

# The Future of Recycled Material Usage in Building Applications: Summary of Conference Viewpoints

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## **Abstract**

Viewpoints gathered at the final session of the “Use of Recycled Wood and Paper in Building Applications” conference were consolidated and grouped into four main categories:

- infrastructural needs;
- environmental issues;
- processing, products, and markets; and
- construction industry issues.

The discussion of the infrastructure includes ideas and suggestions related to the supply and cost of recovered material, information sources, definitions, standards, education, public perception, legislation, and funding for research and implementation. Environmental issues include contaminant distribution and life cycle assessment. The discussion of processing, products, and markets covers handling of material, medium density fiberboard, wood-plastic composites, agricultural fibers, exterior structural products, and new building systems. Finally, the section on the construction industry addresses salvage and reconstruction.

## **Overview of session**

The final session of the conference on the “Use of Recycled Wood and Paper in Building Applications” provided a forum for discussing issues deemed critical to advancing the main premise of the conference. The audience was invited to identify opportunities for

cooperative action, to identify issues not addressed during the conference to present differing views on major strategies for advancing recycling, and to share individual action plans.

The viewpoints gathered from this session were consolidated into the summary presented here. The ideas and concerns are categorized for the convenience of the reader. Each person’s comments are placed in a separate paragraph; care was taken to preserve the original intent of the speakers.

## **Infrastructural needs**

### **Recovered material supply and costs**

One concept offered at the outset of the session focused on establishing a national wood recycling goal. Like the American Forest & Paper Association (AF&PA) paper recovery goal of 40 percent by 1995 (which has been raised to 50%), a national wood recycling goal would raise the visibility of wood recovery efforts within the industry.

A fundamental dichotomy blocks implementation of the vision that formed the premise of the conference: marketing occurs on a global scale, but materials are derived from local sources. Investments required for penetrating national or international markets for commodity products are enormous. Yet, a manufacturing plant established with large investments must draw from specific materials in a region, although this situation is not unique to plants that deal with recycled materials. Thus, marketing occurs on a global scale while materials are drawn from local sources. The

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building codes are also being driven by the global marketplace, reducing the flexibility for creating building products for niche markets. The costs associated with certifying products in an international building code arena will be enormous as well. Such a situation does not bode well for small businesses to capitalize on locally available recovered resources. These businesses will require support to be successful.

### **Information sources**

We need information on the actual waste generated, not only to develop standard definitions and markets for that waste, but also to minimize the waste through better design of products before they are shipped to construction sites. This same type of analysis would allow us to evaluate how modular construction techniques might concentrate and minimize the amount of wood waste generated.

Nonprofit institutions need a way to access information on recovered building materials so that universities or government can assist in disseminating news and technology for innovation in this field.

An Internet source or directory of environmentally friendly building materials is now available as are two commercial suppliers of directories of such products. Maintenance of a directory on an Internet site is of concern since such a site typically requires outside funding to keep it current.

The Wisconsin Council on Recycling identified the lack of information sources as a major impediment to greater recovery and use. More than 50 percent of Wisconsin's landfilled material is either construction and demolition (C&D) waste or papermill sludge. Thus, C&D waste has high priority. The Council considers that meeting the information needs of such groups as business entrepreneurs, architectural schools, building inspectors, and the construction industry will have the highest potential for speeding implementation. We need to generate informational databases and other materials that can assist these entities.

### **Definitions and standards**

In timber recycling, we need to facilitate the development of grading standards to allow ease of reuse of recovered material within the same framework of standards' support enjoyed by virgin timber and lumber products.

The AF&PA staff for national and regional building codes and standards could make a commitment to work with national and regional building officials and grading agencies to support acceptance of recovered and recycled building materials.

The AF&PA could assemble a taskforce to create coherent and comprehensive definitions of recycled wood with the following components:

- Characterize the materials for cleanliness, differentiate the sources of various materials, and project recoverable volumes from those sources.
- Establish processing protocols for identifying the types of materials that could result from different types of processing equipment.
- Identify end-use applications for various processed wood waste streams that relate to the material characteristics, cleanliness, and market values associated with each end-use.
- Provide information on how these definitions connect to definitions from the regulatory arena of recycled, recovered, or environmentally hazardous materials (e.g., demolition wood with lead paint).

### **Education and public perception**

The AF&PA could form a membership committee to develop and implement strategies to increase the use of recovered wood in wood and paper products.

