

NORTHEAST STATES' RECYCLING DATA COLLECTION PROGRAMS

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Report Overview

Background

Over the past ten years, the Northeast Recycling Council (NERC) has conducted extensive research into its member states' recycling data collection efforts. In 1993, NERC published *Data Collection for Recyclable Materials Volume I: Overview of NERC State Programs and Recommendations for Program Improvement*. This report was the first comparative analysis of multiple state's recycling data collection programs. The report's findings and recommendations led to an initiative by the U.S. Environmental Protection Agency to develop a standardized methodology for states to use in calculating their recycling rates. While many have incorporated elements of the EPA methodology into their approaches, there remains a lack of uniformity among the ten states of the region. The Northeast states employ a variety of approaches to collecting and analyzing information on the quantity of materials recovered for recycling within their borders. This report summarizes those approaches.

NERC maintains on its web page information on the quantities of materials recovered for recycling as reported by each of the Northeast states. This information can be found at www.NERC.org.

This report was funded by the Rhode Island Resource Recovery Corporation.

Purpose of Report

This report presents the most current information on the ten Northeast state's programs for collecting data on the quantities of materials recovered for recycling and on the methods for calculating state-wide recycling rates. The report is intended to assist readers in the design and refinement of recycling data collection programs by providing information on the breadth of approaches currently used in the NERC region.

Connecticut's Recycling Data Collection Program

Overview

Connecticut began collecting information on recycling in May 1991. Connecticut law places three different recycling reporting requirements on three different actors involved in recycling: municipalities, recycling facilities, and scrap metal processors. In addition, disposal facilities (resource recovery facilities and landfills) and transfer stations are required to submit reports on quantities of solid waste disposed at or transferred through their facilities. Scrap metal processors only report on scrap metal received from municipalities, state agencies, or other political subdivisions. Data are collected, not only because it is mandated, but also for state solid waste planning; to provide information on tonnage and types of recycled material available from recycling processing facilities; and in order to measure progress towards reaching the state's recycling goal.

Three state entities collect recycling data:

1) DEP's Recycling Program collects data from municipalities, state agencies, and recycling facilities on tons collected by residents, businesses and institutions, as well as data from permitted recycling facilities and scrap metal processors on tons processed, and markets for these materials. There are eleven state-mandated recyclables (bottles, cans, newspapers, corrugated, office paper (non-residential), leaves, scrap metal, storage batteries, used motor oil, NiCd rechargeable batteries, and a disposal ban on grass). Municipalities report their recycling rates on the mandated items, and in addition, some report data on other materials as well (e.g., OMG, office paper by grade, used clothing, anti-freeze, wood/brush, and phone books). Municipalities and scrap metal processors report data annually, while recycling facilities report quarterly. All data are aggregated by month.

2) The state legislature has an environmental committee that also receives data on state agencies' recycling programs.

3) DEP's Hazardous Materials Office collects data from used oil transporters on sources and quantities of used oil collected.

DEP's Recycling Program incorporates most of this data (except data on recycling in state agencies and oil transporters) into one database. State agency data is assumed to be captured in the numbers reported by municipalities .

DEP's Recycling Office has data on the following material categories, although not all reporting entities report data on each subcategory: Paper: ONP, OMG, OCC, mixed, office, other paper separated by grade, juice boxes/milk containers, UBBM; Glass food containers: clear, brown, green, mixed; Metals: steel cans, aluminum cans, scrap metal, RRF pre-combustion metal; Batteries: lead acid; Used oil, and oil filters collected by municipalities; Compostables: leaves, yard wastes, wood/brush, food, grass; Plastics: Plastics 1, 2, 3-7, mixed; Flourescent bulbs; Other: Tires, anti-freeze.

There are numerous reporting forms used to collect information on recycling and waste generation from the following sources: municipalities, recycling/solid waste facilities, scrap metal processors, solid waste transfer stations, landfills, resources recovery facilities (trash-to-energy facilities), state agencies, and waste oil transporters.

Most data are reported on a weight basis. Data collected by the DEP are maintained on PCs, using ACCESS. Approximately one quarter FTE is used by DEP to design reporting forms, develop and maintain the database, analyze data and generate summary reports. One FTE does the data entry. CT DEP is exploring the potential for electronic reporting. Recycling data are available to the public through press releases, and reports to recycling regions, towns, and the legislature and, in the future, will be available on CT DEP's website.

Summary of Data Sources

Residential

The tonnage of material collected for recycling is calculated from data provided in mandatory annual municipal recycling reports, completed by every municipality in the state. CT DEP also gets reports from in-state recycling processing facilities (MRFs, processors, compost facilities, etc.) Those facility reports are used to calculate tons and types of material marketed and to calculate the amount of residue generated by recycling processing facilities. Bottle bill returns are NOT estimated or included.

