MANDATE THE RECOVERY OF ORGANIC MATERIAL

As much as 5% of global GHG emissions emanate from the solid waste sector, most of it from rotting organics. But waste emissions are even more problematic than that, because methane, although a short-lived climate pollutant, is much more potent than CO_2 in trapping heat in the atmosphere.

Capturing organic material, instead of disposing it in landfills, reduces the emission of GHGs, and especially methane. Recovering organic materials also helps replace products that are made from fossil fuels. Composting uses microorganisms to break down organics into the essential component of soil called humus, which can replace fertilizers made from fossil fuels. Cities also use anaerobic digestion facilities to turn food scraps and sewage into biogas, providing clean fuel for buses and other heavy vehicles and replacing fossil fuels. When cities use or sell their compost and biogas, they offset some of the cost of the organics recovery system. This is the beginning of a "circular economy" model.

Composting reduces GHG emissions in yet another way. Compost added to the soil increases plant biomass that can draw CO_2 out of the atmosphere and enhance the soil's capacity to sequester/hold the carbon. This is especially the case in no-till situations, such as in orchards, vineyards, and grazing lands, where the soil is not disturbed in ways that would release the CO_2.

Turning a large fraction of discarded organic material into a de- or re-carbonizing asset involves the mandatory separation, collection, and processing of food scraps, plant clippings, soiled paper and other compostable materials from residences, businesses, and institutions (hospitals, schools, etc.).

URBAN ORGANIC RECOVERY PROCESSES

The urban organics discard stream includes:

- Food scraps, spoiled food, and spoiled leftovers
- Soiled paper products (takeout boxes, plates, napkins, greasy pizza boxes)
- Plant trimmings (leaves and grass clippings, short branches, weeds, plants, and flowers)
- Wood (unpainted, unstained, untreated)
- Natural feathers and hair
- Compostable bags, cups, plates, and utensils

What is also organic, but best handled separately from the above stream, is sewage and animal manure.

Composting uses microorganisms to break down organics into humus. It can take 6-9 months for materials to decompose completely and become compost that helps plants take root and prevents soil erosion.

Anaerobic digestion facilities use microbes to break down organic materials into biogas and digestate. Digestors can be a wetter type (e.g., for a food scraps slurry) or a drier type (e.g., more plant trimmings), depending on feedstock and design.

CNCA EXAMPLE: SAN FRANCISCO

When San Francisco required everyone in the city to keep their compostables separate, the city started reducing the biggest source of GHG emissions in its waste stream while producing about 1 billion pounds of compost that now fertilize vineyards, orchards, and farms in the region and draw CO_2 out of the atmosphere.

For a US city of nearly 900,000 residents, and a world leader in advancing a goal of zero waste, targeting food scraps and other discarded organic materials has involved combining a separation mandate with convenient programming, an extensive and continuing outreach and educational campaign, financial incentives, and city enforcement. The city and its service provider, Recology, provide green bins for storing compostables, and offers smaller kitchen composting pails, signage, multilingual trainings, and consultations for businesses and building managers. Property owners and managers must provide color-coded bins, signage, and education for tenants, employees, contractors, and customers to ensure separation of discards.

Today, nearly 100% of residential and commercial properties in San Francisco are equipped for organics and recycling collection service.

Farmers in the San Francisco area who spread compost on pastured grasslands are eligible for carbon credits from the State of California. Experiments by dairy farmers in the region showed that a one-time application of compost — a ½-inch dusting — resulted in roughly 1 metric ton of carbon captured per hectare, per year. The application also stimulated biological processes in the soil that captured another ton of carbon over the years without adding more compost.[17] In addition, composting helps plants take root, prevents soil erosion, and increases water infiltration and storage in soil, which strengthen the land's resilience to flooding and drought.

Below: Farmers appreciate compost and return food and wine to San Francisco.

17 Brian Barth, "Farmers are Capitalizing on Carbon Sequestration: How Much is Your Carbon-Rich Soil Worth?" *Modern Farmer,* April 6, 2016, https://modernfarmer.com/2016/04/carbon-sequestration/.

