Aligning the Food System
for Food Safety in Food Waste Solutions

Organic Materials Recycling in CA

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CalRecycle

California's Main Organics Policy Drivers

Integrated Waste Management Act: AB 939 (1989)

- Composting is recycling, maximize its use to reduce the amount of solid waste disposed at landfills
- All cities, counties must maintain 50% solid waste recycling/diversion from landfill

AB 341 (2011)

- Statewide goal of 75% recycling, composting, source reduction

AB 1826 (2014)

- As of 1/1/2016, local governments required to offer organics recycling to businesses
- As of 1/1/2019, all businesses generating 4 cy per week total waste must arrange for organics recycling

AB 1594 (2014)

- As of 1/1/2020, no more diversion credit for green materials used at landfills for daily/intermediate cover

SB 1383, (2015)

- Short-lived climate pollutants. Reduce anthropogenic methane emissions 40% by 2030. Reduce organic materials going to landfills by 75% by 2025. Reduce edible food disposed in landfills 20% by 2025.
- ***No way to attain this goal without doubling California's existing organics infrastructure***

Composting

- Composting is a bio-chemical process which completely breaks down organic materials.
- The process is driven by microbes.
- Composting is aerobic; it **requires** oxygen.
- A balance of carbon and nitrogen feedstocks makes composting efficient.
- Preferred feedstock include green waste, food waste, manure, biosolids.
- Wood can be used as a bulking agent to increase airflow, but takes a long time to break down. Will not compost by itself.
- Paper will compost, but takes time.
- Compost is the finished product of composting.

Composting Food Waste

- Requires a full Solid Waste Permit
- Tier 2 Water Board requirements
  - Impermeable working surfaces
  - Lined ponds
- Drives air permit requirements in South Coast AQMD
  - 80% VOC reduction or better
- Increases odor concerns
- Increases VOC emissions
- Increases visible feedstock contamination

There are currently 34 composting sites in California permitted to compost food waste.

Two main types of composting sites

Windrow

Aeration by mechanical turning of elongated piles

Aerated Static Pile (ASP)

Aeration using blowers to force air into or out of pile

New fully permitted composting facilities of either variety cost $10-20 million

Chip and Grind vs. Composting

Composting

- Full biological – chemical breakdown of organic materials.
- Food OK with full permit.
- Must get materials above 131 F (55 C) and maintain temperatures to sanitize materials.
- Virtually unlimited material holding time, but typically 3-8 months.
- Mandatory finished product testing.
- Extensive air quality and water quality permitting and mitigation.
- Expensive to establish; tend to stick around once permitted, unless shut down by odors.

Chip and Grind

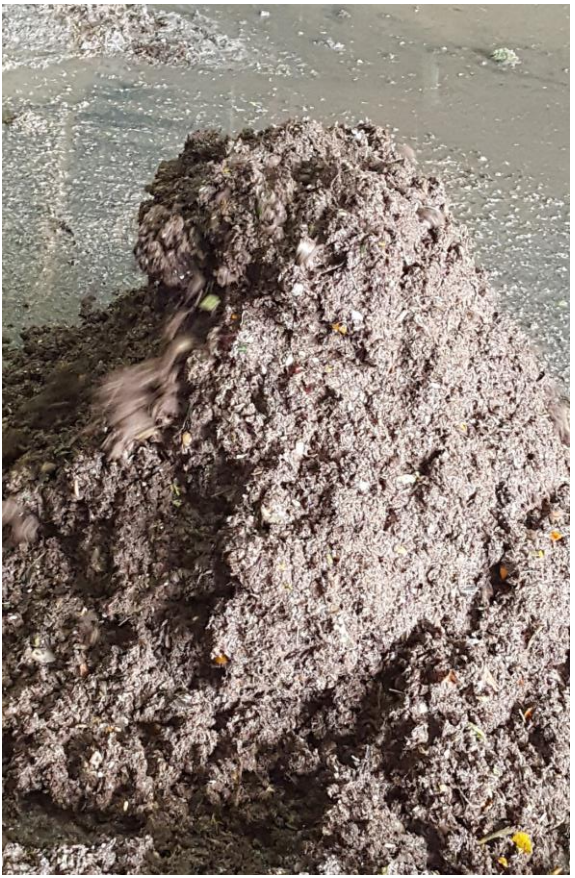
- Size reduction only.
- No food materials ever.
- May not allow materials to get above 121 F (50C), otherwise are composting without a permit
- Must move all materials off site within 48 hours (up to 7 days with LEA approval).
- Finished product testing rare, but testing for inerts may become more common.
- Very few air or water quality requirements for now.
- Smaller footprint, easier to set up; small ones come and go frequently.