Commercial

Commercial recycling data is derived primarily from annual municipal recycling reports. Municipalities request this information from commercial entities (haulers and commercial waste generators) within their borders for inclusion in these reports. The state believes that a discernible fraction of commercial recycling escapes this reporting system, and that reported commercial recycling therefore represents a conservative estimate of total recycling activity in the state's commercial sector. Metals recovered precombustion from (and reported by) waste-to-energy facilities are also reported as commercial recycling. Metals recycled from resource recovery ash are not included in the recycling rate. The state believes, however, that most commercially generated scrap metal is NOT captured in its reporting system.

Recycling Rate Calculations

While the legislation stipulates a 25 percent recycling goal for each town in the state, it does not define how to calculate the recycling rate. Currently only the MSW recycling rate is calculated, using the amount of MSW reported recycled as the numerator and the amount of MSW generated (recycled + disposed) as the denominator.

The MSW disposal rate is calculated based on actual amounts disposed at permitted Connecticut disposal facilities (municipal incinerators, landfills, resource recovery facilities) and the amount of CT MSW disposed in out-of-state disposal facilities, as reported by CT transfer stations. Disposal facilities and transfer stations must report quarterly (showing monthly tonnages) how

much municipal solid waste they received from each town using the facility. These actual disposal totals, in combination with the recycling tonnages reported, are used to calculate the percentage of municipal solid waste recycled by each town, region, and statewide.

DEP does not consider double counting to be a problem because at least some of the information that towns report, i.e., how much they collect, is checked against the data which recycling facilities report, i.e., from whom they receive their materials. To avoid double counting DEP does not ask end users to report their numbers; it is assumed that this material is reported by an intermediate processing center. For those municipalities marketing directly to mills, the numbers will be captured on the municipal report. A bigger problem than double counting is the problem of not capturing all the data on what is being recycled due to commercial waste generators marketing directly with recycling manufacturers or intermediate processors.

Delaware's Recycling Data Collection Program

Overview

Recycling in Delaware is voluntary and consists of 100 drop-off sites around the state. The program, "Recycle Delaware", is managed by the Delaware Solid Waste Authority (DSWA) a quasi-governmental agency created by the legislature to manage the state's solid waste. DSWA contracts with BFI for collection and marketing of the project's recyclables. DSWA owns and operates the state's only public MRF, the Delaware Reclamation Plant, which handles about 35 percent of the state's commingled wastes. The remaining municipal solid waste, and some commercial wastes, in the state are disposed of in DSWA's landfills.

Most information on Delaware's recycling program is collected by DSWA who began collecting this information when the Reclamation Plant began operating in 1983. The DSWA has tonnage data from all points in the "Recycle Delaware" system and is required to publish an annual report containing data on amounts recycled at its facility.

Private recyclers who handle source separated materials are not required to report their recycling numbers. However recyclers handling co-mingled municipal solid waste must be approved by the state and it is through the approval plans that the state can determine how much material private recyclers are handling. DSWA has been given legislative approval to write regulations requiring private recyclers in the state to report their quantity and waste composition numbers to DSWA annually. DSWA seeks this information in order to plan for changes in its operations.

DSWA has data on the following materials: Paper: ONP, OMG; Glass: clear, amber, green; Metals: steel can, aluminum; Plastics: mixed; Batteries: dry cells; Compost: organics other than food and yard wastes; Other: materials diverted for combustion purposes. (DSWA considers refuse-derived fuel as recycling although DNREC doesn't. DNREC does consider tire-derived fuel recycling.)

Summary of Data Sources

Residential

Most residential recyclables in Delaware are handled through a statewide dropoff recycling program managed by the Delaware Solid Waste Authority. Tonnages are derived directly from state-generated data. Residential composting numbers are derived from reports generated by commercial recyclers who pick up and manage leaf and yard waste from the state's largest municipalities.

Commercial

Commercial recycling entities are required to report the tonnages of recyclables they handle each year. Not all entities report this information, however, and to date the state has not attempted rigorously to enforce this reporting requirement. For this reason, the Delaware Solid Waste

Authority believes that reported commercial recycling represents a conservative estimate of total recycling activity in the state's commercial sector.

Recycling Rate Calculations

The state has no established method for calculating its recycling rate. The numerator of the recycling rate equation is difficult to quantify due to the inability of the state to get a comprehensive picture of what the private recyclers are handling. DSWA uses the tonnages disposed at its facilities to quantify the denominator. Commercial generation numbers are more difficult to obtain; DSWA estimates these numbers by subtracting the quantities of municipal solid waste from the total waste disposed of at DSWA's facilities.

Maine's Recycling Data Collection Program

Overview

Every year since 1993, Maine's communities have been required to report the details and tonnage of their solid waste management programs, including trash disposal, recycling and composting, to the State Waste Management & Recycling Program, now located within the Maine State Planning Office. The major categories of residentially generated recyclables reported by Maine communities are: total paper; total glass; total plastic; metal recovered from incinerators; tin cans and aluminum; other materials; food waste; other compost; and reuse. Also reported is the tonnage of bulky materials recycled, which are defined as materials that do not fit into a 30 gallon trash bag. The major categories of bulky recyclables reported to the State Planning Office include: metals (white goods, etc.); yard waste; tires; construction and demolition debris; wood; brown goods; and mixed bulky waste. The major categories of recyclables for those materials that were recycled by businesses and typically reported by the community are as follows: wood; corrugated cardboard; newspaper; plastic; metal; other; bulky.

