

DRYWALL RECYCLING

Drywall is the principal wall material used in the United States for interior purposes. It is made of a sheet of gypsum covered on both sides with a paper facing and a paperboard backing. Drywall is also referred to as gypsum board, wallboard, plasterboard, gypboard and sheet rock. Gypsum is calcium sulfate dihydrate ($\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$), a naturally occurring mineral that is mined from dried ancient sea beds.



Drywall Regulations

Waste drywall is regulated in Michigan as a construction and demolition waste under [Part 115, Solid Waste Management, of the Natural Resources and Environmental Protection Act, 1994 PA 451, as amended, and its administrative rules](#). An exemption was developed in 2003 that approves the use of drywall that has been processed to less than ¼ inch in size if it is at land applied at agronomic rates or added to compost at a rate less than 2.5 percent of the compost mixture. The exemption conditions can be found at http://www.michigan.gov/documents/deq/deq-whmd-swp-Exemption-GypsumDryWall_247538_7.pdf. Any other uses would require specific approval from the Michigan Department of Environmental Quality, Waste and Hazardous Materials Division.

Production Rates

Gypsum wallboard is one of the largest waste components in residential construction. The United States produces approximately 15 million tons of new drywall per year. Approximately 12 percent of new construction drywall is wasted during installation. Most drywall waste is generated from new construction (64 percent), followed by demolition (14 percent), manufacturing (12 percent), and renovation (10 percent). The National Association of Home Builders Research Center (NAHBRC) estimates scrap wallboard is 26 percent by weight of new home construction waste. For a 2,000 square foot home, this equates to about 1.5 tons of material or about half a dump truck load. Based on information from the U.S. Census Bureau in 2005, Michigan issued building permits to construct 68,700 residential housing units. If each construction site produced 1.5 tons of drywall waste, this would equal over 100,000 tons of material from just residential building projects. An equal amount of drywall waste can be expected from commercial construction.

Economics

The economic viability of gypsum recycling depends on several factors, including:

- Landfill tipping fees.
- The cost of transportation, collection and processing.
- The value that secondary markets place on recycled gypsum.

DRYWALL POTENTIAL REUSES

Construction Site Reuse: Drywall scraps can be placed in the interior wall cavities during new construction. This will eliminate the disposal and transportation costs. For guidelines, see Appendix C of *Residential Construction Waste Management: A Builder's Field Guide* from the NAHBRC at 1-800-368-5242 or 202-266-8200. Or go to their Web site at www.nahb.com. In recent years, the concept of recycling gypsum drywall at the construction site has been proposed. In this approach, scrap drywall from new construction is separated and processed using a mobile grinder and then size-reduced material is land applied (prior to placement of sod) as a soil amendment or a plant nutrient. This approach may be feasible when the soils and grass species show a benefit from the application of gypsum. This recycling technique offers a potential economic benefit when the cost to process and land apply the ground drywall at the construction site is less than the cost to store, haul and dispose of the drywall. In order to determine the appropriate application rate, users should consult the local [Michigan State University Extension office](#) or an agronomist.

New drywall: Drywall gypsum can be recycled back into new drywall if most of the paper is removed. The paper limits the amount of recycled gypsum allowed in new drywall because the paper content affects its fire rating. With the closing of the Domtar and Georgia Pacific wall board plants, only the National Gypsum plant is still operating in Michigan. Due to its remote location in the northeast corner of the Lower Peninsula, it is doubtful that National Gypsum is a viable recycling opportunity for most construction sites in more populated areas due to high transportation costs.

Soil amendment: New construction drywall is currently being recycled into soil amendments in other states that can be used for the following purposes:

- General agriculture
- Mushroom growing
- Forestry and mine reclamation
- Nurseries
- City parks and recreation areas
- Residential lawns (sod)
- Golf courses
- Compost (additive)

Cement Production: Cement plants use large quantities of virgin gypsum. The gypsum is added to the "clinker" to control the setting time. At one plant, test runs using recycled gypsum showed positive results when paper is limited. Cement kilns may be interested in recycled gypsum if the paper content is at 1 percent or less. (One company representative claimed their \$1 million machine, which handles 10 tons of drywall per hour removes up to 95 percent of the paper. For an additional \$800,000 they could get the paper content down to less than 1 percent.)

Stucco Additive: A company in New Jersey is adding recycled gypsum to stucco.

Sludge Drying: A company in New York is researching the mixing of recycled gypsum with sludge for bulking and drying. The State of New York is funding the study.

Water Treatment: Recycled gypsum could be used to settle dirt and clay particles in turbid water. The State of New York is also funding this study.

Salty Soil Treatment: Recycled gypsum could be used to facilitate the leaching out of sodium salt in soil along roads where salt is placed during winter.

Manure Treatment: Recycled gypsum can be mixed with animal wastes to reduce odor. Several case studies in the state of Washington showed mixed results with this application.

Animal Bedding: Recycled gypsum can be combined with wood shavings for animal bedding. It can substitute for sawdust or sand to absorb moisture. Separated drywall paper is commercially available to be mixed in with poultry bedding.

Flea Powder: Gypsum makes up over 90 percent of the inert material in some flea powders.

Grease Absorption: Recycled gypsum can be used on shop floors as an absorbent.

Athletic Field Marker: Gypsum is used to mark lines on athletic fields.

POTENTIAL PROBLEMS WITH DRYWALL REUSE:

- Nutrient imbalance if over applied to land
 - Source separation – obtaining a clean source of drywall due to contamination at the job site
 - Storage/scheduling
 - Dust during grinding and storage
 - Paper fragments on surface if not incorporated
 - Hydrogen sulfide gas may be produced when landfilling or using gypsum as alternate daily cover, particularly in a wet climate. Several conditions are required, including a moist, anaerobic environment and a low pH. Hydrogen sulfide gas is toxic at high concentrations (~1,000 parts per million) and has a foul, rotten-egg odor.
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Equipment Suppliers

Andela Tool and Machine, Inc.

493 State Route 28
Richfield Springs, New York 13439
315-858-0055
Dick Christman: 714-289-7733
andela@recycle.net

Premier Gear & Machine Works

1700 North West Thurman
Portland, Oregon 97209
503-227-3514

Related Organizations

Gypsum Association

810 First Street, NE, Suite 510
Washington, D.C. 20002
202-289-5440

Approved Drywall Recyclers

Currently none approved in Michigan.

DEQ Contact Information

For information related to drywall recycling regulations, please contact:

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This document was developed in January 2007 by the Waste and Hazardous Materials Division.

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