The Environmental Building News publication is focused on educating the building community for minimal environmental impact in the industry—from such aspects as material choice, building design, planning, and C&D waste.

We need to do a better job of communicating our vision for how sustainability can be attained within the forest products industry and what paradigm shifts will allow us to reach our goals.

### **Legislation**

In the past few years, some of the legislation created for embracing the use of recycled materials has been very positive for overall development of the recycling industry. The City of Austin (Texas) Green Builder Program has raised awareness without creating any negative costs for the community.

We should be hesitant to legislate recovery and recycling. The government needs to set some long-term goals, level the playing field, and assist in setting standards and definitions. Regardless of who sets and monitors these goals, they need to be in place for use in industries, such as the wood pallet industry. Well-defined goals will assist wood-using industries to dispel perceptions of wastefulness and will assure users of waste wood that we are committed to long-term solutions.

The government's purchasing preferences are not abided by, not enforced, and little understood. How-

## Environmental issues

ever, this situation may change since agencies are currently preparing plans for implementing the “Environmentally Preferable” purchasing guidelines.

Considering that 150,000 government buildings are slated for demolition each year, we have the opportunity to interject specific recommendations for contractors engaged in federal demolition/deconstruction. One outcome from this conference could be to establish guidelines to encourage or require salvage in these government projects. These guidelines could also be aligned with other material recovery goals in masonry, glass, steel, or other metals to strengthen the salvage industry infrastructure.

### Funding for research and implementation

The USDA Forest Service has committed \$3 million each year for the past 5 years to assure some continuity in its recycling research program (even in this climate of federal government downsizing) and to advance the goals of the agency. Although a large percentage of those funds has been directed toward the goal of increased paper recycling, increasingly greater portions of the research program have been directed toward wood waste recycling issues.

The Environmental Protection Agency (EPA) currently funds two projects at the National Association of Home Builders (NAHB) Research Center to advance the minimization, recovery, and reuse/recycling of construction site wood waste and remodeling disposals.

The NAHB and its Research Center consist of 175,000 entities in the light-frame construction industry. Many are willing partners who, without outside funding, can help to advance the goal of this conference. However, their support for our goals will necessarily be tied to reducing the costs for implementing recycling of construction waste.

Agenda 2020, a partnership between the U.S. Department of Energy and the forest products industry, is presently reviewing research proposals with some emphasis on recycling of wood materials. Many states also have seed money for research that may lead to new products.

To assist small businesses that are developing innovative technologies, the Small Business Innovative Research programs within the Departments of Defense, Energy, Agriculture, and Commerce provide multi-stage funding. In addition, many states have funding programs established for such ventures that relate to recycling. Indiana has up to \$500,000 in funds for each new business of this nature. Wisconsin has set aside \$9 million for industry development in this arena.

### Contaminant distribution

We need to consider the future environmental fate of the processed materials that we interject into the marketplace. The principal concern here is to minimize the commingling of difficult-to-separate materials for ease of reuse in the future. Issues of concern include lead paints, inorganic fiber contaminants, polymeric materials, and heavy metals. Do we have a valuable mixture of materials or a mixture of valuable materials? The inclusion of contaminants makes it difficult for us to glean the real value of the materials in our mixtures.

The usage and collection of material treated with chromated copper arsenate needs to be studied to assure solutions for future disposal problems. A massive amount of southern pine (50%) is being treated. With the continued installation and use of treated material, we should have a plan for its safe reuse or disposal when its 30-year service life comes to an end.

### Life cycle assessment

Life cycle assessment is important. It is complex and we are still at the beginning stages of understanding how to use this tool, but we need to pay attention to the perspective that this measure can bring to a holistic view of our environmental impacts. Life cycle assessment serves as an integral method for quantifying those aspects of our building material choices that are not reflected in product pricing.

Life cycle assessment is critically important, not for definitive quantitative answers, but to identify in a systematic way the environmental burdens associated with our processing and material choices. The wood products industry has a good story to share in its life cycle costing. Our material competitors are systematically improving their processes and reducing their environmental burdens for an improved life cycle inventory. We also need to continue developing this tool or we will find our significant competitive advantage dwindling or surpassed by material competitors.

The AF&PA, in concert with its sister organizations around the world, is currently assembling a publication that summarizes information and techniques for implementing life cycle inventory in the forest products industry. This publication should soon be available through the AF&PA.