Biannually, a Broker's Survey is conducted to estimate the tonnage of municipal solid waste generated in Maine that is recycled, reused and/or composted by private sector companies. This information is used in conjunction with data collected from Municipal Solid Waste Annual Reports, which is also used to calculate recycling rates for municipalities and regions.

Summary of Data Sources

Residential Data

While Maine municipalities are required to report MSW disposal and recycling data for their municipal and solid waste management association operations, there is currently no penalty for non-reporting. On the whole, municipalities have been very cooperative in providing data via the Municipal Solid Waste Annual Reports. In 1997, these mandatory annual municipal recycling reports were completed by 97% of municipalities in the state. The state does not adjust reported recycling tonnages to account for non-reporting municipalities; however, it does adjust generation tonnages to account for non-reporting municipalities.

Commercial Data

Unlike the municipal requirement for reporting solid waste management activities to the State Planning Office, the private sector's recycling efforts are surveyed every other year to determine materials and levels of recycling. To ensure the confidentiality of the data that companies would be reporting, the State Planning Office contracts with an outside consulting firm to conduct this recycling survey of brokers and end-users. However, some firms are reluctant to participate in the survey due to the proprietary nature of the information and the possible effect on their competitiveness.

From these total recyclables tonnages, which include municipally and commercially generated recyclables as reported by the various brokers and end users, the Planning Office subtracts that

recyclables' tonnage reported by municipalities in order to determine the level of recycling accomplished by the commercial and institutional sector. This adjusted recycled material tonnage is then used in determining the statewide recycling rate (see below). Maine is conducting its 1999 broker survey during the Spring of 2000 and has retained the services of a third party contractor to conduct its commercial survey.

Recycling Rate Calculations

The calculation of the solid waste generation and the recycling rate includes Municipal Solid Waste (MSW) only (i.e., special, hazardous and universal wastes are excluded from the calculation). MSW is the waste typically generated by households and businesses and is managed by municipalities. It includes nonbulky waste (corrugated cardboard, newsprint, office paper, mixed paper, food waste, plastics, glass, metals and textiles) and bulky waste (tires, appliances, furniture, wood waste, yard waste, and construction and demolition debris).

The amount of wastes recycled and annually reported by municipalities is combined with the data derived from the Broker's Survey and information gathered from other sources to form an estimate of the level of waste generation and recycling in Maine; these other sources include the annual reports of disposal facilities (landfills and incinerators) and disposal data from neighboring state and provincial governments. The estimated statewide solid waste generation combines the amount of waste disposed (incinerated, landfilled and exported), recycled, composted, and reused.

The recycling rate was derived by using recycling, composting, reuse and disposal data in conjunction with the following formula:

Recycling Rate = Recyclables tonnage divided by the total MSW tons disposed, recycled and reused multiplied by 100.

The process is not a precise measurement. Some data is incomplete, particularly for certain recycling activities in the private sector. Additionally, adjustments are made to try to eliminate duplicate counting when material moves from a broker to an in-state end-user. Although there may be errors in the estimates for some individual materials, SPO estimates that the overall result is accurate to within a 5% margin of error.

Massachusetts' Recycling Data Collection Program

Overview

Each year, the Department of Environmental Protection (DEP) surveys all 351 cities and towns in the Commonwealth to determine the quantity of waste recycled through municipal recycling programs. Recyclables counted are generated by single-family homes and some multi-family residences. The survey also collects data on centralized (off-site) composting of leaf and yard waste that is used to determine the amount of residential composting¹ taking place at municipal and commercial composting facilities. DEP adjusts centralized composting of leaf and yard waste to account for non-reporting towns that operate leaf and yard collection programs.

DEP does not adjust reported recycling tonnages to account for municipalities who did not report or whose data is incomplete. However, DEP does estimate waste generation for these municipalities. DEP uses a regression analysis based on the towns that do report and multiplies the resulting index of the amount of per capita waste generated (.40 tons per year) by the population of each town lacking generation data.

Each year, DEP also sends a composting survey to all municipal and commercial composting sites. This survey provides the total centralized composting tonnage. For sites that do not submit reports, DEP assigns tonnage based on average tons composted derived from reporting sites. To derive a base commercial composting² amount, the total amount of residential composting from the municipal recycling survey is subtracted from the total amount reported on the composting facility reports. 100,000 tons is added to the base commercial composting amount to account for farm composting which is not reported to DEP. This figure is an estimate from the Massachusetts Department of Food and Agriculture (DFA).

DEP collects data from recycling processors in two ways. DEP contacted roughly 20 of the state's largest processors by telephone that resulted in direct reporting of a significant portion of the recycled materials. DEP estimated a smaller portion of materials managed by non-responding processors by multiplying the number of employees at each facility (using information obtained from InfoUSA) by productivity indices (developed in a study done by Research International/Cambridge in 1998).

