

## Unique Flooring from Old Pallets

*The US EPA's Office of Solid Waste and Emergency Response (OSWER) initiated a series of innovative pilots to test new ideas and strategies for environmental and public health protection. A small amount of money is set aside to fund creative approaches to waste minimization, energy recovery, recycling, land revitalization, and homeland security that may be replicated across various sectors, industries, communities, and regions. We hope these pilots will pave the way for programmatic and policy recommendations by demonstrating the environmental and economic benefits of creative, innovative approaches to the difficult environmental challenges we face today. This fact sheet presents the results of a completed Innovation Pilot.*

**Project Leader:** Waste Reduction Partners: Land-of-Sky Regional Council

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### Background

The US Forest Service (USFS) estimates that 38 percent of America's hardwood lumber production, or 4.5 billion board feet, is used in pallet manufacturing, making it the single largest use of hardwood lumber. Waste pallets represent a sizable portion of C&D and MSW waste streams, 3.3 and 2.0 percent, respectively. While pallet repair and recycling is already a \$3.5 billion industry in the U.S., the pallet recyclers themselves create scrap wood waste that is expensive to manage. "Much of the pallets' valuable hardwood ends up as mulch, animal bedding and boiler fuel and not as quality, value-added products," states Phil Araman with the USFS. "We want to capture the most value from these used pallets, and convert them into building materials such as flooring, paneling, furniture, cabinets and similar products." The USFS's Southern Research Station has made extensive efforts to demonstrate the technical and financial feasibility of pallet recycling.

### Summary of the Project

The Land-of-Sky Regional Council's Waste Reduction Partners is coordinating a public/private partnership to demonstrate a commercially viable business that produces a unique, high quality flooring product from wood pallet waste. This pilot project builds upon existing research, business models, and technical expertise of the USFS and North Carolina State University (NCSU) to advance an innovative pallet recycling concept into commercialization.

Dave Lowles, a retired businessman and engineer with Waste Reduction Partners, led the effort by working through the technical challenges of the recycling process while rallying the participation of many public and private business partners to ensure the project's success. With joint participation from Phil Araman of the USFS and Urs Buelmann with NCSU, a business development process was strategically plotted. Numerous project tasks were undertaken, including project planning, process routing, technology needs assessments, processing cost

<b>Innovation Pilot Partners</b>	
<i>Public/Private Partner</i>	<i>Role</i>
Oaks Unlimited	Lead Business Partner
Land-of-Sky Regional Council – Waste Reduction Partners	Project Managers / Retired Engineers Program
US Forest Service – Southern Research Center	Technical Assistance/ founding research
North Carolina State University, Wood Products Extension	Technical Assistance/pilot lab funding
NC Division of Pollution Prevention and Environmental Assistance	Technical Assistance & grant funding
Kings Kountry Klassics	Pallet board supplier
WNC Pallets	Pallet board supplier / demo site
American Floor Finishing Company	Flooring Finisher / Technical assistance
Carpenter Designs	Pallet board supplier
Vintage Harwood Flooring	Retail Outlet & Marketing
Sprig, Inc	Demonstration Floor site
Numerous other businesses	Focus Study participants, equipment vendors, wood mills, and pallet recyclers

analysis, processing technology demonstrations, business planning refinements, market assessments, prototype creation, a public-sited demonstration floor, business partner identification/coordination, securing a lead business partner, test manufacturing runs, business grant assistance, and continued technical assistance with the lead business partner.

The first major milestone of the demonstration project included the manufacture and installation of a 750-square-foot (sf) demonstration floor at Sprig, a flower accessory shop in the Grove Arcade Public Market in Asheville, NC. The recycled pallet floor at Sprig is attractive, unique, and eye-catching, and the shop's owner, Renee Fisher, championed the cause.

Early in the project, twenty-five architects, designers and flooring marketers participated in a focus study group where preferences in wood species, stains, and board widths were determined. The market study showed that the nail holes in the boards are a mark of recycled 'authenticity,' and that recycled wood is of great interest to a number of custom builders and end customers alike. The marketing of this flooring is directed at designers, architects and owners who are concerned about using natural resources, as well as practitioners of the 'green' movement. Currently, this unique flooring is marketed through Vintage Hardwood Flooring, also at the Grove Arcade in Asheville. Vintage played a significant role in finding sites for demonstration floors and promoting the recycled-product concept.

