

Integrated Solid Waste Management



One of the greatest challenges we face is the cost-effective and environmentally sound management of waste. From a sustainability perspective, the generation of waste is an inefficient use of natural resources, and millions of dollars are spent annually by cities to manage these wastes. RTI International helps governments and organizations worldwide make decisions about sustainable waste management. We design and implement strategies that consider the life-cycle environmental, cost, and social impacts. We also support the development of policies and regulations for municipal, industrial, agricultural, and hazardous wastes management.

Areas of Expertise

RTI is distinctive in our ability to capitalize on a cadre of in-house technical experts working across all spectrums of solid waste management, from design to implementation of integrated solid waste management strategies. We provide a full array of waste-related services:

- Life-cycle assessment and design of solid waste management strategies
- Technology evaluations, including emerging waste conversion technologies such as gasification, pyrolysis, and anaerobic digestion
- Emission inventories and greenhouse gas reporting
- Regulatory and economic impact analysis
- Social impact assessment
- Computer-based decision-support tool development
- Outreach, capacity building, and training.

Project Highlights

Our staff and facilities are represented in regional offices in Asia, Africa, Europe, the Middle East, and North, Central, and South America and in energy research and technology development laboratories. This diversity and global presence allows us to provide reliable and flexible project support to a variety of domestic, international, and commercial clients.

Domestic Work

Our domestic work includes projects with various federal agencies, and state and local governments. One of our main clients has been the U.S. Environmental Protection Agency (EPA). We have supported various EPA offices and projects, including the following:

- **Solid Waste Life-Cycle Assessment (LCA).** Since 1994, RTI has been leading the development and application of LCA concepts and methodologies to solid waste management and developing tools to help local planners evaluate and optimize the energy use, environmental emissions, and cost of various solid waste management strategies.



- U.S. Waste Sector GHG Inventory and Report Program.** Since 2004, RTI has prepared the U.S. solid waste emissions for landfill and composting and participated in the development of the Intergovernmental Panel on Climate Change model for inventory preparation. We also supported EPA in the development of mandatory reporting rule methods for landfills and are currently supporting the greenhouse gas (GHG) reporting project for landfills.
- State-of-Practice for Emerging Waste Management Technologies.** RTI investigated the penetration of emerging conversion technologies for treating post-recycled wastes. Technologies include gasification, pyrolysis, plasma arc treatment, and anaerobic digestion. Technology-specific data were collected, and costs, life-cycle energy usage, and emissions were quantified and compared with a baseline landfill disposal option.

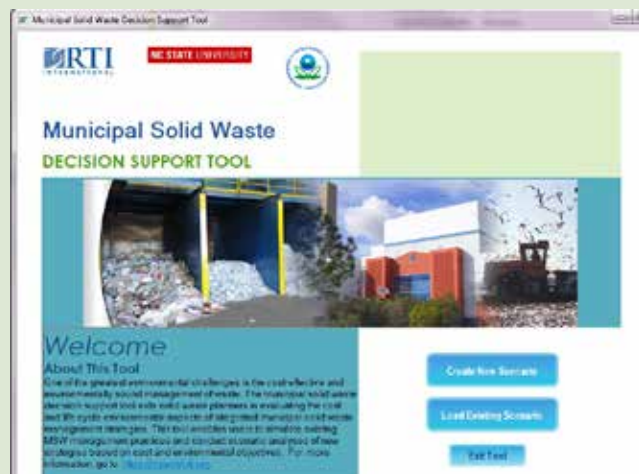
- Helping Livestock and Poultry Operations Manage Nutrients.** As part of this 5-year contract, RTI provided confidential environmental assessments and nutrient management planning assistance for solid waste (manure and poultry litter) and wastewater management to more than 400 beef, dairy, swine, poultry, and other livestock operations. Working in 20 states east of the Mississippi River, RTI's team conducted a threefold program of waste management-related tools development, outreach to farmers, and field consultation services on best management practices to minimize nutrient runoff from farms.

Examples of work conducted for other government organizations include the following:

- Army Net Zero Waste.** RTI worked with the National Renewable Energy Laboratory to support the U.S. Army's Net Zero Waste program. We used the MSW DST and our in-house waste conversion technology models to perform LCAs of feasible waste management strategies in two Army Installations.
- Life-Cycle Assessment of Organic Diversion Alternatives and Economic Analysis for Greenhouse Gas Reduction Options.** RTI led a team of consultants to support CalRecycle's efforts to reduce GHGs and achieve zero waste by performing a life-cycle environmental analysis and an economic analysis of organic waste diversion options, including conversion technologies for energy production. We also developed a tool for estimating the environmental and economic aspects of these options.