In addition, DEP performed a telephone survey of all known companies that processed construction and demolition (C&D) material for reuse. The companies were surveyed for information on the type and amount of material processed, and the results were used to estimate the C&D diversion rate. DEP attempted to contact all the processors that handle C&D waste. For quantities handled by known processors that did not respond, numbers from the last survey performed in 1995 were carried forward.

¹ Composting tonnage is considered residential if it originates from a residential source, regardless of where it is composted.

² Composting tonnage is considered commercial if it originates from a commercial source, regardless of where it is composted.

Bottle bill recycling results are credited toward the residential recycling rate. Container recovery (i.e., deposit redemption) rates were obtained from the Massachusetts Department of Revenue for 1998. DEP estimates the recycled tonnage using trade association data on both material composition (glass, aluminum, plastic, etc) of the beverage containers recovered and average unit weights for different container types. Composition percentages were adjusted based on information provided by deposit container collection companies to reflect the specific conditions in Massachusetts.

Recycling Rate Calculations

The following formulas and definitions are used to estimate the state-wide recycling rate.

Total Generation = Disposal + Diversion + Exports - Imports

Exports are estimated using data from Annual Facility Reports and a survey of other states

MSW Generation = MSW Disposed + MSW Diverted + MSW Exported - MSW Imported

Residential Generation = Residential Recycling + Residential Composting + Residential On-site Composting + Bottle Bill + MSW Disposed.

Commercial Generation = MSW Generation - Residential Generation

Non-MSW Generation = C&D + Other Generation

C&D Generation = C&D Disposed + C&D Diverted + C&D exported – C&D imported

Other (non-MSW) Generation = Other Disposed + Other diverted + Other exported – Other imported

Total Management = Diversion + Disposal

Imports are estimated using data from Annual Facility Reports and a survey of other states

Diversion = MSW Diversion + Non-MSW Diversion

MSW Diversion = Residential Recycling + Commercial Recycling + Residential Composting + Residential On-site Composting + Commercial Composting

Residential Recycling is estimated using municipal recycling survey data plus bottle bill data.

Commercial Recycling = MSW Recycling (estimated using commercial processors survey and bottle bill data) - Residential Recycling

Residential Composting is estimated using the municipal recycling survey data.

Residential On-Site Composting is estimated using the *Residential Organic Waste Management Study* and includes yard waste, food waste and paper waste.

Commercial Composting is estimated using composting facility report data – Residential Composting + DFA estimates.

Non-MSW Diversion = C&D diversion

C&D diversion is estimated using data from the C&D processors survey

Disposal = Landfill Disposal + Combustion Disposal

Landfill Disposal = MSW Disposal + C&D Disposal + Other Disposal

MSW Disposal is estimated using data from Annual Facility Reports

C&D Disposal is estimated using data from Annual Facility Reports

Other Disposal is estimated using data from Annual Facility Reports, and represents all non-MSW disposal other than C&D (e.g., contaminated media, recycling residues, industrial waste, street sweepings, etc.)

Combustion = MSW Combustion + non-MSW Combustion

MSW Combustion is estimated using data from Annual Facility Reports

Non-MSW Combustion is estimated using data from Annual Facility Reports

DEP made the following key improvements in data collection and analysis for 1998 data, and, where possible, applied these improvements to 1997 data:

- Updated commercial recycling processor survey by:
 - Reducing recycling processors list from approximately 120 firms to approximately 85 to avoid double counting. (Some of the companies listed collected materials and then transferred them to other processors);
 - Directly surveying larger processors;
 - Extrapolating recycling tonnage for smaller processors. DEP used updated recycling employment-to-productivity indices (developed by Research International/ Cambridge) and using updated employment information from InfoUSA to estimate tonnage.
- Updated recycled textiles tonnage by telephone survey
- Updated C&D processors surveys.
- Updated on-site composting information by conducting the *Residential Organic Waste Management Study*.
- Improved off-site composting estimates by assigning tonnage to non-reporting facilities based on responding facilities.
- Differentiated backyard composting from off-site estimates.
- Excluded from disposal tonnage total metals recovered from incinerators to avoid double counting. These materials will only be counted as recyclables.
- Removed an assumption used since 1995 that an additional 200,000 tons of waste is imported annually into Massachusetts but not accounted for. This 200,000 tons of additional import assumption artificially decreased generation rates calculated in the past.
- Removed an assumption used since 1995 that 200,000 tons of reported MSW disposed in landfills is actually C&D misclassified as MSW.

New Hampshire's Recycling Data Collection Program

Overview

NH has dual information systems pertaining to waste generation information.

The Governor's Recycling Program (GRP) was founded in 1989 to manage a \$1.5 million capital equipment program for municipalities with recycling programs. As part of its initial work, the Program compiled the recycling data collected by three separate groups (the New Hampshire Department of Environmental Services (DES), the Northeast Resource Recovery Association, and the University of New Hampshire) into one database. The goal for combining all the statewide information into one database was threefold: 1) to computerize the information in order to make it more easily accessible; 2) to provide a base for peer matching and technical assistance for municipal officials; and 3) to begin the collection of historical data of recycling in New Hampshire. The database provides details on every New Hampshire municipality that is recycling. At present, the database has 1998 municipal quantity data for 96 percent of the population. GRP publishes annually *An Overview of Recycling in New Hampshire* that includes several reports generated from the database. It also contains "Municipal Recycling Activity", a listing of towns and cities in New Hampshire that recycle, their population, who the contact person is, and what they recycle.

