

# *Building* **SUSTAINABILITY**

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## Waste Not—Be Good Stewards

By Jennifer Langton

This second edition of *Building Sustainability* is all about reducing waste, conserving precious resources and saving money. This is certainly a win-win proposition for all Habitat affiliates, but it does require planning, communication, research and assessment of available resources within your affiliate and within the greater community.

*Jennifer Langton is the environmental resources specialist for the Construction & Environmental Resources department at HFHI.*



STEFAN HACKER

*Mountains near Bishkek (HFH Kyrgyzstan).*

## Design to Reduce Waste and Cut Costs

By Jenny Wyant

Thousands of dollars worth of wood goes into a conventionally built home, but thoughtful design can save both money and resources when it comes to lumber. Habitat for Humanity East Bay (HEB) in Oakland, Calif., reduced the amount of lumber used by about one-fourth, and did so by applying advanced framing techniques. Also called Optimum Value Engineering (OVE), this method of building need not

affect architectural design, though it may need the approval of a structural engineer.

The most obvious difference in OVE is that it calls for studs every 24 inches instead of the traditional 16 inches. To maintain structural integrity, the key in framing homes is to stack: the roof trusses stack on the studs of the second floor, which stack on the floor joists, which stack on the studs on the first floor. Two-by-six

walls on the ground level provide extra support, and the reduction in the number of studs and the deeper wall cavities allow for more effective insulation. Two-stud corners replace three- or four-stud corners, and single sills replace double sills in window openings. Site-built insulated headers (TJI + rigid foam or insulation) are supported by header hangers that eliminate the need for trimmers.

OVE works well for Habitat

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affiliates because of the cost savings, and also because it does not require a total buy-in from the staff. Any of the above elements can be adopted into the design independently of the others. For example, single top plates are permissible through OVE, but our affiliate continues to use double-top plates. Our estimated lumber savings are between \$2,000 and \$3,000 per house. Some of the savings goes toward purchasing the 5/8-inch drywall and wider insulation needed to accommodate OVE, but the homeowner energy savings from a better insulated house makes it worthwhile.

Although wood is a big ticket item, throughout the building process there exist many other opportunities to make smart choices that benefit resource conservation. Some of the nontraditional, waste-mitigating elements of HEB's projects include: bioswales that filter and return water to the local water tables (in lieu of storm drains that send unfiltered water to our bay), finished floors of stained concrete, and recycled exterior paint. Up front, the concrete staining is more of a resource savings than a monetary savings. When the professional stainer does the job, it is \$1 per square foot more expensive than installing carpet (about \$4/square foot). The concretist has donated his time for many of our houses, and has taught one of our site supervisors how to stain, which of course lowers the cost significantly. We stain our slabs so that homeowners benefit from the thermal mass and the lower energy bills that result. We also do our best to clean up after ourselves, so each site is furnished with recycling bins for wood, metal, cardboard, cans, bottles, and food scraps.

If you are interested in learning more about Habitat East Bay's green building program, visit our Web site at [www.habitatbay.org](http://www.habitatbay.org), or e-mail [jwyant@habitateb.org](mailto:jwyant@habitateb.org).

*Jenny Wyant is a construction engineer for Habitat for Humanity East Bay in California.*



EAST BAY HHH

*Stacking*



EAST BAY HHH

*Recycling pile*



EAST BAY HHH

*Site-built insulated header*

# When Resources Are Limited: Tips from a Rural Affiliate

By Michelle L. Connor

Our affiliate operates in a very rural area of West Virginia. Without many existing resources to help with waste reduction and recycling, we have had to “go it alone.” Below are tips for other affiliates in similar situations drawn from our experience in slowing the waste stream.

