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# State-of-the-Art for Removing Contamination from Organic Wastes

G.M. Savage and L.F. Diaz
CalRecovery, Inc.
Concord, California
GSavage@calrecovery.com

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# Overview

- Types of Feedstocks

- Key Feedstock Characteristics

- Technologies

- Performance

- Conclusions

# Types of Feedstocks

- Food waste from businesses and institutions

- Organic residues generated by clean and mixed waste (dirty) materials recovery facilities (MRFs)

# Examples of Organic Materials





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# Important Organic Feedstock Characteristics (typical ranges)

- Moisture content:  45% to 75%

- Bulk Density: 15 to 25 lbs./cu. ft.

- Organic matter:  50% to 90%, dry wt. basis

- Plastic:  5% to 15%, wet wt. basis

- Friable inerts (including glass):  5% to 15%, wet wt. basis

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# Markets and Characteristics

- Anaerobic digestion (AD) facilities to produce biogas
  - "Wet" AD, prefer wet organic feed
  - "Dry" AD, prefer dry organic feed, unless bulking material is available

- Composting facilities to produce soil amendment: wet or dry depending on operations

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# Example of Glass Contamination

# Markets and Characteristics

- Organic feedstock specifications for AD industry are in a state of flux

- Project by project basis

- Composting industry markets and uses better defined than those of AD industry

# Key Physical Properties

Particle Size Distribution

Composition

Particle Shape

Particle Density

"Flowability" ?

# Processing Indications

- Low moisture content-mixtures (less than 40 to 45%) can be processed using "dry" processing equipment

- High moisture-content mixtures (greater than 50% to 55%) are difficult to process using "dry" processing equipment

- Moisture removal is usually costly

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# Technologies/Unit Operations

- Screens

- Air separators

- Electro-magnetic

# Generic Types of Screens

- Trommel (cylindrical screen)

- Disc

- Vibrator flat bed

# Generic Types of Air Separation

- Stoners

- Air classifiers

# Electro-magnetic Systems

- Plastic resins (infrared, visible, etc.)

- Aluminum (induced electro-magnetic force (eddy current))

- Glass (X-rays)

# Effect of Selective Post-Processing MRF Residues for Organic Upgrading

| Size Class (inches) | Percent (dry wt. basis) | |
| --- | --- | --- |
| | Biodegradable Organics | Inerts |
| -3 | 60 | 40 |
| -2 + 0.5 | 80 | 20 |
| -0.5 | 40 | 60 |

**Sizing improves efficiency of separation**

**Dirty MRF Residue -- Yield of Organics versus Glass Contamination**

Yield, % of Organics Recovered

Purity, % Glass in Organic Fraction
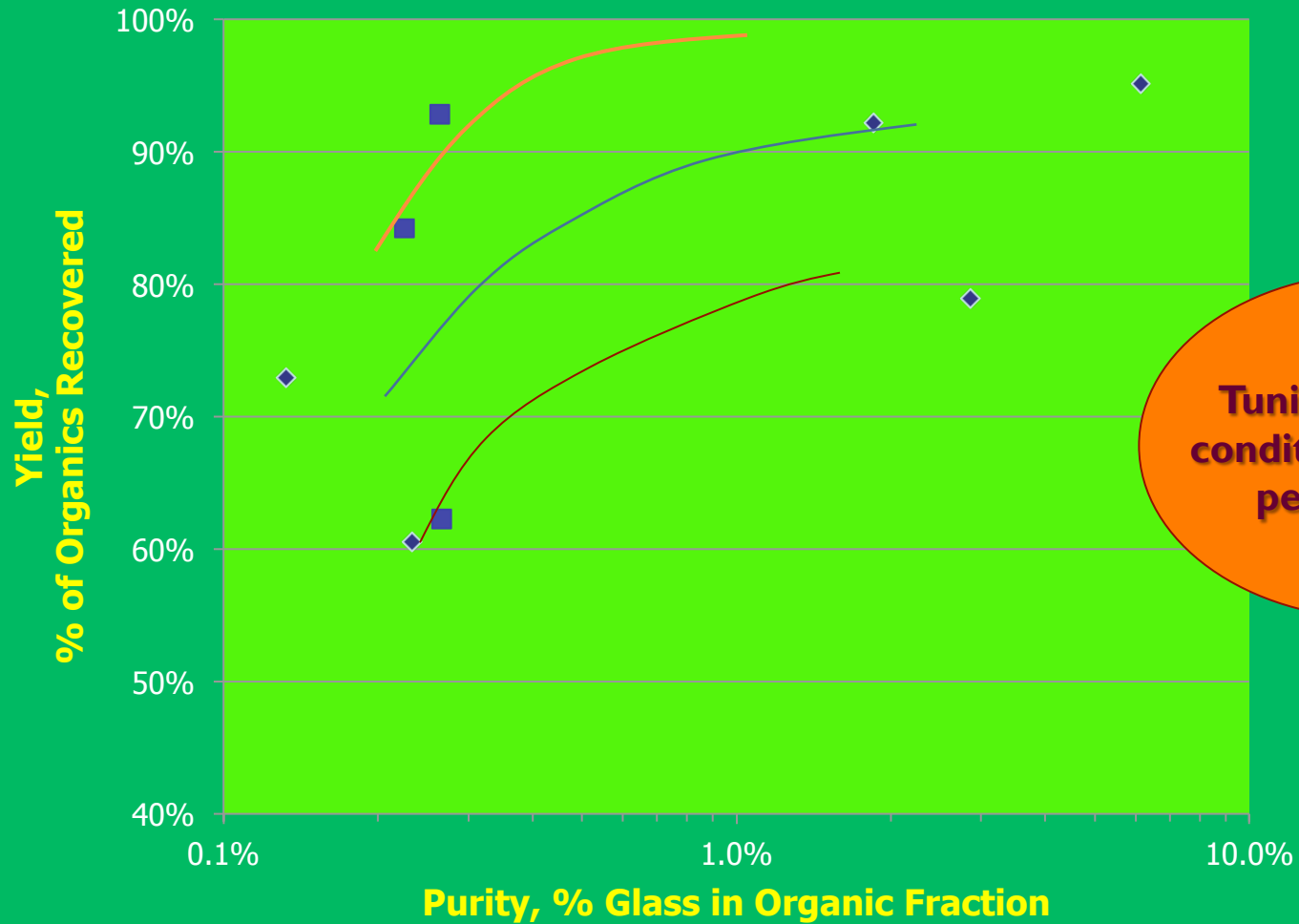
Tuning operating conditions improves performance

# Conclusions

- Need to know the important feedstock properties

- Need to know the fundamental preprocessing equipment variables and their limitations affecting separation performance

- Size classification can improve performance of electro-magnetic and air separation systems

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