



WORKING WITH WASTE

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INTRODUCTION

More Treasure Than Trash

WASTE IS FAR FROM A GLAMOROUS SUBJECT, BUT IT CAN'T BE AVOIDED. DEPENDING on lifestyle and consumption patterns, each of us can generate tons of waste over our lifetimes, from longstanding sources such as table scraps, old newspapers, and bottles and cans to the ever-growing stream of consumer electronics that nowadays approach obsolescence mere months after purchase. The total really skyrockets if you include the farm, mine, and industrial wastes generated to produce food, power, and products in the first place.

As this special issue of *Science* highlights, however, trash is often treasure—a feedstock that cannot be overlooked as an expanding world population tries to use resources more efficiently and reduce the strain that our consumption places on natural systems. Those heaps of crop leftovers and yard clippings, for instance, can offset petroleum as a source of the commodity chemicals used to make fuels, medicines, and cosmetics, if systems are in place to collect and distribute them. Plastics and metals can be recycled multiple times. One of our newest waste concerns, the carbon dioxide gas produced by burning fossil fuels, could have value if captured and used creatively. Even the wastewater we generate can be transformed into a source of energy and clean water, and water treatment cost-effectiveness is on the rise.

Of course, these aren't all novel concepts; people have been imaginatively working with waste for millennia, from using human waste to create “black soil” in farm fields to melting down broken swords to make plowshares. But as the News stories, Reviews, and Perspectives in this issue demonstrate, working with waste is an increasingly complex challenge. To minimize the amount of waste we generate and wring the most value out of the trash we create requires a mix of smart science, practical policy, and appropriate technology. It's not enough to understand chemistry and materials science, for instance, because psychology, politics, and economics also play a big role in how we come to terms with our waste.

Still, the snapshots offered in this special section suggest that we are making some progress, even as sobering challenges remain. A series of infographics helps put these developments in a broader context but also reminds us that, in much of the world, collecting reliable waste statistics remains a work in progress. Online content, including a podcast and several videos, adds additional perspective.

Together, the reporting suggests that, ultimately, we can make our waste more treasure than trash. But it also reveals that to achieve that goal, we'll have to work with our waste more than ever. Luckily, a growing number of researchers appear to be interested in getting their hands dirty.

— NICK WIGGINTON, JAKE YESTON, DAVID MALAKOFF

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See also Cover story at <http://scim.ag/cov6095>;
Editorial p. 623; Science Podcast; and videos at
www.sciencemag.org/special/waste

Wireless. Shredded plastic from the insulation of discarded electrical cables at a processing facility in Montpellier, France.

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