Key Implementation Steps

San Francisco's composting mandate didn't emerge suddenly or on its own. It was added to a well-established citywide recycling system and a long-standing zero waste goal to not dispose of any waste in landfills or through incineration. Over the years, city officials say, recycling has become a cultural norm for San Francisco households and businesses, enabled by city policies and investments. Over the years, the city has tested and refined ways to make recycling convenient and to incentivize and publicize the desired behaviors. This baseline of behaviors and expectations helped keep, to a minimum, any political opposition to an organics mandate. San Francisco also has a citywide refuse system, operated primarily by Recology, an employee-owned business, which can cost-effectively produce large volumes of high-quality materials for markets.

Given this context, the city took a number of key steps to implement its composting mandate (though not necessarily in the following order).

1 **Establish the mandate firmly.** San Francisco adopted a mandatory recycling and composting ordinance in 2009. It was not a call for volunteers or a pilot initiative or government program for a small segment of the population. It was a full-fledged city commitment to composting by everyone, which signaled its purpose and priority.

2 **Design and build an organic discard collection and processing infrastructure.** The city must make numerous design decisions unique to organic materials, including:

- **Which organic materials will be accepted?** Different cities target different parts of the organics stream, depending on what they want to generate and can process. San Francisco accepts all organics, emphasizing food scraps, while Adelaide/South Australia's organics stream is mostly from industry and timber, for example.
- **How and where should organics be separated?** San Francisco provides bins of different size and color for collection of compostables, recyclables, and trash. Oslo provides green bags for organics that go into the household trash and are later separated out by optical scanners in city facilities.
- **How often will the city pick up the organics?** San Francisco collects residential organics once a week, apartments and commercial facilities more frequently if needed, and up to daily for large restaurants. San Francisco determined that collection schedules for food scraps should be at least as frequent as for trash, to prevent it from becoming too smelly on site, which could deter compliance.
- **Will organics be converted into compost, biogas, or something else?** San Francisco strives for an "uncontaminated" compostables stream to turn into high-quality compost that organic farms can use. Other cities may divert food scraps to a digester (or mix them with sewage, which decreases compost quality). Composting requires more land for sites than digesters, but also needs much less capital expenditure for equipment.
- **Where will compost sites, which require lots of land, be located?** Locating composting sites near agricultural customers reduces transport costs and time. Existing composting enterprises may be accustomed to processing farm waste like rotting vegetables, but not the processed foods and food-soiled paper products from cities.

3 **Incentivize user participation.** San Francisco provided free composting collection initially to help with compliance. When it started to charge for the service, it charged less for composting than for waste collection.

4 **Educate and enable users.** San Francisco undertook large-scale and long-term communications efforts to get residents and businesses to understand why it is important for the city and that recovering organic materials is the law. But the city also needs

people to understand how to comply and that handling organic discards is easy to do properly and conveniently. At the same time, the city must make sure everyone has the collection infrastructure—bins, compostable bags, etc.—and reliable services to encourage organics recovery.

5 **Enforce the mandate.** The mandate to separate organics provides a tool that the city can use to ensure compliance. In San Francisco, failure to separate organics properly can result in a fine for residents or businesses, starting at about $100 USD for the first offense. In addition, the city can place a lien on the property of those not subscribing or paying for adequate refuse service, taking possession until the owner meets their obligation. Although composting is mandatory for everyone, the city decided not to enforce the mandate initially in multi-tenant buildings because of the difficulties of identifying non-compliant entities in those facilities.

6 **Develop circular markets.** Oslo and Portland use organic discards to generate biogas for city-owned buses and other heavy-duty vehicles. This is a way of providing an "instant customer" for the recovered product. Compost, on the other hand, is sold on the open market to farmers and must compete with other products and meet customer requirements. San Francisco establishes specific plans for, and partners with whom to establish, these circular markets.

Right: San Francisco children cleaning plates and composting food scraps.