

Deconstruction for Urban Revitalization

The Environmental Protection Agency's Office of Solid Waste and Emergency Response initiated a series of innovative pilot projects to test ideas and strategies for improved environmental and public health results. This series of fact sheets highlights the innovative approaches, results, and environmental and economic benefits from the pilot projects that may be replicated across various sectors, industries, communities, and regions.



PROJECT DESCRIPTION/INNOVATION

EPA awarded an Innovation grant to the Institute for Local Self-Reliance (ILSR) to develop an innovative and cost effective deconstruction technique for dismantling structurally unsound row houses to recover the maximum amount of roof and floor lumber. This project sought to formulate a methodology that could be used by the City of Philadelphia Neighborhood Transformation Initiative (NTI) to recover valuable lumber from the thousands of abandoned houses slated for demolition.

This project introduced panelization, a mechanized deconstruction technique used to maximize the recovery of building materials for reuse while minimizing labor costs and onsite time. This technique involved dismantling and removing complete sections of the row house, which were then transferred to an offsite location for further processing.

BACKGROUND

In 2004, it was estimated that 300,000 buildings are demolished each year in the United States; generating 65 million tons of demolition material. Of the 65 million tons of demolition material generated each year, EPA estimated that only 20 to 30 percent of this material was reused or recycled, while the remaining 70 to 80 percent were sent to construction and demolition (C&D) landfills.

The demolition industry focuses on removing structures as efficiently as possible, and for the most part, does not recover reusable materials in the process. As a result, valuable wood framing, flooring, doors and a wide range of other valuable materials end up in the waste stream.

In contrast to demolition, deconstruction is the planned disassembly of buildings with the purpose of harvesting materials for reuse. Deconstruction is an emerging industry in the U.S. due to the recognized value of used building materials and the need to reduce the amount of demolition material that is landfilled.

Since there are many row house units in Philadelphia, they were often removed using a combination of mechanized and hand demolition, a more labor intensive process that safeguards the structural integrity of the adjoining house or houses. In 2004,

Project Highlights

- Demonstrated mechanized deconstruction was cost competitive with hand demolition.
- Encouraged two property owners to step forward and deconstruct three buildings designated for demolition.
- The Inquirer, a local newspaper, featured the project in an April 2006 article entitled "Old Homes Become Donors for New Ones."
- Diverted from disposal, recovered and sold more than \$7,500 worth of valuable building materials including hemlock joists, finished pine flooring, metal, a roof turret, decorative tin pieces, a wrought iron gate and brownstone.

there was very little, if any, deconstruction of abandoned housing in Philadelphia due to its perception of being more labor-intensive and costly than conventional demolition.

A barrier to deconstructing these units was the high labor costs associated with removing materials by hand. If mechanized deconstruction was found to be cost-competitive to hand demolition, it was hoped that this project would encourage the city and regional demolition and deconstruction contractors to reclaim the lumber from the thousands of remaining houses scheduled for removal by the NTI.

PROJECT SUMMARY

ILSR, in partnership with the Hamer Center and EPA Region 3, conducted a mechanized deconstruction pilot to determine a cost-effective method to recover valuable lumber and other materials from a NTI abandoned house.

Kevin Brooks Salvage (KBS), a local minority contractor, performed the deconstruction work in spring 2006 on the pilot unit, which comprised half of a row house. At the Hamer Center's direction, the KBS crew experimented with panelization, which

involved cutting the roof and floor panels into sections and moving them to an offsite location for further processing.

All aspects of the pilot were tracked, including labor, machinery, transportation for workers, material recovery and disposal in order to compare the costs of mechanized deconstruction to hand and mechanized demolition. The baseline measure for comparison was the amount Philadelphia NTI paid for the demolition and landfilling of building materials. The final evaluation of the innovative deconstruction method included an assessment of pilot findings, outreach efforts and methods to encourage use of recommended practices by demolition companies.

RESULTS

The project demonstrated that mechanized deconstruction can be cost-competitive with hand demolition when there are sufficient recoverable materials with market value to offset higher labor costs. Overall, the net cost per square foot to deconstruct the abandoned row house was \$8.94. This falls within the cost range of an average hand demolition project (\$7.75 - \$9.30), and was higher than the cost range of an average project using mechanized demolition (\$7.50 - \$7.75). Other factors such as the scale of the project, the market for building materials, and the availability of tax incentives can lower the cost even further.

This mechanized approach to deconstruction also allowed for highly efficient recovery and reuse of the roof and floor structural lumber from the row house. In addition, the ability to complete the deconstruction process offsite increased the recovery of materials and reduced overall costs by using mechanical labor. ILSR and KBS believed that project costs could be lowered in future projects by incorporating better dumpster removal and replacement procedures and improving the economy of scale by removing more than one house at a time.

Since the completion of the project, the findings have been presented to several real estate, green building, sustainability, architectural and economic development organizations to share the value of deconstruction techniques.

2010 UPDATE

Kevin Brooks Salvage (KBS), the deconstruction contractor for the pilot project, has expanded beyond the Philadelphia area and reports that its deconstruction techniques have been adapted by environmental contractors across the state. The City of Philadelphia's Sustainability Director also hopes to incorporate architectural salvage and deconstruction practices into the city's Sustainability Action Plan.

Innovation Pilot Partners

Lead: Institute for Local Self-Reliance

Sponsor: U.S. EPA Region 3

Other Partners:

- Hamer Center at Pennsylvania State University
- City of Philadelphia Neighborhood Transformation Initiative

Additional Information

OSWER Innovation Projects:

www.epa.gov/oswer/iwg/pilots

OSWER Innovation Deconstruction Success Story:

www.epa.gov/oswer/iwg/

EPA Construction and Demolition Material – Deconstruction and Reuse:

www.epa.gov/osw/conservation/rrrr/imr/cdm/reuse.htm

In 2010, ILSR reported that deconstruction has grown tremendously over the past decade. In the private and non-profit sectors, over 300 deconstruction-related companies are now operating in the US and Canada. In the public sector, the Department of Housing and Urban Development (HUD) recently made deconstruction a major component of its overall Sustainable Communities Planning Grant Program. Building deconstruction and resale were also components in each of the green economic development grants awarded by the U.S. Department of Labor in March 2010. Additionally, the Department of Health and Human Services now provides grants for start-up deconstruction enterprises in the non-profit sector.