when they are woven into the fabric of that relationship.

### **Government -**

**In parallel** with Veridian's work to implement an EMS in 2004 we also were founding members of the Clear Waters Initiative Charter.

In 2007 Veridian worked as a member of this group to incorporate additional Charter members, champion environmental organization participation, establish erosion control guidelines for Sock use, and perform site erosion control in a manner that provided leadership to others. Veridian took steps to seek participation by the Department of Commerce in matters concerning erosion control and Uniform Dwelling Code coordination. We also worked with the Board to secure connections to the Department of Administration (DOA) for matters regarding energy efficiency integration. Veridian has involved City and County inspectors into internal meetings to discuss (continuous) improvements that could be done to achieve uniform standards and superior environmental performance.

Although the focus of the CWI Charter has been erosion control and storm water management related to construction activities, 1 participants discovered that prevention of erosion from construction activities is directly related to the collective behaviors and resulting decisions of all Charter participants. Communication and enforcement methods were seen to play a significant role in either driving or stifling improved performance. Collaboratively we have moved from assigning fault to all becoming a part of permanent solutions and improvements. We have not focused (just) upon the identified problems but searched for root cause preventive changes that can be made efficiently and economically to eliminate the situations that breed problems. Although an intangible, this communication and understanding provide the basis for continual improvement in all aspects of environmental management.

In 2007 Veridian continued to develop the three environmental performance systems components identified below:

- Set continuous housekeeping expectations of internal trades and our **trade partners** at each home. This has been accomplished through incorporation of procedures, contract language, and training with trades. This effort is ongoing through frequent teachable moments our construction managers and production managers capture daily and weekly with site trades. Our internal and **third-party audits** of home construction sites can verify that both the home site and the home itself are models of good housekeeping on a daily basis. This has allowed us to use less material per home, reuse more of the materials home-to-home and recycle more of those materials that are no longer useable for home construction like small bits of wood, metal and vinyl.
- Establish delivery and site materials management expectations of our **suppliers and trades**. The goal was to ensure that damage to raw materials would not occur, destruction of curbs, sidewalks, and other destructive wastes would be curtailed, and destruction or efficiency minimization of erosion control established at the site would be eliminated. Veridian made significant investment with our trades to assure lumber and other materials would be delivered in a way that driving over erosion controls would be eliminated while still insuring site safety
- Work with our **Charter partners** to pilot acceptable erosion prevention and control techniques that could be shared throughout the building industry.
  - Our pilot effort to understand the best deployment of silt controlling “socks” is an example of a physical erosion control improvement.
  - Our proposal and implementation of a virtual inspection program has instilled erosion control as part of our daily quality process at each site and allowed the State, County, and City inspectors and interested parties to see every site. Independent inspection by a third-party and by audit of a group (City of Madison/Dane County/WDNR) has confirmed our practices evidence a very high level of erosion control performance.

#### **NGO’s, Communities, Peers and Other Developing Parties -**

Consistent with our EMS continuous improvement goals in 2007, Veridian engaged other interested parties like **Upper Iowa University** and our consulting partners to participate in significant aspects of our EMS concerning our energy efficiency objectives and targets. We also engaged **1000 Friends of Wisconsin**, and the **Rivers Alliance** to participate in the CWI Charter. We believe they will strengthen the idea pool for possible erosion, energy, and resource improvements we can consider to achieve additional environmental performance improvement.

Veridian engaged our **consulting partners** to identify EMS programmatic changes that can foster new accomplishments within construction activities to achieve improved performance that can be measurably linked to permanent reductions of GHG. Veridian worked closely with its communities (**Sun Prairie Area School District, Madison Library System and Dane County YMCA**) to assure essential services are available within Veridian neighborhoods. Accessibility to these services without using an automobile will reduce travel and its related emission and safety problems.

### III. Environmental Performance

- **History of Voluntary Environmental Improvements**

The chart below lists some of the recognition awarded to Veridian for achievements that are related to improved environmental performance. The awards attest to the operation of a systematic approach to quality, trade partner communication, training, and Plan/Do/Check/Act (PDCA) continuous improvement. The EMS at Veridian is integral with these systems because its performance is linked directly to the smooth execution of all aspects of our business.

Please note that each successive award has evolved in complexity necessary to win the award. Achieving these awards year over year demonstrates that new achievements are made each year. To Veridian the awards show evidence to our peers, customers and stakeholders that we successfully utilize a process of continuous improvement.

