

# A Primer on Recycling Facilities

## Introduction

Understanding recycling, processing and manufacturing facilities can help cities and counties get the full benefit of the economic development and greenhouse gas reductions they produce. California cities and counties determine what areas in their communities are zoned for residential, industrial and commercial uses and what conditions are imposed on individual projects. Every project is different and will involve different potential impacts, but when local officials, residents and staff have a basic understanding of recycling facilities they are better prepared to consider the individual potential of each project in their community.

## Understanding the Collection and Processing System

### Step 1: Collecting Materials

Nearly all recyclables and organic waste generated by single family homes are collected through curbside recycling programs. These are usually operated by local agencies or trash/recycling collection companies exclusively authorized by the city and/or county to collect solid waste and recyclables within the jurisdiction. Some cities and counties also operate drop-off and buy-back locations for recyclables. Recyclables generated by businesses are typically collected by trash/recycling collection companies who operate through a contract, permit, or by an exclusive or non-exclusive franchise issued by the city or county.

In addition to curbside recycling, recyclables may also be donated or sold. For example, many businesses separate cardboard or scrap metal and then sell it to private, independent recyclers. Commercial programs that collect organic materials serve communities with access to food waste composting facilities, or newer anaerobic digestion facilities. Landscaping businesses frequently haul organic/green material from commercial or residential sources directly to compost facilities.

### Challenge for the Future:

“California will need to maximize recycling, composting and anaerobic digestion (instead of landfilling) and expand current waste management infrastructure to accommodate the increase in recycling and remanufacturing of waste material that is expected. This would mean constructing more composting and anaerobic digestion facilities that can use organics from the waste stream, as well as building more remanufacturing facilities for recyclable commodities such as fibers and resins.” (AB32 Scoping Plan Update, page 76)

## Step 2: Processing the Materials

After recyclable materials are collected, they go to a recovery or processing facility where the materials are separated into marketable commodities, baled and shipped to manufacturers of consumer goods. The type of processing facility needed depends on the recyclable material collected and whether the materials are mixed with trash, mixed with other recyclables or pre-sorted by material type.

For example, some residential curbside recycling programs combine all recyclables into one bin and green waste into another bin. In some communities recyclables and trash are combined in one bin and then the recyclables are later pulled out at a material recovery processing facility. Businesses may also pre-sort some of their recyclable materials for sale with little or no additional processing. (See the “Understanding the Different Types of Recycling and Processing Facilities” section of this document for more about different types of recovery and processing facilities.)

## Step 3: Additional Processing and/or Manufacturing

Once the materials are sorted or processed, they may go to facilities for further processing, be turned into a new material and/or be used in manufacturing products with recycled fiber, resin, metal or glass content. Organic materials (such as grass, tree trimmings, food waste or agricultural wastes) can be chipped, ground, composted or digested. If they are “digested,” they are turned into fuels through a process called anaerobic digestion. This is a process where the green waste is broken down through biological process in an oxygen-free environment, producing methane gas. Called biogas, it is used to produce fuel (compressed natural gas) for vehicles or to generate electricity. Some materials, such as plastic, may be turned into pellets or sheets used to manufacture products with recycled content, such as picnic tables made of “plastic wood.” Other materials, such as paper or cardboard, can be used in manufacturing paper, cardboard boxes or paperboard for wine or beer containers.

## Understanding the Different Types of Recycling and Processing Facilities<sup>1</sup>

---

After collection, recycled materials next go to one or more types of processing facilities, depending upon the material type and collection system. These include the following:

### Material Recovery Facilities (also known as MRFs)

- **What goes in?** A material recovery facility receives recyclable materials and sorts them by type or grade to meet commonly accepted quality standards needed for further processing or

---

<sup>1</sup> For more information about different types of processing facilities, see “Recycling, Reuse and Remanufacturing”, September 17, 2013 – CalRecycle Report for AB 32 Scoping Plan – <http://www.calrecycle.ca.gov/Actions/Documents/77/20132013/935/Recycling%20Reuse%20and%20Remanufacturing%20FINAL.pdf> and “Composting and Anaerobic Digestion” <http://www.calrecycle.ca.gov/Actions/Documents/77/20132013/935/Composting%20and%20Anaerobic%20Digestion%20FINAL.pdf>

manufacturing. This type of facility is sometimes referred to as a “clean MRF.” A “dirty MRF” is a mixed waste facility that accepts recyclables combined with solid waste (or trash).