- (1) **No dumpsters on site:** Instead, arrange for regular residential road side garbage service to start as soon as you start construction. Find out what materials qualify as residential. We have found that volunteers are otherwise more likely to throw useable things away (in an effort to clean up) rather than think about how it can be reused or recycled.
- (2) **Leftovers:** Have your ReStore manager come out to the construction site once per week to see if there are any leftover materials on the site that could be sold in the store. That damaged half sheet of drywall or squashed piece of drip edge may be just what one of their ReStore customers was looking for. If you don't have a ReStore, ask a local thrift store or Goodwill to do the same thing.
- (3) **For homeowner classes:** Save damaged unusable components such as light fixtures or faucets for use in your homeowner classes. They make great learning opportunities to show families how to take off the globe and replace the light bulb, or how to replace the seals and gaskets in the faucet. Save your wire scraps for homeowner classes as well. You can show them how to wire



ALMOST HEAVEN HFH

*SIPS window cut-out for dog houses.*

- (4) **Drywall:** Don't send your drywall scraps to the landfill. Hide them in the interior walls or grind into soil as amendment. Check with state government on any restrictions.
- (5) **Foam blue board:** Put insulation blue board and other foam scraps in the attic prior to blowing in the insulation.
- (6) **Paint:** Use leftover paint for an extra coat on the wall or leave with the homeowner for any future touch-ups. Rinse out the five-gallon paint bucket, leave it with the future homeowner, or buy a bucket buddy, add a few tools to the bucket and give it to the family as a house-warming gift.
- (7) **Cardboard:** The cardboard from your appliances can be used as drop cloths, and also for making posters and signs.
- (8) **SIPS:** At our affiliate, we use SIPS (structural insulated panel systems) scraps (the cut-outs for the windows and doors) to make insulated dog houses which we sell.
- (9) **Shingles and siding:** Leave the extra shingles and siding pieces with the family for potential future repair needs and for matching existing samples with new product.
- (10) **Lumber:** Give away any small pieces of lumber to civic groups for craft projects.

*Michelle L. Connor is the executive director of Almost Heaven HFH in Franklin, W.Va.*

# Construction Waste Reduction, Recycling and Management

*Adapted from the Web site of the King County Solid Waste Division in Washington state.*

## Prevent Job Site Waste

Waste prevention, such as Optimum Value Engineering (OVE) of lumber and reusing salvaged building materials, not only cuts disposal costs but also reduces new material expenses.

## Design to Prevent Waste

An affiliate waste management plan should include these strategies:

- Select and create house designs that use materials efficiently. Consult with Habitat's Materials Management Program Manual on PartnerNet (<http://partnernet.habitat.org/>) to learn about several easy strategies, including OVE framing, building on a modular layout of 24 inches on center, and airtight drywall strategies.
- Set waste prevention goals in writing at the beginning when planning a project, assign responsibilities accordingly, and target specific waste-producing activities.
- Include waste management specifications in any affiliate construction documents.

## Prevent Waste On Site

There are a number of ways to reduce the amount of waste produced on site.

- Ask suppliers to take back or buy substandard, rejected or unused items; or, turnover such items to your Habitat ReStore.
- Request that vendors deliver materials in returnable containers.
- Review and modify storage-handling practices to reduce material loss from weather and other damage.
- Train construction crew leaders and volunteers so that they know their tasks well, eliminating mistakes that may waste resources.

## Purchase to Prevent Waste

Implement purchasing strategies that prevent waste.

- Purchase quality, previously-used building

materials, such as cabinets, doors and fixtures.

Such products may include overstocks and those just going to the landfill.

- Choose materials that are delivered with minimal or no packaging.
- Re-evaluate estimating procedures to ensure that the correct amount of each material is delivered to the site.
- Plan and complete construction schedules and materials lists ahead of time.

## Reuse and Salvage

If you are in the unique position of demolition and potential salvage of materials, reuse items on site or donate (ReStore) salvageable items to cut waste and supply costs.

- Identify potentially reusable or salvageable items before demolition.
- Determine how salvaged items will be removed and whether they will be reused, donated or sold.
- Inform the demolition crew of salvage procedures and expectations.