The project team continued advancing solutions to the technical processing details and organizational aspects of the project commercialization.

Mr. Lowles enlisted the participation and assistance of a variety of pallet wood waste suppliers, wood millworkers, a finishing company, equipment vendors, and others.

Key to moving the project forward was the involvement of Oaks Unlimited Inc, a lumber dryer and marketer of high quality hardwoods to worldwide customers. Oaks Unlimited now manages the process, including contracting with pallet recyclers for boards, de-nailing, drying, pre-planing if required, molding and end matching. American Floor Finishing Company in Bryson City provides the final factory finish, final inspection, and packaging of the flooring. Initial production cost estimates proved to be low. Business partners expect retail price for the recycled pallet floor to be in the \$5.00+ /square foot range, which will compete with other reclaimed wood flooring that range from \$6.00 to \$14.00 a square foot.

This project has proven that unique high-style flooring can be made from used pallet deck boards and that a market exists for the material at prices that make the process economically viable for small private enterprises with wood processing expertise.

#### **Technical Details about the Process**

During the development of the project, partners explored and resolved the following process details:

1. Determined the specifications and cost factors for boards removed from used pallets.
2. Developed a machine and method for removing the nails from the material.
3. Developed sorting criteria for species, quality and suitability
4. Validated the need and refined the process for precise drying the boards.
5. Determined the molding machinery and profile tooling requirements
6. Proved the merits and process for the final stains and finishes.
7. Began the investigation into nail hole filling techniques and materials.
8. Determined methods of packaging, counting and labeling.
9. Established marketing, distribution and pricing approach.

## Environmental Performance Measures: Present and Scale-up Projections

Impact / Outcome /Metrics	Accomplished through IWG Pilot (as of 4/04)	Projected Output of full-scale operation of current commercialization site (near term)
Natural resource conservation - Estimated number of hardwood trees conserved, (trees/yr)	8,950 sf recycle pallet flooring produced. 56 hardwood trees conserved	700,000 sf annual capacity of present pilot. 4386 hardwood trees conserved annually
Conservation of landfill/waste management capacity, (tons/yr)	22 tons diverted from landfilling/waste management	1750 tons/yr projected to be diverted from landfilling
Greenhouse gas (methane) reduction through carbon sequestration and landfilling elimination: Metric Tons of Carbon Equivalent, (MTCE)	8.4 MTCE	665 MTCE
Business & economic development impact, (\$ value added/yr)	Private and public cash investment leveraged by grant: \$112,000	Gross sales revenue \$3.5 M/year Expected job creation 12-14

The project has many environmental, natural resource, and economic development benefits to the community. Other appropriate regions across the country have similar opportunities to replicate this business concept.

### Lessons Learned

1. Many small business persons are naturally skeptical and will not get excited about new ideas, even in their own industry.
2. In the recycling industries, many do not know their real costs.
3. The recyclers do not reach out to explore alternative end uses of materials.
4. The concepts of "Total Quality" are foreign to most small business persons.
5. The cost of the finished floor is very dependent upon the quality of boards harvested from used pallets.
6. Flooring recycled from pallets must be factory finished to have any sales appeal.
7. Project publicity helped identify key business partners.
8. It takes grant money to kick off a program such as this.

### Recommendations

1. Consider the harvesting radius to be approximately 100 miles.
2. Look for sources of heavy-duty specialty pallets that do not have a second use.
3. Locate pallet recyclers with large volume and saw type dismantlers.
4. Find the right private enterprise machining partner, generally from the wood products industry.
5. Identify the right marketing partner(s) who focus on high-end builders and architects, designers.
6. This flooring must be factory pre-finished!
7. Don't market on the basis of price.
8. Contact architects and interior designers to get close to end-use customers.
9. Work to get articles in local and regional publications.



Demonstration Floor Site at Sprig in the Grove Arcade, Asheville, NC  
(Renee Fisher, shop owner, and Dave Lowles, project manager shown)



Courtesy of Benjamin Hicks | Mountaineer Publishing  
Joe Pryor of Oaks Unlimited is shown with scrap lumber from the used pallets before and after it has been recycled into rustic flooring he plans to turn out.