### Processing, products, and markets

#### Material handling

New feed-handling or other flow-type equipment may be needed to include C&D and other wood waste

materials into the traditional feed streams for processing equipment. This may seem like a small hurdle, but the lack of such equipment or the shortcomings of equipment adapted to this job may be an Achilles heel in moving forward into new markets.

### **Medium density fiberboard**

*There* has been much talk about using demolition wood/wood waste for medium density fiberboard (MDF) production. It is anticipated that the MDF market is going to be flooded as new plants come into production within the next 2 years. We shouldn't focus on this material if the demand for the product isn't viable to support additional use of recovered wood or paper fiber.

### **Wood-plastic composites**

The United States seems to be focusing on the use of wood and plastics in combination. The recyclability of wood or plastic is readily adaptable in existing industry. However, the mixture of wood and plastics seems to be a temporary solution since the next generation of products will be difficult to sort and reprocess. In addition, the plastic materials contribute to the carbon dioxide gain in the atmosphere when these mixed materials are ultimately burned.

The United States has many plastics in the waste stream; 55 billion pounds (25 billion kg) are disposed of each year. Much of this material is commingled with paper and is not usable by the resin industry. Thus, the primary interest is to take mixed paper and plastics to create high-value products that offset the amount of virgin plastic used.

### **Agricultural fibers from residues and agro-forestry**

We need to be aware of the potential for competition from "alternative" fiber sources. The amount of material available from agricultural fibers is roughly equivalent to the total wood harvest. Thus, we have an opportunity to meet additional demands for fiber from those sources. To assure the sustainability of an industry such as use of wood waste for building materials, we must also look at a competing fiber source—poplar on intensively managed stands. If these agro-forestry-produced fiber sources are cheaper than recovered materials, we can't expect recovered materials to compete in a sustainable economic system.

### **Exterior products for construction**

We need good credible information on the correlation of accelerated aging and durability of recycled materials in service. To make a rapid transition from

product development to the marketplace, we need to be able to use the types of accelerated tests for aging or freeze/thaw cycling that will provide customer confidence or code approval of new materials/products in a timely manner.

The demand for construction materials is toward materials that are more durable and more resistant to fire, decay, and insects. These new technologies must also focus on reducing the cost of the final installed product. For new products to be sustainable in the marketplace, they must reflect market forces such as these.

### **New building systems**

We need to minimize waste through better design or analysis of products before they are shipped to construction sites. This type of analysis would allow us to evaluate how modular construction techniques might concentrate and minimize the amount of wood waste generated.

Investments required for penetrating national or international markets for commodity products are enormous. The building codes are also moving toward an international basis, which will reduce the flexibility for creating niche-market building products.

### **Construction industry issues**

Salvagers who harvest materials from C&D sites should be more involved in this discussion. They are the industry that delivers or brokers material that moves around the recycling loop while creating many small business jobs and opportunities.

For the salvage industry to achieve high recovery rates, the timelines for removing structures needs to be lengthened from a matter of days (as is common at most demolition sites) to a period similar to that provided for new construction. This will allow good reconstruction practices to recover higher quality material. In addition, the demolition side of a project needs to be advertised for salvage, allowing this fledgling industry to respond in a "corporate" fashion.

Reconstruction projects within the federal government are being recognized as a major source of material and incubation of this industry. Within the Department of Housing and Urban Development, the Department of Defense, and other agencies, 150,000 buildings per year will be available for recovery for the next 10 years. There will be much room for growth within the context of those removals.

An outsider to this conference would wonder why the end-users of these materials—contractors—are not better represented here. How can we get their

input into our activity to maximize their implementation of our actions?

### **Concluding remarks**

Recovered materials lack the infrastructural support given to other raw materials. This support includes information on quality, supply, and utilization options. A major stumbling block is the lack of uniform definitions, standards, or grades for marketing waste wood. Private sector interests working together with government can develop these standards as appropriate for the identified higher value end-uses. Government can further encourage widespread adoption through working demonstrations of deconstruction projects and dissemination of their costs and benefits.

To market recovered wood waste, we need to compete with other materials on the basis of price. Our ability to do this requires improved collection and processing efficiency for delivery of appropriate quality material. Introducing these materials into existing industry is the first step. We can also identify processes and products such as wood-plastic or wood-cement composites that use these materials in value-added applications. Working in cooperation with the construction industry, we should identify which construction materials and products require enhanced performance attributes. Delivery of needed new products that utilize C&D waste materials will assure success in both the marketplace and reduced disposals in our nation's landfills.



# The Use of Recycled Wood and Paper in Building Applications

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