

Composting & the Environment

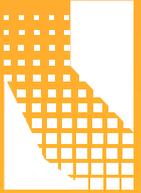
California Integrated Waste Management Board/San Bernardino County

Local Government Compost Workshop

April 7, 2009

Rancho Cucamonga, CA

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This Presentation

- 1. State law and implementation**
- 2. Benefits of composting**
- 3. Issues related to compost production**
- 4. California Integrated Waste Management Board's (Board) efforts to support compost / organics recycling**

Integrated Waste Management Act (AB 939)



- **Enacted in 1990**
- **All cities and counties must reduce solid waste sent to landfills by 25% in 1995, 50% in 2000 and each year thereafter**
- **Created waste management hierarchy**
- **Legislators now interested in increasing diversion mandates**

The Hierarchy

CA Public Resources Code Section 40051

**State and local government SHALL...
promote the following waste management
practices in order of priority:**

- (1) Source reduction.**
- (2) Recycling and *composting*.**
- (3) Environmentally safe transformation and
environmentally safe land disposal...**



Local governments respond

- **361 residential curbside greenwaste recycling programs in California**
- **Nearly 3 million tons collected in 2006**
- **211 jurisdictions pick up greenwaste from businesses, 163 from government properties, 88 from schools**



Massive investment



Public

Private



Benefits of Composting

- **Important outlet for urban organic residuals**
- **Major part of city/county diversion rates**
- **Important outlet for farming and food processing by-products**
- **Displaces agricultural burning**
- **Preserves landfill capacity**
- **Reduces landfill methane**

Benefits of Compost Use

- **Increase water infiltration and decrease runoff**
- **Reduces water use and pumping**
- **Improve soil tilth, biology**
- **Supplant use of synthetic N fertilizers and pesticides with high embodied energy content**
- **Erosion control and landscape establishment**

Increasing compost use...



...may decrease use of less sustainable methods.

Compost Production Issues

■ Air Quality Regulations

- Local air quality districts concerned about compost pile emissions of volatile organic compounds (VOCs)
- Districts in ozone-impacted areas considering rules which will raise production costs

■ Water Quality Regulations

- Concerns about runoff from production areas to surface waters and infiltration to groundwater

■ Economic

- Composters compete with landfills for feedstocks and cannot afford to raise tipping fees much

Why worry about compost air emissions?

- **Some VOCs react with NO_x and sunlight to create ground-level ozone**
- **Ground-level ozone is a criteria pollutant under the federal Clean Air Act**
- **Local air districts must reduce criteria pollutants or face federal penalties**
- **Ground-level ozone harms human health**
- **Ground-level ozone interferes with photosynthesis and reduces crop yields**

Air Quality Regulations

South Coast Air Quality Management District (AQMD)

- **1133 (2003): chippers, “co-compost”**
- **Green materials compost : 2010?**

San Joaquin Valley Unified Air Pollution Control District (APCD)

- **4565 (2007): biosolids & manure**
- **4566 (2010?): green material compost**

Mojave Desert AQMD

- **Rule 1133 adopted in 2008**

Antelope Valley AQMD

- **Rule 1133 adopted in March 2009**

Other air districts likely to follow

South Coast AQMD

■ Rule 1133.1 Chipping & grinding

- Feedstock-based holding-time restrictions
- Intended to prevent “inadvertent composting”

■ Rule 1133.2 Co-Composting

- New facilities must enclose active composting and vent to biofilter; or propose alternative compliance measures
- Existing facilities must achieve 70% reduction in VOC & NH₃; new facilities must get 80%

San Joaquin Valley Unified Air Pollution Control District

- ***Rule 4565: Biosolids, Manure and Chicken litter composting***
 - Facilities <100,000 tons per year may select from a menu of best management practices
 - Facilities >100,000 tpy must vent active compost piles to device with control efficiency of 80% or better
- ***Rule 4566: Greenwaste composting (draft)***
 - Facilities <50,000 tons per year may select from a menu of best management practices
 - Facilities >50,000 tpy must vent active compost piles to device with control efficiency of 80% or better