#### **Awards Chart:**

AWARD Category-Sponsor	Scope of Award	YEAR and level	Value
<i>Energy Efficiency</i>			
ENERGY Star (ES)-US EPA	All homes meeting or exceeding ES criteria	<b>2007-Sustained Excellence</b>	432 homes @ 30% better (min) that standard home. Project home achieved 28.6% less infiltration than ES criteria. <b>Built 2467 ES certified homes since started.</b>
		2006- Sustained excellence	439 homes @ 30% Over 1200 since start
		2005-Partner of the Year	550 homes @ 30% Over 600 homes since start
		2004-Partner of the year And Outstanding Achievement Awards	550 homes @ 30%
Energy Value Housing Award By NAHB Research Center	Energy efficiency incorporated into design, construction and marketing	<b>2007-Gold</b>	Pilot home including cellulose seal/insulation, lumber minimization, engineered lumber and sealed tube duct and other features

<i>Home Building Quality and Materials</i>			
National Housing Quality Award by NAHB-Research Center		2006-Gold 2005-Silver	Pilot home showing high quality workmanship, efficient use of materials and trade partner relationship management
Innovative Housing and Technology Award by TecHome Builder and NAHB		<b>2007</b>	For developing software to all inspections to be conducted in the field and synced live to databases to track performance of management systems
LEED for Homes Demonstration project	Incorporating LEED qualifying aspects into residential home design	2006	Incorporated innovative sealing/insulation blown in material and sealed round plastic ducts for leak prevention and whole house air flow control
NAHB Green Building Project of the Year	Holistic environmental focus on construction.	2005	Recycled product, structural optimization, energy efficiency, rain gardens, TND neighborhood design.
<i>Reuse and Recycling</i>			
WasteCap “Big Diverter”	Reuse and recycling innovation	2006	Diverted 3298 tons of materials from landfill and recycled 69 tons of vinyl
Habitat ReStore Certification of Excellence	For support of Habitat Restore and focus on recycling home building materials.	2006	Supporting Habitat and creating a support base through our trade partners to recycle and reuse building material.
FET Governor’s Award by FET	Innovations and accomplishments in material reuse and recycling	2006	Vinyl recycle pilot, lumber reuse, erosion control, recycling

- **Tangible-Quantifiable Performance Improvement**

- **Wisconsin Energy Star Program**

As is shown in the AWARDS chart above, Veridian Homes, LLC has been engaged in Wisconsin Energy Star Homes (WESH) qualifying construction since 2004. Veridian has constructed 2467 homes since 2004 that meet/exceed the WI Energy Star infiltration (energy efficiency) criteria. In addition these homes have offered features like ES appliance packages that provide additional energy savings for the customer and result in less actual pollution to the environment every day of their life than conventional appliances.

By September 2007, Veridian had crafted and completed 2320 certified Green Build homes and 2467 WES homes. Below is an example of heating and cooling of a 2007 built typical Veridian home compared to the Energy Star reference home:

Energy Type**	ES Reference Home	Veridian	Reduction/yr
Natural Gas use	1579 Therms	788 Therms	791 Therms
CO2 from Natural Gas	18474 lbs	9219 lbs	9255 lbs
Electricity use	9617 kWh	7796 kWh	1821 kWh
CO2 from coal burning	17022 lbs	13798 lbs	3223 lbs
LBS Coal	10963 lbs	8887 lbs	2076 lbs

\*Calculations based upon current 2006 state average. The emission factors used in the chart above represent published data from USEPA and USDOE. \*\* Does not include other GHG emissions.

The estimates below are calculations of the energy and GHG reductions using the per home reduction values shown above. This data shows the magnitude of our achievement directly related to one of today's most pressing environmental issues:

Energy Type	Reduction/yr/home	Reduction for 2467 Veridian homes
Natural Gas	791 Therms	1,951,397 Therms
	9255 Lbs CO2	22,832,085 lb = 11,416 tons
Electricity	1821 kWh	4,492,407 kWh
	3223 Lbs. CO2	7,951,141 lb = 3976 tons
<b>Total CO2</b>	<b>12,478 lbs CO2</b>	<b>15,392 tons CO2</b>

- **Wisconsin Green Built & LEED Programs**

There are many energy related overlaps between Wisconsin Green Built (WGB) and Wisconsin Energy Star Homes (WESH). For the purposes of this section we will focus upon the differences. WGB includes a variety of features that are not considered in WESH. WGB characteristics can be linked to permanent and verifiable reductions in material use or natural capital preservation that can further represent permanent GHG reductions. The primary impact of the WGB features Veridian incorporates are benefits like improved indoor air quality, customer comfort, building safety and home durability.