The Department of Environmental Services uses multiple sources of information to arrive at waste generation figures. Of primary importance is the Annual Facility Report, which is required of all solid waste facilities. The report details waste generation, the market and tonnages for recycling, composting, and imports and exports. Once the report is received by DES and verified for accuracy by staff, the information is entered into a database. At the end of the reporting period, the tonnages are averaged and extrapolated to those municipalities that either did not file a report, or under-reported their tonnages as a result of curbside activities. The final numbers are compared to the disposal amounts reported by in-state disposal facility figures. A per capita waste generation figure is then determined.

Summary of Data Sources

Residential

At the beginning of each year, municipalities are surveyed about their previous year's recycling activity. Reporting by municipalities is voluntary. Residential recycling data is collected for the following materials: newspaper; corrugated; mixed paper; commingled fibers; glass; aluminum cans; tins cans; commingled cans; PETE plastic; HDPE plastic; commingled plastics; commingled containers; textiles; scrap metal.

Commercial

Because NH businesses and industries are not required to report on their waste generation and disposal (non-permitted), commercial tonnages for waste disposal and recycling are determined indirectly. Once the in-state figures for disposal have been obtained, the difference between the

total disposal in-state tonnage and the residential tonnage are considered to be in-state commercial tonnage. The commercial recycling rate is determined using data from the annual facility reports, calls to facilities, generator contacts, and experiences from neighboring states, particularly with regards to their ratios of commercial to non-commercial recycling estimates. The totals for both disposal and recycling are double checked against modeling of commercial activity through the Office of State Planning employment data for select communities and an estimated per employee rate.

Recycling Rate Calculations

The DES is responsible for tracking progress made towards reaching the state's recycling goal. The calculations are done by using DES' generation numbers and the recycling numbers that the Governor's office obtains.

The numerator of the recycling rate equation includes all materials for which recycling data are available. The denominator includes the residential, commercial, and industrial waste streams excluding batteries, tires and used oil.

New York State's Recycling Data Collection Program

Overview

The New York State Department of Environmental Conservation (DEC) publishes the Recycling Bulletin annually. The Bulletin is intended to provide the most up-to-date information on recycling in New York State in a functional format. The Bulletin is generated through a database developed and maintained by DEC.

The DEC started collecting recycling data in 1989. DEC's principal reason for collecting data is to measure recycling progress. DEC conducts an annual survey of municipal solid waste recycling coordinators who voluntarily provide data on the types and quantities of recyclables within their planning units. Data obtained by the DEC from the planning units is for all material generated within the planning unit. However, in some instances, data on non-municipally managed materials are not available to the planning units and are consequently not reported or included in the recycling rate calculation. Data on the following materials are reported, although not all reporting entities report data from each subcategory: Paper: ONP, #6 mix, #8 mix, OMG, OCC, office, telephone directories, junk mail, mixed paper (animal bedding), kraft, gable top/drink boxes, paperboard/chipboard/boxboard, hard cover books, soft cover books and commingled; Glass: clear, amber, green, mixed, plate and other (ceramic glass and light bulbs); Metals: ferrous (may include bi-metal cans), aluminum, white goods, other (typically mixed ferrous/aluminum, white goods/mixed metals, or automobiles/mixed metals); Batteries: dry-cell, lead acid; Used oil; Compostables: yard wastes, food waste and other organics; Plastic: HDPE (#1) clear and color (reported as non-specific HDPE), PET (#2) soda and other (reported as non-specific PET), mixed, other plastics (#s 3-7)(reported as non-specific other plastic); Other: tires, sewage sludge, oil, used oil filters, construction and demolition debris (including contaminated soil), household hazardous waste, commingled (recyclables collected in a commingled manner, typically glass/plastic/metal), textiles, wood, paint, refrigerants and antifreeze.

Recycling data are also reported to the DEC in other ways. All facilities (public and private) where non-putrescible recyclables are separated from the solid waste stream or at which previously separated non-putrescible recyclables are processed are subject to registration with the Department. Such registered facilities must report annually to the DEC. These reports include information about materials diverted for recycling. To avoid double counting, DEC assumes that the material reported by recycling facilities is accounted for in data provided by municipalities. It is recognized that this practice is somewhat conservative and may preclude some material from being reflected in our recycling numbers.

A generator or potential user of a solid waste can be granted a case-specific Beneficial Use Determination (BUD) by the DEC to use a solid waste as a product or as an ingredient in a manufacturing process. The DEC annually requests BUD holders to report the quantity of solid waste beneficially used during the previous calendar year and through a voluntary survey form. This data is included in the Bulletin.