Mojave and Antelope Valley

Air Quality Management Districts

■ *Rule 1133 Composting and Related Operations*

- Chip and grind holding times from South Coast AQMD 1133.1**
- Best Management Practices (BMP) mostly from San Joaquin Valley 4565**
- Full enclosure for all facilities >100,000 tpy and 80% VOC & NH₃ destruction required *IF* district labeled non-attainment for fine particulate matter**

Composting Water Quality Issues

- **State Water Resources Control Board's (SWRCB) statewide order**
- **SB 390 terminated all existing waivers**
- **Leachate and/or storm water runoff as a "designated waste"**
- **Application of compost as a "discharge of waste to land"**

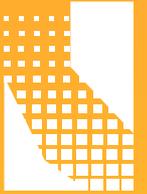
Composting Water Quality Issues (continued)

- **SWRCB / Regional Water Boards / Board collaborative approach**
 - **Challenges:**
 - **Filling data gaps**
 - **Addressing salt loading issues**
 - **Maintaining protections for water quality**

Composting Water Quality Issues

(continued)

- **SWRCB / Central Valley Regional Water Quality Control Board (CVRWQCB) / Board Cross Media efforts:**
 - **Santa Ana Regional Water Quality Control Board's emergency waiver**
 - **Quarterly meetings with SWRCB / Regional Water Quality Control Board (RWQCB)/ California Department of Transportation (Caltrans) / Board**
 - **United States Environmental Protection Agency grant application package**