## Other Reuse Options

- Use extra materials for building bird houses, sheds and raffle or auction items.
- Conduct a "yard sale" at the job site to sell reusable items.
- List items in your newsletter or in the free items section of the local newspaper.
- Allow workers to remove materials for their own use.
- Post signs offering free materials to the general public.

## Helpful Resources at the Environmental Protection

### Agency Web Site:

WasteWise Building Challenge Resources

<http://www.epa.gov/epaoswer/non-hw/reduce/wstewise/targeted/challenge/cbres.htm>

Construction and Demolition (C&D) Debris

<http://www.epa.gov/epaoswer/non-hw/debris-new/index.htm>

Setting Up A Jobsite Recycling Program

<http://epa.gov/region09/waste/solid/cd3.pdf>

## Cost Effectiveness of Job Site Recycling

### Are There Dollars in Your Dumpster?

It may be easier and less expensive to recycle your job site waste than to dispose of it. Recycling fees are generally lower than disposal fees, and there may be

several recycling options available to you, depending on your county.

### Determine Project Waste

Determine the types of materials you will recycle and reuse at the job site.

- Use engineering estimates, previous material purchasing records or previous waste disposal records, including wastes from demolition, as a guide to estimate the types of construction materials that the project will generate.
- Estimate the quantity of each material the project will generate in cubic yards or tons.
- Keep recycling and garbage disposal receipts to accurately estimate the quantities generated on future projects.
- Identify the types of materials that can be reused or recycled during the project. Include the more unusual materials such as plastic, ceiling tiles, paint, asphalt, roofing and carpet in your plan.

### Choose a Recycling Method

There are several options for collecting and delivering materials to recycling facilities.

- Contract with a recycling hauler that accepts commingled construction, demolition and land-clearing (CDL) materials. This method allows you to put multiple recyclables such as wood, cardboard and metals in one container. The hauler takes the materials to a sorting facility where the materials are then separated for recycling.
- Separate recyclables at the source for recycling. This method involves collecting recyclables in separate containers as they are generated. The hauler takes the sorted materials to a recycling facility. Materials not accepted in commingled recycling loads, such as carpet or ceiling tile, must be source-separated for recycling.
- Self-haul your recyclables. Source-separate recyclables in piles or containers on site and haul them to a local recycling facility or transfer

site yourself. You also may be able to drop off commingled loads at certain recycling facilities. This option is most appropriate where resources are limited.

### Calculate Costs and Savings

Once you have established a plan for recycling and reusing materials, you can determine the cost effectiveness of your efforts by using an Excel spreadsheet to calculate your disposal and recycling costs. Your worksheet can contain separate calculation sheets for commercial-hauling and self-hauling options.

### Design Specifications and Waste Management Plans

Successful waste prevention and recycling programs outline the requirements up front so that all volunteers and staff who form the construction team will understand what is expected of them.

### Design Specifications

When creating design specifications, include specific language to address expectations for waste reduction, reuse and recycling during construction and demolition.

### Waste Management Plans

A waste management plan does not need to be lengthy or complicated to be effective, but a successful plan should contain the following information:

- Waste recycling or reuse goals.
- Analysis of project waste.
- Disposal methods.
- Material handling procedures.
- Instructions for all construction volunteers and staff on site and subcontractors.
- A simple spreadsheet showing which products are to be recycled, sent to landfill, or reused as well as how each material type will be stored and transported.

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EAST BAY HFH



*East Bay HFH engages in waste reduction and recycling.*

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### **Specifications in Subcontractor Agreements**

In addition, for large projects, it is important to specify the waste management goals in any subcontractor agreements. For example, the subcontractor agreement might state: "The subcontractor will make a good-faith effort to reduce the amount of waste generated on the job site and recycle material as per the contractor's waste management plan. The subcontractor will follow the designated handling procedures for each type of waste generated on site and provide documentation to verify material reuse, recycling and disposal as indicated in the waste management plan."