Summary of Data Sources

Residential

Recycling reports completed by 65 planning units (widely varying in size and jurisdictional composition). Reports are mandatory every other year, but are completed in all years by nearly every planning unit. Reported tonnages are expected to include commercial recycling, but the state does not attempt to distinguish between residential and commercial recycling through the planning unit reports.

Commercial

Commercial recycling is requested and expected to be included in annual planning unit reports, however, it is recognized that many planning units have difficulty in obtaining this data from private haulers. Commercial tonnages are not distinguished separately from the totals. For metals and paper, the state estimates additional commercial recycling through an analysis of trade association data (e.g., on material consumption by in-state mills for paper) and export data from New York's international ports of entry for metals.

Recycling Rate Calculation

The recycling data submitted by municipalities in response to the DEC's annual survey are a reflection of the materials recovered from the municipal solid waste stream through municipal recycling programs. These data, in conjunction with data from the Port Authority of New York and New Jersey, New York's Returnable Container Act survey of deposit initiators, and Beneficial Use Determinations, are used by DEC to determine the numerator when calculating the state's recycling rate. Several assumptions are made, however, in calculating this rate. These assumptions include:

- all materials shipped from the Ports of Ogdensburg and Buffalo originated from within New York State;
- 70 percent of materials shipped from the Port Authority of New York and New Jersey originated in New York State, and;
- all materials that were recovered for recycling in the state were utilized as secondary materials in the state to the extent that the capacity for such use exists; any excess materials were considered to be exported via the Port Authority. These recyclable materials in excess of the state's utilization capacity of New York manufacturers were deducted from the Port Authority numbers to avoid double counting.

For DEC, the denominator of the recycling rate includes the following waste streams: residential, commercial, institutional, industrial/manufacturing, construction/demolition, and sludges. The denominator is quantified using numbers from Local Solid Waste Management Plans (LSWMP) and Comprehensive Recycling Analyses (CRA) which municipalities must submit as part of their

solid waste management plans. LSWMPs and CRAs contain information on all sources of waste and all recyclable components in all the waste streams. These LSWMPs and CRAs may be approved based on generic waste stream composition statistics, such as those published by Franklin Associates.

New Jersey's Recycling Data Collection Program

Overview

New Jersey has been collecting data on recycling in the state since 1982. New Jersey mandates that municipalities report their recycling data and historically, these data have been reported through tonnage grant applications to the Department of Environmental Protection (DEP). Each year, 567 municipalities and 21 counties submit tonnage grant applications. The data are used not only to calculate the annual disbursement of grants, but also to measure progress towards reaching the state's mandated recycling goal.

Data are reported annually by townships, boroughs and cities. Private haulers who contract with municipalities or direct haul to out-of-state markets also report, as do public and private MRFs, private recyclers, landfill and incinerator operators, and material and product manufacturers. Transfer stations and disposal facilities report monthly and quarterly

Data on recycling are measured and reported at all levels of the recycling system, from collection to marketing. However, because this system can cause double and triple counting, DEP data collection methodology uses data from only those entities which handle the recyclables last to determine per capita recycling and to allocate grant funds. The reporting system is also used to attempt to calculate any residuals, or what would otherwise be disposed of that is collected for recycling.

Data are collected for the following materials, although not all reporting entities report data from each subcategory: Yard waste; food waste; newspaper, corrugated, office paper, other paper, plastic containers, other plastic packages, other plastic scrap, glass containers, other glass, aluminum cans, foils and closures, other aluminum scrap, vehicular batteries, other non-ferrous scrap, tin & bi-metal cans, white goods and sheet iron, junked autos, heavy iron, wood waste, asphalt, concrete and masonry, tires, other municipal and vegetative, other bulky and construction and demolition debris.

Summary of Data Sources

Residential

Mandatory annual municipal recycling reports are completed by every municipality in the state.

Commercial

Haulers and commercial generators are required to report information to municipalities for inclusion in their reports to DEP. Nonetheless, the state believes that a discernible fraction of commercial recycling escapes this reporting system, and that reported commercial recycling therefore represents a conservative estimate of total recycling activity in the state's commercial sector.

Recycling Rate Calculations

All the materials for which recycling data are collected are used in calculating the state's recycling rate. The denominator of the recycling rate calculation includes residential, commercial, institutional, industrial/manufacturing, and construction/demolition waste. Total waste generation numbers are reported to the state from landfills, incinerators, and transfer stations.

DEP calculates annually both an MSW recycling rate and a total solid waste recycling rate, as called for in the Statewide Mandatory Source Separation and Recycling Act. The Act establishes mandated goals for both. The MSW recycling rate calculation includes those items (both recyclable and solid waste) that closely mirror the model EPA MSW recycling rate calculation methodology.

Pennsylvania's Recycling Data Collection Program

Overview

Pennsylvania mandates source separation of materials for curbside collection in all municipalities with populations over 5,000 and with a density of greater than 300 people per square mile (PA Act 101). Recycling is mandatory for commercial, municipal, and institutional establishments within the mandated municipalities.

