Methodology Overview

National Recycling Database

September 2024

The Recycling Partnership

1. Introduction

The Recycling Partnership (The Partnership) has developed a comprehensive national database of local recycling programs across the United States. The National Recycling Database (Database) indicates what materials are accepted for recycling by more than 9,000 programs, covering all communities that have over 2,500 households.

The Database serves two purposes. First, it characterizes the acceptability of packaging types and individual items in community programs. Second, the Database helps inform the recycling industry (e.g., policymakers, waste management experts, material producers, nonprofits, retailers, and brands) about the acceptance rates of specific package types and materials across communities.

This document describes the Database's data sources, architecture, and management processes. The data is accessible through several digital tools designed to serve the needs of multiple audiences. To learn more, visit recyclingpartnership.org/data/.

2. Data Management

Three core data elements comprise the Database: 1) communities, 2) recycling programs, and 3) accepted materials. Figure 1 describes the relationships between the core data elements and critical database tables.

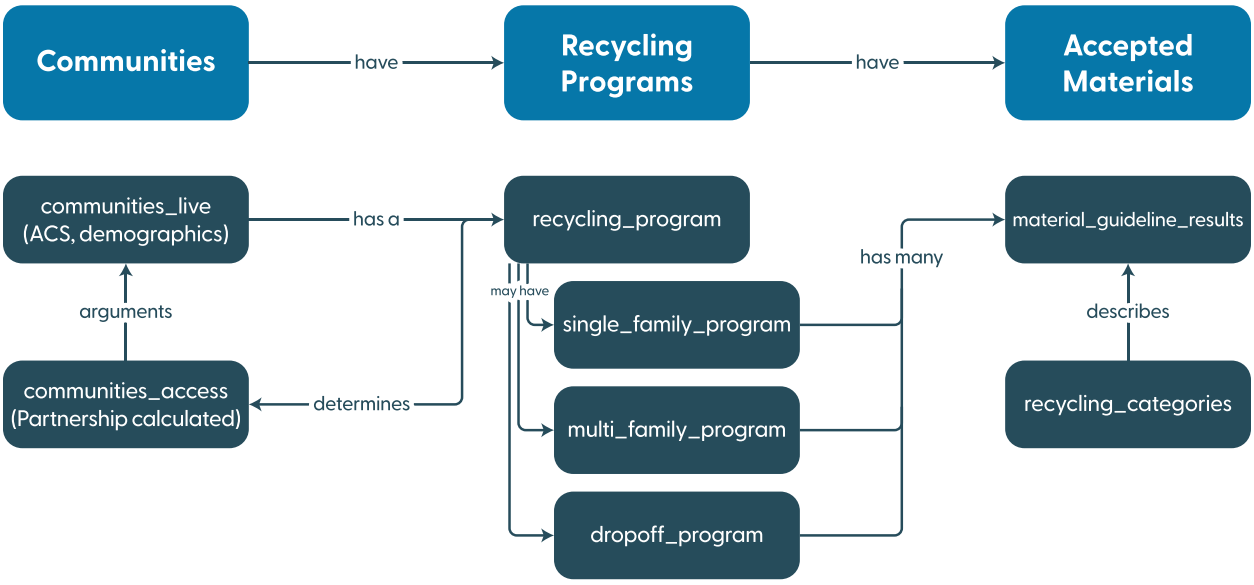

Figure 1. National Recycling Database core data elements and critical tables

At a high level, the sources and version management for each of these data elements is shown in Table 1. Details for each are provided in the sections below.

Data Concepts	Sources	Reviews and Updates
Communities	U.S. Census Bureau	Lists are updated every two years within six months of publication of the U.S. Census Bureau's American Community Survey.
Recycling Programs	Community managers, Community websites	Communities with over 2,500 households are reviewed at least annually through a combination of automated and manual processes. Communities with less than 2,500 households are reviewed at a minimum every two years.
Acceptance Taxonomy	Derived from program information and aligned taxonomies	Taxonomies are reviewed at a minimum annually and as needed for new initiatives.

Table 1. Data Sources and Review/Update Targets

2.1 Communities

The list of communities is composed of three distinct categories:

- **Counties:** Most states have administrative boundaries called counties that cover the entire state. Some states label these boundaries as parishes, boroughs, and planning regions (in Louisiana, Alaska, and Connecticut, respectively). Independent cities also fall into this category because they do not have an overarching county that is separate.
- **Census places:** Census places include both administrative government entities and Census Designated Places (CDPs). CDPs rarely contract for recycling services, but more often identify populated areas within a county that residents may know by name. Census places that have local governments include cities and towns. Census places may cross county boundaries, but the census does provide household totals for each census place in each county.
- **County subdivisions:** Thirteen states utilize county subdivisions as a local form of government. These are often called towns or townships. The states are Connecticut, Maine, Massachusetts, Michigan, Minnesota, New Hampshire, New Jersey, New York, Ohio, Pennsylvania, Rhode Island, Vermont, and Wisconsin.

For each community, the Database includes geographic boundaries, population, number of households (categorized by number of units in each building), and demographic data.

The list of communities and all associated data is updated every two years based on the latest American Community Survey (ACS) five-year estimates from the Census Bureau. It is also refreshed every 10 years with the full census update, with the next one scheduled for 2030. The Database is updated within six months of the publication by the Census Bureau.