Integrated Solid Waste Management Models and Tools

- RTI's Municipal Solid Waste Decision Support Tool (MSW DST) has been used in numerous domestic and international projects to help governments and organizations strive toward zero waste targets. Peer-reviewed and EPA-funded, the MSW DST simulates and optimizes various waste management strategies, including alternatives such as landfill with energy recovery, recycling, composting, and various waste-to-energy technologies.
- A suite of RTI-developed LCA models of emerging waste conversion technologies for the production of electricity and fuels developed for various projects and that include anaerobic digestion, gasification, and pyrolysis.





International Work

RTI has also worked with aid organizations, international development banks, and research institutions in various regions of the world. Examples of that work include the following:

- **Technical Assistance for Environmental Programs in Morocco.** RTI is working on a 5-year capacity-building project to support the Moroccan government agencies in performing activities such as monitoring, permitting, inspections, and enforcement in key environmental areas including solid waste management.
- **Support for the Center of Waste Management, Abu Dhabi.** RTI is providing support to the Center of Waste Management in the development of the regulatory framework for waste management. The work consists of developing a waste management strategy, implementation plan, and associated key performance indicators to determine what amendments and supporting policies and regulations are needed.
- **High Efficiency Lighting Sustainability Impact Assessment.** RTI worked with the Emirates Wildlife Society to develop a sustainability assessment that considered impacts that may occur prior to distribution

of lighting products to the United Arab Emirates, during residential use, and at the end-of-life stage. We developed estimates for potential mercury waste generation and fate from the use of fluorescent lamps, identified potential human health effects, detailed potential public perception aspects, and made recommendations for recycling of spent lighting products based on international best practices.

- **Uruguay Low Carbon Development Study.** Since 2011, RTI has been supporting the World Bank and the government of Uruguay in identifying technically feasible options for reducing GHG emissions, quantifying costs and benefits, modeling future mitigation scenarios through the year 2040, evaluating economic impacts using computable general equilibrium models, evaluating externalities, and developing marginal abatement cost curves across various sectors, including agriculture, energy, solid waste, and waste water. RTI is also leading the dissemination and capacity-building tasks of the study.
- **Global Study of Solid Waste Management.** RTI supported the World Bank in analyzing waste management strategies and their potential application in Nepal, Guinea, Pakistan, Bosnia and Herzegovina, Amman, Argentina, Shanghai, Japan, and the United States. We analyzed the costs and environmental aspects of the strategies and developed sections of the report that World Bank will use to provide guidance to its member countries.
- **Improving Solid Waste Management in Manado (Indonesia).** We worked with the U.S. Agency for International Development to improve to improve the effectiveness of Manado's solid waste management system by strengthening the capacity of city and sub-district officials, non-government organizations, and community groups to plan for, implement, and manage solid waste collection, disposal, or reutilization in recycling and composting operations. RTI helped the city establish a Solid Waste Management Strategic Plan and conducted five pilot projects to establish best practices for source reduction.
- Support for various international projects where governments and individuals have approached us to train them in the use of the MSW DST. The most recent example is “**Managing Trash in Colón, Panama: A Case Study of Selected Strategies A Report of the Panama Initiative,**” where RTI used its MSW DST to model various waste management scenarios for Colón, Panama.



Commercial Work

- **Life-Cycle Impacts of Plastic and Mixed Waste Conversion Technologies.** Since 2010, RTI has been working with the American Chemistry Council in various LCAs looking at alternatives for managing post-recovery waste with an emphasis on conversion technologies such as gasification and pyrolysis.
- **Environmental Impact Statement Supplemental Solid Waste Modeling for the Honolulu Resource Recovery Facility (HPOWER).** We have worked with Covanta Projects, Inc., on various projects, including the evaluation of the energy, climate, and economic impacts of its HPOWER facility and other solid waste management alternatives for Oahu, Hawaii. The analysis also included recycling activities taking place in China.
- **Waste Resources Implementation Plan.** We often work in partnership with other consulting and research companies to provide solid waste management support. In this project, CH2M HILL hired us to evaluate the cost

and life-cycle environmental aspects of an integrated solid waste management system that will comprise the Waste Resources Implementation Plan for Masdar City in the United Arab Emirates.

More Information

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