Here are some of the 2007 program features that have primary value and secondary value:

1. Use of Certified SF lumber
2. Use of composite materials in place of non-SF lumber (floor joists etc)
3. Building techniques that use less lumber per home
4. Recycling of clean dimension lumber into erosion control
5. Recycling of recycled erosion control lumber for growth media
6. Use of recycled materials in the home (concrete, wood, composites)
7. Use of low and no VOC coatings
8. Education materials and home maintenance supplies for home owner

- **Delivery of materials**

Veridian has piloted a program that seeks to have framing lumber and insulation delivered to a building site in such a manner that it is near enough the foundation that an off-road vehicle is not required to move it around on the disturbed site. This prevents significant disturbance and erosion potential on each worksite.

In addition certain delivery vehicles are able to deliver the material by boom so that it is not necessary to go over curbs erosion control devices to make the delivery. This results in cleanly delivered materials (waste prevention), no erosion or disturbance of erosion controls, and no breakage of curbs or sidewalks from this activity. Again these improvements result in fewer repairs with correspondingly less waste and energy consumption.

○ **Reuse and Recycling**

Veridian has been developing its direct reuse and waste material recycling system for many years.

Below are the results from 2005 through January 15, 2008:

Material	2007 Vol/Wt.	2006 Vol/Wt	2005 Vol/Wt.	Comment
Cardboard/Wood	50,571.9cy/ 3954T	40919 cy/3157 T	37,423 cy/2299 T	
Vinyl	109.8 T	880 cy/ 69 T	100 cy/ T	
Drywall	115.68	-----	-----	
Erosion Sock**				

\*\* Jan 2007 through January 2008

\*Erosion control tubes/socks consist of tube shapes of filter material stuffed with chipped recycled wood waste and compost (mostly recycled wood scraps). The “socks are reused site to site unless the filter media is no longer useful or unless the sock filter cover material is damaged. When the sock has reached its useful life the filter cover is opened and the compost is distributed on graded lots for final cover and growth of new lawns. Since this is recycling using twice recycled materials an accurate count has not be done of the life cycle benefits. The silt fence they replace is a single use item made from virgin materials.

Veridian also purchases recycled content materials. The example linked to a closed loop purchase is the silt sock outlined above. Veridian recycles more wood waste than it produces within this system.

Another example is engineered woods and composites. Veridian does not generally generate the waste materials used in the production of these products and is therefore a net consumer of the recycled materials.

○ **Outreach**

**Veridian** has paid to train our trade partners through the National Housing Quality Certification (NHQ) program. We currently have paid for 85 of our 90 trades to be trained. Of the 85 organizations trained, 22 have gone on to be certified under NHQ. The importance of this effort should be underscored in that other builders and customers are also served these same trades serve. The environmental benefit is far greater than is experienced only on Veridian sites. Feedback from the trades indicates they appreciate the cleanliness, housekeeping and overall responsibility and respect this process has created. They demonstrate it at other building sites whether the other businesses working those sites do or do not exhibit these improved behaviors.

In 2007 Veridian organized and sponsored our annual trade partner conference. At this conference, new building and energy techniques are displayed and discussed, opportunities to improve are presented, and green building materials and techniques are reviewed. Nearly two hundred trade partner owners and their employees participate.

Veridian also holds weekly “build” meetings to assure all trade partners are in alignment with current schedules, materials, and techniques. It is also one of several opportunities a trade partner has to display or discuss new techniques to improve the building process and environmental performance.

While accomplishing this level of communication is difficult to directly measure as a tangible improved environmental performance, the results we have outlined in this document would not have happened

without the foundation of training that has been established. Our trade partners understand we expect quality, efficiency, environmental performance and on-schedule delivery of work at a competitive price point.

- **Education**

Veridian also has procedures for customer service during construction, upon closing, and after the closing including maintenance and care. We inform our home buyers about our processes, the built-in environmental improvements and provide them information about how they can continue these behaviors as they live-in and care for their home.

Veridian also works with different entities within the University of Wisconsin, MATC and Upper Iowa University to disseminate what we have learned about home building in the context of establishing high-performing homes and neighborhoods.

- **Conclusion**

As our report shows, Veridian has spent several years working to improve environmental performance.

We continue to leverage high performing reuse and recycling programs by maintaining or improving reuse rates of existing material, eliminating certain waste types, and including new waste types within the recycling category.

We have firmly established our trade partner roles within our EMS. We have engaged new stakeholders group through the GTCWI Charter and our work with Upper Iowa University. We have worked to expand the CWI group to include key local environmental organizations. In addition our systematic and task level accomplishments are supported by a continuous improvement system internally and third-party external reviews of our processes.

While Veridian has several goals planned for 2008, our main environmental improvements will focus on continued energy efficiency and defining measurement of previously intangible performance accomplishments.