Version Management

The current version of the communities data is the ACS 2022 five-year estimates, published Dec 7, 2023.

2.2 Recycling Programs

We researched recycling programs in more than 9,000 communities, including all counties nationwide. Where data is publicly available on the web, the recycling program is categorized with the following characteristics:

- **Program type:** Curbside, Drop-off, Multifamily (any or all)
- **Collection format:** Single stream, Single stream with separate glass collection, Dual containers with fiber separate, Source separated, Mixed waste, and Other

For curbside programs:

- **Frequency of collection:** Weekly, every other week, other
- **Container type:** Carts, bins, bags, dumpsters, other
- **Who provides the collection:** Public crews, publicly selected or franchised haulers, open market
- **How residents receive collection:** Automatically, opt-in (subscription) with no additional fee, opt-in (subscription) with additional fee, other
- **URL(s)** for material guidelines published on the community website (acceptable materials)

The Database currently stores one list of accepted materials for each program type (single family, multifamily, and drop-off). Development is currently underway to expand the capability to allow for multiple material acceptance lists for individual drop-off locations and other program types.

When a community itself does not have a recycling program, we assign it to the county in which it is located.

A community's primary program is identified for each community based on a hierarchy of programs. If the community has a curbside program, whether automatically provided or subscription, the curbside program is assigned as the primary program. If a curbside program is not available, a drop-off program will be considered the primary program.

Recycling Program Updates

Multiple data sources are consulted, which follow a data source hierarchy for review and publishing updates. The Database is updated using five primary data sources:

1. Direct input from community managers verifying existing information and providing updates through the Recyclability Solutions Hub, which is then reviewed by The Partnership staff before being published;
2. Direct input from community managers into the Municipal Measurement Program, which is then reviewed by The Partnership staff before being published;
3. Automated research including website screenshots, text scraping, and processing;
4. Input from state organizations that survey communities and collect program information (usually annually);
5. Manual research to verify that material acceptance, website links, PDFs, and program information are current.

Guidelines for reviewing and approving or rejecting updates to recycling program information are provided to internal users. Only authorized users from The Partnership's System Optimization or Data Operations teams can approve or publish updates.

Research processes are monitored through two key performance indicators (KPIs): (1) overall percentage of households covered (with target of 100%) and (2) overall number of primary programs and communities covered.

Reviews of community-level primary recycling program information are triggered at a minimum by recency (see Data Inspection) as well as automated monitoring processes.

Recency is monitored through two KPIs: (1) average age of community data and (2) percentage of data meeting our age targets (see Table 1).

Source Hierarchy

Multiple data sources are consulted and integrated into the Database. With every submission, the original source, user and timestamp is stored in a staging area. Sources are ranked hierarchically, with community program managers ranking highest, followed by state representatives and Partnership researchers. The most recent information from the highest-ranking source is stored in the Database. When it is available, we provide a link to the community website as a reference point.

When new data sources that affect the hierarchy are identified, we inspect the accuracy and recency of the data source and update the source hierarchy as required.

Version & Change Management

All updates to recycling program information are made through entries to the staging tables. These entries are tagged with the source, user, and timestamp.

Data Inspection

Data quality is proactively monitored using (1) integrity checks, (2) data recency checks, (3) random sampling inspection for accuracy, and (4) third-party audits.

1. **Integrity checks:** Each month, records that display unexpected features, such as missing common material types or inconsistency with a neighboring zip code are flagged for review.
2. **Data recency:** Each month, records with a version age older than 365 days for communities greater than 2,500 households or more than 730 days for communities less than 2,500 households are flagged for review.
3. **Random sampling for accuracy:** Each month, The Partnership's Data & Analytics team reviews a report of 10 randomly selected programs for spot checking.
4. **Third-party audits:** A third-party review of the data management processes contained in this document and a data accuracy check is to be conducted at a minimum every 36 months.

The inspection checks (1–3 above) are completed monthly. The first annual third-party audit will be started in 2024.

2.3 Acceptance Taxonomy

The terminology used to describe packaging varies across resident educational materials and industry. To track acceptance rates for materials reliably and comprehensively, it is necessary to standardize the use and application of packaging terms across all communities and programs.

The Acceptance Taxonomy is composed of two main categories, each of which was developed leveraging comprehensive and distinct sources.

- **Material Guideline Categories:** Broad categories of materials commonly acknowledged in community acceptance lists, such as plastic bottles and metal cans.
- **Recycling Categories:** The Recycling Categories, a core data element of the Database, are Subcategories of Material Guideline Categories commonly acknowledged in community acceptance lists that include both packaging and products. The Database stores Recycling Categories that are either accepted in local recycling programs (curbside and drop-off) or are considered contaminants. For example, Recycling Categories such as corrugated cardboard and aluminum cans are stored with a yes (accepted) or no (contaminant) for each community and program.

As packaging and Recycling Categories evolve and further information becomes available, these categories will be updated.

Overall, we are not evaluating the recyclability of packaging types or individual items but are characterizing their acceptability in community programs.

Version Management

Current version: National Recycling Database Community Recycling Program Acceptance Taxonomy 2.0.
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Available: This document is available publicly.