### **Make Your Recycling Program Successful**

How can you ensure that your recycling program will be successful? Preventing waste and practicing recycling pays off by lowering supply and disposal costs. But even when a sound waste management plan has been implemented, difficulties may still arise. Here are solutions to some common challenges.

#### **Manage Your Program**

Designate a leader—either an individual or a team—who will be responsible for educating the crew and subcontractors, setting up the site and coordinating and supervising recycling efforts to prevent the contamination of recycling loads.

#### **Involve Subcontractors**

Require subcontractors to use the on-site recycling and disposal bins or require them to recycle their own waste.

#### **Find Appropriate Space**

Recycling and reuse efforts require space. Set aside an area of the job site to store salvaged building materials and house recycling bins for either commingled or source-separated loads.

#### **Promote and Educate**

Communicate your plan to all construction staff and volunteers, subcontractors, and others within the affiliate involved in making leadership decisions. They will need to know:

- How materials should be separated.
- Where materials should go.
- How often the materials will be collected and delivered to the appropriate facilities.

Include waste-handling requirements and expectations in all project documents and put on file with other important construction documents.

### **Prevent Contamination**

Adopt strategies to prevent contamination.

- Clearly label the recycling bins and waste containers on site.
- Post lists of recyclable and non-recyclable materials.
- Conduct regular site visits to verify that bins are not contaminated.
- Provide feedback to the construction crews and subcontractors on the results of their efforts.
- Advertise your successes! Potential donors and volunteers like to know that your affiliate is resource-efficient.

For example documents pertaining to these topics, go to <http://www.metrokc.gov/dnrp/swd/construction-recycling/prevent.asp>.

### **Where and How to Recycle—Local Support**

(Adapted from the National Recycling Coalition Web site: <http://www.nrc-recycle.org/howto/index.htm>)

What you can recycle usually depends on where you live and the services offered in your area.

- 1) The first place you should call when you want to learn how to recycle something is your local recycling, solid waste, environment or public works department. The names of these departments vary from place to place, but all local governments (i.e., cities, towns, counties) should be able to help you identify the recycling options in your area.
- 2) You can also ask the company or organization that picks up your garbage or that operates your local disposal facility about recycling options.
- 3) Your state environmental agency may be able to help. The U.S. EPA maintains a list of these agencies: <http://www.epa.gov/msw/states.htm>.
- 4) The store where you originally bought the product may know about recycling options. This is particularly true for durable goods (e.g. furniture, electronics, appliances, etc.).
- 5) Local and state environmental organizations may be able to help.

#### **Web sites to assist with local recycling:**

**Earth 911:** <http://www.earth911.org/>

**The Internet Consumer Recycling Guide:**

<http://www.obviously.com/recycle/>

**EPA's Setting Up A Jobsite Recycling Program:**

<http://www.epa.gov/region09/waste/solid/cd3.pdf>.

**Waste to Wealth:** <http://www.ilsr.org/recycling/links.htm>.

Also post questions to PartnerNet's Construction Round Table. Look for the Construction Discussion link at <http://partnernet.habitat.org/ubbcgi/ultimatebb.cgi>.

# Recycling in a Wasteful World

By Shea Hagy

## Initial Problems

Hartford Area Habitat for Humanity has undergone a major paradigm shift in its building techniques, products, and material usage and waste disposal. It has been a struggle to change the status quo and implement more environmentally-sound construction methods, especially in the recycling of construction waste. However, we are making progress!

When I arrived at the affiliate in September 2005, our major subdivision project was littered with mountains of old lumber and construction debris—called construction and demolition (C&D) waste—most of which was no longer usable. This prompted me to begin the long and arduous task of finding a waste hauler that would recycle C&D waste. My journey through the debris took me more than five months, hundreds of phone calls, and endless frustration. I found that many in the Hartford area talk about recycling but no one really does it.