- **What comes out?** After they have been sorted, different material types come out of a material recovery facility. These include, for example, baled paper or cardboard, rigid plastic containers sorted by plastic type, glass, concrete, wood, green waste and aluminum or steel cans. Some facilities also receive and handle construction and demolition waste, such as concrete, lumber, drywall, packaging, asphalt singles and metal.
- **Where is it done?** Material recovery facilities can be stand-alone facilities or co-located at, or adjacent to a landfill or a transfer station. (A transfer station receives, temporarily stores and ships unprocessed waste/recyclables.)<sup>2</sup>

## Organics/Green Waste Facilities

- **What goes in?** Organic waste, also known as green waste, includes lawn and tree clippings, painted and untreated wood waste, forest waste and other organic waste, including consumer food scraps.
- **What comes out?** Green waste can be processed to produce compost, fertilizer, soil amendments, transportation fuels, energy, mulch or boiler fuel.

Some organic waste can also be used to produce biofuels through a technology known as anaerobic digestion. Anaerobic digestion produces biogas, which is then used to produce fuel (compressed natural gas) for vehicles or to generate electricity. In addition to biogas, anaerobic digestion facilities produce solid and liquid residuals known as digestate. Digestate may be used as fertilizer or as a material to produce compost.

Organic materials also can also be processed through pyrolysis<sup>3</sup>, a process that heats organic waste in an oxygen free environment to produce fuels. However, no commercial-scale pyrolysis facilities are currently operating in California.

- **Where is it done?** Facilities to treat organics or green waste may be located as stand-alone facilities, co-located at or adjacent to a landfill or material recovery facility (MRF), or co-located at a transfer station or a solid waste or recycling collection facility or at a waste water treatment plant. Some anaerobic digestion facilities produce biogas to fuel the trash and recyclables collection vehicles.

Green waste can also be processed at chipping or grinding facilities and then used as mulch, as input material at compost facilities or as fuel for biomass plants that generate energy.

## Recycled Content Manufacturing (Remanufacturing) Facilities

- **What goes in?** Recycled content manufacturing facilities (sometimes called remanufacturing or intermediate processing facilities) accept sorted recyclable materials.

---

<sup>2</sup> See CalRecycle Glossary of Terms/Definitions at [www.calrecycle.ca.gov/FacIT/Glossary.htm#transferstation](http://www.calrecycle.ca.gov/FacIT/Glossary.htm#transferstation) .

<sup>3</sup> “Pyrolysis is the thermal degradation of a material usually without the addition of any air or oxygen. The process is similar to gasification but generally optimized for the production of fuel liquids or pyrolysis oils (sometimes called bio-oils if biomass feedstock is used). Pyrolysis also produces gases and a solid char product.”

[www.calrecycle.ca.gov/organics/conversion/Pathways/ThermoChem.htm](http://www.calrecycle.ca.gov/organics/conversion/Pathways/ThermoChem.htm)

- **What comes out?** These facilities turn recyclable materials into either consumer products or products used in further manufacturing. For example, a plastics remanufacturing facility turns rigid plastic containers into pellets for use at another facility to make products with recycled plastic content. Manufacturing facilities that produce consumer products with recycled content could include, for example, facilities that manufacture cardboard boxes made from recycled paper or factories that produce picnic tables made of recycled plastic pellets.
- **Where is it done?** Recycled content manufacturing/intermediate processing facilities can be located as stand-alone facilities, co-located at or adjacent to a landfill or material recovery facility (MRF), or co-located at a transfer station or a solid waste or recycling collection facility. Recycled content manufacturing facilities that produce consumer products with recycled content are generally located with other manufacturing facilities in industrial or heavy commercial zones.