Materials mandated for recycling include: ONP, OCC, high-grade office paper, clear and colored glass, aluminum beverage cans, steel and bi-metallic cans, and plastics. Municipalities must select a minimum of three materials for their programs, but 85 percent have chosen to include four or more.

The recycling law requires towns, cities, boroughs, and townships implementing recycling programs to annually report their recycling data to counties who then report to DER; some municipalities report actual numbers, others report estimates. DER compares national per capita generation and recovery figures to state data to check the accuracy of the reported numbers.

County reports include data from various sources. Some counties have reported commercial and institutional tonnages, however, because non-municipally managed recycling data (commercial and institutional) are hard to obtain, DER's data are primarily on municipally-managed materials. Some municipalities also obtain recycling data from landfill and incinerator operators. Recycling data are also obtained voluntarily from MRFs that handle source separated materials (source separated materials are not considered a waste in Pennsylvania and, therefore, facilities handling them are not required to be permitted or to report to the state).

Data are reported on the following materials, although not all reporting entities provide information on each subcategory: Paper: ONP, OCC, and high-grade office paper. Data on OMG (very limited), CPO, mixed office paper, and mixed residential (reported as one unit) are occasionally reported; Glass: clear, amber, green, mixed; Metals: steel and bi-metal cans (reported as one unit), aluminum, white goods; Plastics: HDPE, PET, mixed (plastic resins not reported by type); Batteries: dry-cells (very limited), automobile; Compost: yard waste and leaf waste; Other: textiles, used oil.

Data are reported as tonnages or volumes of recyclables collected.

Recycling data are also collected through Performance Grants. Performance Grants are awarded to municipalities based on documented tonnages of recyclables marketed.

The principal reason for collecting data on recycling in Pennsylvania is to track progress made towards reaching the state's recycling goal. DER also believes data collection is important for market development purposes. PA Act 101 required DER to conduct a Market Development Study and update that report on the capacity of the existing markets to absorb supply and to identify barriers and opportunities to increase demand.

Summary of Data Sources

Residential

DER requires mandatory annual municipal recycling reports to be completed by every municipality in the state. Municipal reports are reviewed and supplemented with additional information from county recycling coordinators.

Commercial

Commercial recycling data is derived primarily from annual municipal recycling reports. Municipalities request this information from commercial entities (haulers and commercial waste generators) within their borders for inclusion in these reports. Although municipally reported data is supplemented by information gathered by county recycling coordinators, the state nonetheless believes that a discernible fraction of commercial recycling escapes this reporting system, and that reported commercial recycling therefore represents a conservative estimate of total recycling activity in the state's commercial sector.

Recycling Rate Calculations

All recyclable materials for which data are collected are included in the numerator of the recycling equation despite the fact that only eight materials are mandated for collection.

The denominator of the recycling rate equation (waste generated plus recycled) includes the residential, commercial, and institutional wastestreams. Generation numbers for the denominator come from county reports. Several counties rely on landfill and incinerator reports for their generation numbers and, therefore, only report tonnages disposed, as opposed to generated. Because the denominator is defined as waste generated in Pennsylvania, imported waste is subtracted.

Rhode Island's Recycling Data Collection Programs

Overview

Two separate entities share the responsibility for solid waste management and recycling in Rhode Island. The Department of Environmental Management Office of Waste Management (OWM) has regulatory oversight of solid waste facilities and handlers; while the Rhode Island Resource Recovery Corporation (RIRRC) owns and operates the State's Central Landfill and Materials Recovery Facility for sorting and processing mixed residential recyclables.

Because of its size and centralized, publicly-owned disposal and recycling facilities, Rhode Island has maintained accurate data regarding residential waste generation and recycling throughout the past decade. The absence of a comprehensive commercial sector recycling data program has made development of a reliable statewide combined residential and commercial recycling rate difficult. Therefore, to this date, the State has only published an accurate and reliable residential recycling rate.

In a move to improve commercial recycling data collection, the OWM instituted in the Spring of 2000 an annual reporting program for all licensed solid waste facilities in the state. This information will provide the basis for estimating an annual statewide recycling rate by quantifying, by type and disposition, all materials handled at licensed solid waste facilities. However, even with this new reporting program, important data on recyclables diverted by commercial entities and handled directly by brokers and scrap processors will not be available. Therefore, additional attempts will be made to further quantify those materials not handled at solid waste facilities.

As noted above, the new solid waste facility reporting program should account for the majority of waste generated and those recyclables diverted by the waste handling industry. The reports will be submitted by all licensed solid waste facilities in Rhode Island. These facilities include landfills, transfer stations, and those composting operations not regulated as farms. The reports solicit quantities (tons where possible) of materials delivered and shipped by various categories. In addition, the reports breakdown shipments and receipts as either in-state or out-of-state.

While the reliability of these reports is entirely determined by those entities responsible for their submittal, much of the State's MSW is eventually handled at RIRRC facilities or one of three small municipal landfills. This makes it possible to verify the reports submitted by transfer facilities and accurately account for the overwhelming preponderance of the State's MSW disposal. However, due to the nature of waste tipped at the RIRRC's Central Landfill, the estimated MSW generation and disposal may be overstated for two reasons.