I called small waste haulers, national haulers, dumps, Hartford municipal departments, the EPA and many other organizations looking for someone that could help me recycle our on-site waste. Every person I spoke with would either refer me to someone else or tell me that they were willing to help, but never follow through with the offer.

## Changes From Within, Help From Outside

Discouraged and worn out, I moved on to attacking our waste problem from the other end. I took a hard look at our site waste management activities and proposed changes. Some of these changes involved ordering less material,



GREGG PACHKOWSKI

*Volunteers Kathy Trainor from Watervliet, Mich., and Amy Cartwright from South Bend, Ind., load cardboard for recycling at the 2005 JCWP.*

making sure our volunteers used the material more efficiently, and reusing material such as bracings. Our construction supervisors and volunteers jumped right on this concept. Since taking these action steps, our affiliate has reduced waste by more than 50 percent and saved up-front costs.

I did continue to pursue a recycling facility and hauler. Adam Ney, the president of Buildingtgreen.com, connected me with OAKLEAF Waste Management, a huge national waste outsourcing company based in East Hartford. Adam set up a meeting and we met with senior staff of the company. As a 24-year-old AmeriCorps volunteer, it was pretty intimidating to walk into the corporate headquarters of a multimillion dollar corporation, but I had nothing to lose. I told them what I wanted in a waste hauler, explained our eventual aspirations to meet LEED standards, and challenged them to come up with a solution to our lack of recycling on-site. They were on board! A few meetings and one month later, we had a waste hauler, a 20-yard commingled (mixed waste)

recycling dumpster, and a 10-yard cardboard dumpster.

While my efforts have paid off, my work is not over. Currently we recycle only cardboard, metal and some wood scraps. My goal is to continue to pursue more efficient materials management on site and challenge our waste hauler to find new and innovative ways to recycle C&D materials. Approximately 45 percent of all waste that goes to the landfill is C&D. Just think about the positive consequences if every builder recycled just a small portion of their waste and managed their materials better. From this experience I've learned to never take no for an answer, and to continue challenging myself and everyone around me to make positive change in the world—no matter how large or small. And of course, to reduce, reuse and recycle!

*Shea Hagy is the construction supervisor and Green Building coordinator for Hartford Area HFH in Connecticut.*

# Green Building Relationships

By Jennifer Langton

## Building America, a Longtime Partner

Building America is a program of the U.S. Department of Energy that exists to fund research and provide technical assistance on projects and actions that increase the energy-efficiency of housing in the United States. Janet McIlvaine, whose work is funded by Building America, works at the Florida Solar Energy Center, a research institute of the Florida State University System. Janet McIlvaine is a former Habitat affiliate board member and has directed and worked on many Habitat housing projects over the past 10 years. From the “Hammering in the Hills” Jimmy Carter Work Project in Appalachia to the JCWP in Houston, and most recently the JCWP in Michigan, Janet has helped ensure that all houses were built to Energy Star® standards.

Today, Janet is the liaison for Building America and Habitat for Humanity. Building America is continuing its partnership with Habitat’s Congress Building America program. Since the winter of 2005, Building America has been working with all affiliates participating in Operation Home Delivery in an effort to aid the building of houses that are durable, disaster-resistant, healthy and meet Energy Star® standards for family living. Through Janet’s presence, Building America will provide technical assistance, testing and training for the next JCWP in Los Angeles.

**For more details, check out the following Web sites:**

[http://www.eere.energy.gov/buildings/building\\_america/affordable\\_housing.html](http://www.eere.energy.gov/buildings/building_america/affordable_housing.html)

<http://www.fsec.ucf.edu/bldg/baihp/partners/BuilderPartners/hfh.htm>

## RESNET Offers Raters Across the United States

As part of the relationship with Congress Building America, Building America formed a partnership with the Residential Energy Services Network (RESNET) in order to match affiliates with certified raters who offer pro bono services. This relationship has since grown, and today is formally recognized by HFHI as a great triangular partnership and tremendous resource for Habitat affiliates. RESNET’s goal is to develop a national market for home energy rating systems and energy efficient mortgages, partly through the certification and accreditation of raters, and by providing to the public information about the rating process and listings of certified raters in each state.