## Recycling and Processing Facilities are Different from Landfills

---

Recycling and processing facilities are different from landfills, which are referred to as solid waste *disposal* facilities. Some recycling facilities are located adjacent to or at a landfill others are located separately. Recycling facilities must meet a variety of regulatory requirements, depending upon their size and type of material accepted. Most are located in industrial zones.

All recycling facilities must obtain land use permits from the city or county in which they are located and comply with the California Environmental Quality Act (CEQA).<sup>4</sup>

Additional permits usually required include the following:

- An air quality permit from the regional air quality or air pollution control district.
- A water quality permit from the regional water quality control board.
- A solid waste facility permit from the Local Enforcement Agency (usually the city or county), depending upon the size and type of facility and the material accepted.<sup>5</sup>
- A permit from the California Department of Food and Agriculture for some facilities that process food waste.

## Recycling and Economic Development

---

Recycling is big business. Over 5,300 recycling and reuse establishments do business in California. Compare it to other large industries in California and you will find that it is as large as the movie and video industries. Recycling employs over 85,000 tax paying Californians and generates almost \$4 billion in taxable income, almost \$5 billion in taxable sales and more than \$10 billion in new products and services.

<sup>4</sup> <http://resources.ca.gov/ceqa/>

<sup>5</sup> The Local Enforcement Agency regulates solid waste facilities at the local level on behalf of the state agency (CalRecycle) that oversees solid waste facility permitting. Information about types of permits required by the Local Enforcement Agency and CalRecycle may be found at: [www.calrecycle.ca.gov/swfacilities/permitting/Facts.htm](http://www.calrecycle.ca.gov/swfacilities/permitting/Facts.htm).

Achieving the state's goal to recycle 75 percent of California's waste annually by 2020 is estimated to generate about 59,000 jobs total in the collection and processing sectors and about 50,000 jobs total in the manufacturing sector.

## Recycling and Reducing Greenhouse Gas Emissions

Since recycling uses less energy than extracting and processing raw materials, making new products from materials that have already been used (and thus recycled) can save energy and reduce greenhouse gas emissions. Similarly, when products are made using recycled materials, they embody less energy than the same products made with virgin materials. Keeping recyclable organic materials out of landfills reduces potential emissions of methane, a powerful and short-lived greenhouse gas, from landfills.

### More Resources

[AB 32 Updated Scoping Plan, Air Resources Board. May 2014.](#)

[Waste Management Working Papers for Updated AB 32 Scoping Plan. September 2013. Prepared by CalRecycle.](#)

- [Overview of Waste Management Sector](#)
- [Recycling, Reuse, and Remanufacturing](#)
- [Composting and Anaerobic Digestion](#)
- [Biomass Conversion](#)
- [Landfilling of Waste](#)
- [Municipal Solid Waste Thermal Technologies](#)

[AB 341's 75 Percent Goal and Potential New Recycling Jobs in California by 2020. CalRecycle. July 2013.](#)

[From Waste to Jobs: What Achieving 75 Percent Recycling Means for California. Natural Resources Defense Council. March 2014.](#)

CalRecycle Business Assistance Website: [www.calrecycle.ca.gov/Business/default.htm](http://www.calrecycle.ca.gov/Business/default.htm)

The information provided in this whitepaper, and other resources prepared by the Institute for Local Government related to recycling infrastructure, is intended to provide practical and impartial information to help local officials and others make informed decisions for their communities and projects.

Prepared as part of CalRecycle contract number DRR12063, Total Contract Amount \$200,000, pursuant to Government Code Section 7550.

© Institute for Local Government, 2014. All rights reserved.