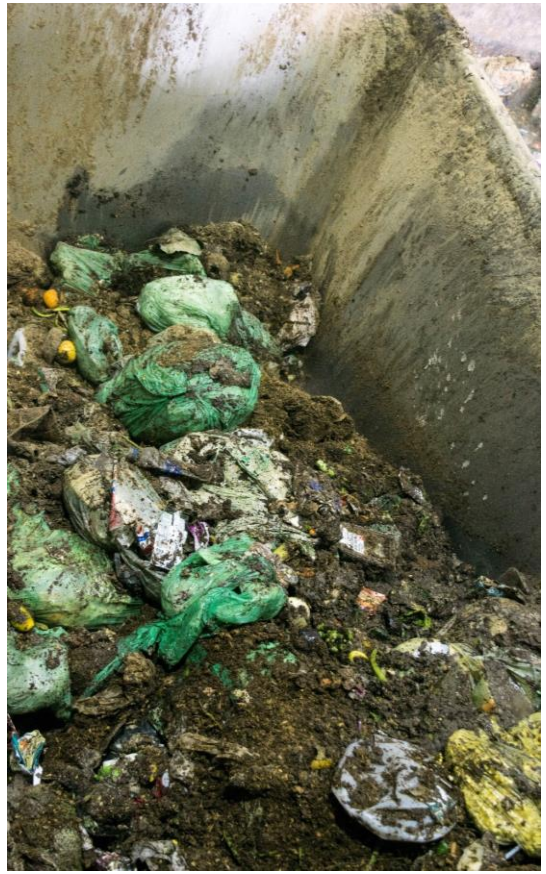
Anaerobic Digestion

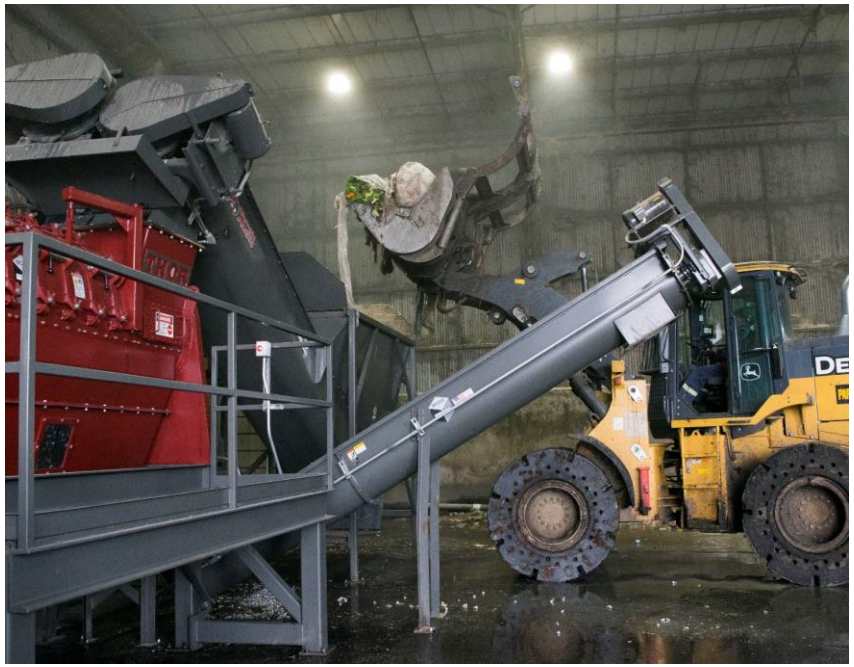
- Also driven by microbes, but **cannot** occur in the presence of oxygen
- Two main types of design; tanks or tunnels (enclosed bays)
- Preferred feedstock include food waste, food processing wastes, manure, biosolids
- Woody materials, paper do not digest well
- Already employed at most of California's largest wastewater treatment plants.
- Addition of food waste can greatly increase gas production from biosolids or manure.
- Microbes generate heat, but not as much as composting
  - Mesophilic: roughly 85-110 F
  - Thermophilic: roughly 110-130 F
- Retention times 15-40 days
- Safety and pathogen content of solid and liquid digestate still mostly unknown, recommend composting solids

Pre-processing of food waste

Food waste collected from businesses in the City of Napa, processed using a Scott THOR Food Waste Separator. The "oatmeal" (lower left) is <1% contamination. Machine paid for by a CalRecycle Organics Infrastructure Grant.