With the recognition that a house is not affordable unless it is affordable to operate, HFHI continues its recommendation that all Habitat affiliates build to the Energy Star® level as a minimum for energy efficiency. In addition, basic healthy building strategies are critical so that families may live in a home with healthy indoor air quality. Luckily, the provision of these two components of a house can be largely tested by a professional rater. As a community service, RESNET members can help interested affiliates reach their goal by providing pro bono testing services and field verification. Building America researchers will work with RESNET volunteers to produce and register an energy rating jointly. For information, please contact David Beal at [david@fsec.ucf.edu](mailto:david@fsec.ucf.edu). Also visit <http://www.natresnet.org/resources/consumer/default.htm>.

## Building Knowledge Inc. Brings Building Science Expertise

Building Knowledge Inc. is a private company whose mission is to promote proven technologies and practices that produce high-quality

homes while saving energy and preserving precious natural resources. Composed of building science trainers and educational specialists, the company provides interactive educational tools and trainers who inform the public on how to improve the durability, energy efficiency and healthiness of homes.

Today, Building Knowledge has entered into a partnership with HFHI to provide professional training, interactive educational tools, and consulting on building science and green building issues to help Habitat affiliates build healthier, more durable, and energy-efficient housing. At the recent Habitat Charlotte Leadership Conference in August, the company’s presence made an impact through its exhibit and staff and through their senior trainer Mark LaLiberte, who presented an all-day intensive on building science strategies.

While supplies last, Building Knowledge and HFHI have made available a deeply discounted package for each affiliate that contains three of each of the following: (1) a three-CD educational program detailing how to build energy-efficient and healthy houses; (2) a climate-specific Builder’s Guide on construction details for your climate zone; and (3) a getting-started booklet on helping affiliates integrate these practices into every house that they build. Affiliates need to call (952) 942-5754 CST to purchase this package for \$100. As the president of Building Knowledge assumed a leadership position with the past Jimmy Carter Work Project 11 years ago in Los Angeles, the company is very excited to participate in a reunion JCWP this next year, providing training, testing and green building assistance to affiliates for this event. Visit [www.buildingknowledge.net/](http://www.buildingknowledge.net/) for more information.

## Global Green USA, Green Building Technical Assistance

Global Green USA is a nonprofit organization that works with governments, industry and individuals to create a global value shift toward a sustainable and secure future. Global Green worked with HFHI 10 years ago to help Habitat for Humanity develop its Environmental Initiative. From this concept, Habitat's GreenTeam and its program activities emerged.

Now Global Green USA is partnering with HFHI to provide technical assistance, training, and HERS Rating services to affiliates participating in the Operation Home Delivery program. In June, the organization helped organize the Green Homes for Healthy Families symposium in Hartford, Conn. At this event, the Hartford affiliate, other area Habitat affiliates in the Northeast, and interested organizations and companies presented and discussed green building issues. In addition, Global Green's staff will be assisting with the "greening" of the next Jimmy Carter Work Project, to the extent deemed appropriate by the host affiliate, HFH of Greater Los Angeles. For more information, visit [www.globalgreen.org](http://www.globalgreen.org).



STEFFAN HACKER

*HFH Kyrgyzstan is building houses under the Cane Reed Project. This abundant material, used in the 19th century but forgotten in the 20th century, is friendly to the environment, local economy, volunteer labor force and community. Cane reed is 34 times lighter than brick and the \$8,500 per house cost is 60 percent less. The home-building process becomes quicker and more efficient. The project invests in the local economy by employing a community labor force to harvest the reeds which are woven into the timber frame, and to mine the clay (wattle), sand and mud (daub) used to fortify the reeds. Reeds are better insulators than brick for the cold winters and hot summers of Kyrgyzstan, which translates into financial savings for the family.*



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