First, while RIRRC is prohibited from accepting out-of-state waste, it has been demonstrated that waste from neighboring states has been illegally tipped at the Central Landfill in the past. While recent actions have curbed this activity, it is entirely possible that a small amount of out-of-state waste is still being received. Conversely, it is unlikely that Rhode Island is exporting a significant amount of waste due to its below regional average disposal rates. Therefore, if there is

a net flow of waste across Rhode Island's borders, we can assume the State to be a net importer. And, if these imports do in fact exist, they cannot be adjusted from the total disposed.

The other factor overstating MSW disposal in Rhode Island is the inclusion of wastes not defined as MSW but disposed along with MSW at Rhode Island Disposal Facilities. For instance, while the processing and recycling of construction and demolition wastes is common here in Rhode Island a significant portion of C&D mixed with MSW is landfilled and counted as commercial sector waste. Likewise, a significant amount of industrial process waste is disposed in the same manner. Because C&D and industrial process waste is not included in the EPA's definition of MSW, Rhode Island's total MSW generation and disposal will be overstated; and therefore, any estimate of a statewide recycling rate derived from these figures will be conservative.

Summary of Data Sources

The following summarizes Rhode Island's recycling data collection programs by sector:

Residential:

Most residential solid waste and recyclables are handled by RIRRC and easily identified. Therefore, accurate data for most of the residential sector is easily obtained. For residential sector material not handled by RIRRC, information will be compiled from the annual solid waste facility reports obtained from municipalities.

Commercial:

Commercial solid waste generation and recycling will be estimated by subtracting residential waste and recyclables from the total amounts reported in the annual solid waste facility reports. In addition to the information compiled in these reports, where possible, attempts will be made to account for those recycling activities not performed by licensed solid waste facilities. These efforts will include surveying recycling brokers as well as borrowing information and techniques from neighboring states.

Recycling Rate Calculations

OWM and RIRRC are currently working cooperatively to develop a standard methodology, consistent with EPA guidelines, to estimate an annual statewide recycling rate. It is hoped that the first of these estimates is available by the Fall of 2000.

Vermont's Recycling Data Collection Program

Overview

Certified solid waste facilities are required to report to the Vermont Department of Environmental Conservation (DEC) on the types and amounts of wastes received for disposal, recycling or composting. Recycling facilities that are required to report include material processing facilities and drop off centers. Annual reporting is required for recycling facilities which accept 50 to 400 tons per year and quarterly reporting is required for recycling facilities which accept more than 400 tons per year. Recycling facilities accepting less than 50 tons per year are not required to report since they are exempt from permitting.

Materials for which data is reported include the following, although not all facilities report data from each subcategory: Containers: co-mingled (drop offs only), glass, metal cans, PET, HDPE, other: Fibers: co-mingled (drop offs only), books, boxboard/paperboard, corrugated cardboard, magazines, mixed paper, and newspaper; Other materials: C&D, lead acid batteries, scrap metal/other metal, textiles, used motor oil, white goods/appliances, wood, and other.

Some of Vermont's recyclables are transported out of state without entering a Vermont recycling facility that is required to report. This includes some recyclables from the residential sector collected by waste haulers as well as recyclables from the commercial sector that are directly marketed. Some municipalities or Districts in Vermont may require haulers to report recycling data.

In 1994, the DEC hired DSM Environmental Services to conduct a survey of the amount of materials recycling and composting that occurred in Vermont in 1993 and 1994. The primary goal of the project was to survey handlers and processors of recyclables and organic material and attempt to obtain accurate information on the quantity of materials recycled, reused and composted.

The project included a survey of recycling processors, metal processors and centralized organics composting programs as well as a review of material quantities recycled through the bottle bill, material reused through salvage operations, estimates of backyard composting, construction and demolition recycling and reuse activity during the reporting period. In addition, DSM conducted a survey of "economic recycling" defined as materials recycling activity occurring directly between a generator and a broker or end user based on the economic value of the material and outside of Vermont recycling processors.

The survey conducted by DSM was intended to supplement information that Vermont recycling processors are required to report to DEC on quantities recycled as part of their facility certification. From the DEC's perspective, an important part of using an outside consultant was the ability to offer confidentiality to processors who are highly competitive in acquiring and

marketing recyclables. Similar work in other states had indicated to DEC that more precise survey data could be obtained if the respondent could be assured of confidentiality.

Diversion Rate Calculations

Vermont currently uses data from the reporting system for calculating its diversion rate on a state wide level. For data that the current reporting system does not cover, data from the 1994 report are used. ANR uses the following formula to calculate the diversion rate:

$$\text{Diversion rate} = (\text{Reduced} + \text{Reused} + \text{Recycled}) / \text{Total Potential Waste}$$

The expression of “total potential waste” is used since the total figure includes the amount of source reduction and reuse in addition to the amount recycled and disposed. Disposed includes waste disposed and incinerated as well as illegal disposal.

$$\text{Total Potential Waste} = \text{Reduced} + \text{Reused} + \text{Recycled} + \text{Disposed}$$