State regulations for composting protect public health & the environment

Load check

- Regular checking of incoming materials for contaminants (esp. treated wood)
- Training for staff to recognize prohibited materials

Process for Further Reduction of Pathogens (PFRP)

- Pile temperature must exceed 131 degrees F/ 55 degrees C
- Windrows: maintain temps 15 days with 5 turns
- Aerated piles with insulating layer: maintain temps 3 days
- Temperature logs available for inspection

Mandatory Finished Product Testing

- Detailed sampling protocol and regular testing frequency
- Testing for two pathogens and nine heavy metals
- Inert materials such as glass, plastic must be <.05% of finished product
  - Film plastic > 4 mm maximum 20% of the .05%
- Test results available for inspection

CalRecycle

CA Code of Regulations
(Title 17, Div. 7, Ch. 3.1, Article 7)

Regular inspection by CalRecycle or its Local Enforcement Agents (LEAs)

Standards for Biological Soil Amendments of Animal Origin

	Title 14	LGMA	FSMA	NOP
Fecal Coliforms	<1000 MPN/dry g	<1000 MPN /dry g	N/A	N/A
Salmonella	<3 MPN per 4 g	<DL (<1 MPN/30 grams)	ND 3 MPN per 4 grams)	N/A
L. Monocytogenes	N/A	N/A	ND (1 CFU per 5 grams)	N/A
E. Coli. 0157:H7	N/A	<DL (<1 MPN per 30 grams)	ND (0.3 MPN/1 gram)	N/A
Biosolids?	N/A	**No**	N/A	**No**
Raw manure?	N/A	No, or wait 1 year to grow.	No contact with produce during application; minimize potential for contact after application.	120-day interval between application for crops in contact with the soil; 90 days for crops with no soil contact.
PFRP required?	Yes	Yes	Yes	Yes

Inert contaminants

- New calrecycle regulations effective Jan. 1, 2018
- Customer education key to clean feedstock, must be continuously reinforced
- Newer, better machines can help a lot!

Densimetric separator at compost site in Gilroy, good at removing glass, rocks, rigid plastic.

"Hurricane" air lift separator works well on film plastics.

Other “contaminants” of concern

- **Persistent pesticides**: Aminocyclopyrachlor, aminopyralid, bifenthrin, etc. Extremely durable. Can kill crops. Gray area for organic certification.
- **PFAS:** Used extensively in food service packaging. If it is paper, and it repels moisture or water, it likely has PFAs. Fate in composting and AD unclear. Threatens organic certification.
- **Compostable plastics**: Viewed as contaminants by most composters. Does not break down fast enough. Threatens organic certification. May contain PFAS or other compounds.
- **Pests**: California is under attack by a variety of invasive species, some of which pose a serious threat to agriculture and our landscapes. Composting kills pests.

Compost nutrients

- Not a large source of nitrogen (N)
  - Not all compost N readily available to plants.
- Manure and biosolids composts: most nitrogen
- Poultry manure composts: most phosphorus (p)
- Good source of calcium and micro nutrients

C:N Ratio	Total C	Total N	NH4 - N	NO3 - N	Total P	P2O5
16	22.3%	1.6%	0.1%	0.02%	0.6%	1.4%
Total K	**Total Ca**	**Total Mg**	**SO4**	**pH**	**Na**	**Fe**
1.1%	3.3%	0.6%	0.5%	7.66	0.3%	1.6%

- Average values from 1,239 compost samples from southwestern United States courtesy of Soil Control Labs, Watsonville, CA
- Based on dry weights; average moisture content 33%.

Soil carbon: the linchpin for climate stabilization

A large source and a large potential sink

- 50-70 % of soil carbon lost worldwide
- Soil still holds:
  - 2x more carbon than the atmosphere
  - 3x more carbon than plants and animals combined

Soil carbon sequestration can help mitigate emissions

- Building soil carbon holds water & increases fertility
- Soil has potential to absorb up to 3 ***B***illion tons CO_2 per year
- Ocean sink nearly maxed out, resulting in acidification
- Reductions in CO2 emissions are not enough, we must start actively moving carbon back into the soil pool; compost use is a simple way to do that

Thank you for listening

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