**Board efforts
to support
composting**

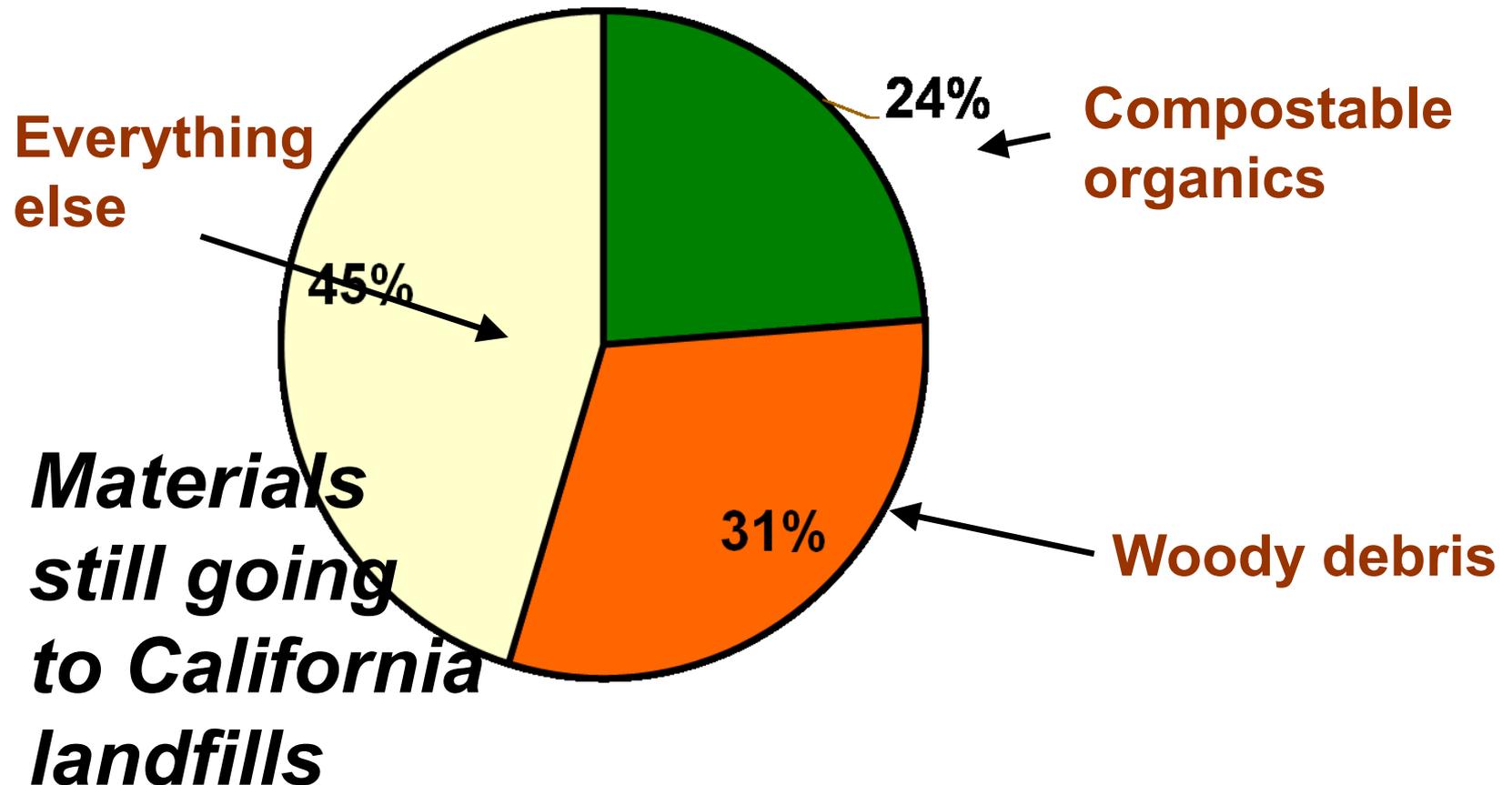


20 Years of Support for Organics Recycling

- **Compost use demonstration projects on farms and in urban landscapes**
- **Compost emissions field research**
- **Compost specifications and quality assurances**
- **Infrastructure surveys and reports**
- **Partnerships with air and water regulators**
- **Compost greenhouse gas research**
- **Organics as climate change measure adopted in AB 32 Scoping Plan**
- **20 Organics as Board Strategic Directive**

Board Strategic Directive 6.1

Reduce organics sent to the landfill by 50% by 2020





Description of previous slide

The previous slide shows a pie chart illustrating the materials still going to California landfills are composed of:

- **31% woody materials**
- **24% compostable organics**
- **45% everything else**

Board Organics Roadmap

- **Organics Summit conducted in 2007**
- **Key Roadmap issue areas identified:**
 - **Alternative Daily Cover (ADC) Policy**
 - **Economic Incentives and Disincentives**
 - **Siting and Capacity Development**
 - **Regulatory and Permitting Constraints**
 - **Research, Product Standards & Technology Evaluation**
 - **Education and Procurement**

Alternative Daily Cover

- **ADC Policy Working Group**
- **Organics Toolbox**
- **ADC field investigations and data tracking**
- **Statutory Changes**

Economic Incentives & Disincentives

- **Coordinating with other agencies to create effective incentives and disincentives that address core issues identified by stakeholders.**
- **Plan to hold a workshop in June 2009 to collect additional stakeholder input and recommendations**

Siting & Infrastructure

- **On-line survey & interviews to identify siting challenges & opportunities**
- **Workshops April 2008**
 - **Coordination with air & water agencies**
 - **Web-based information clearinghouse**
 - **Legislation for diversion capacity**
- **Infrastructure Survey**

How many new or expanded compost facilities will California need?

And where will we put them?



Regulatory & Permitting Constraints

- **Review of Board regulations affecting organics management**
 - Mammalian tissue composting
 - Food waste
 - Farms & ranches
 - Land application
 - Emerging Technologies
 - Contamination
- **Coordination with air and water regulatory agencies**



Research, Product Standards & Technology Evaluation

- **BioEnergy & Biofuels Contract**
- **Compost BMPs & Benefits Contract**
- **LifeCycle Assessment for Organics
Materials Management**
- **Agricultural Specifications Contract**
- **Compost Cover Methane Reduction at
Landfills Contract**
- **Landfill-Based Anaerobic Digestion**

2006-2007 Compost Workshops

Interagency Agreement with University of California Riverside (UCR) Extension

- **Caltrans compost-based specifications developed in 2006**
- **Workshops targeted Caltrans' contractors & designers, and conducted around the state**
- **Developed 'Compost Use For Landscape & Environmental Enhancement' manual**



2008-2009 Compost Workshops

Interagency Agreement with UCR Extension

- **10+ workshops around the state**
 - **Introduce Caltrans compost-based specifications to a wider audience**
 - **Local Governments Often Adopt Caltrans Specifications**
- **Field demonstration component**
 - **Northern California – San Jose**
 - **Southern California – Yorba Linda**
 - **Erosion Control on Fire-Damaged Lands**

Board Compost Emissions Studies



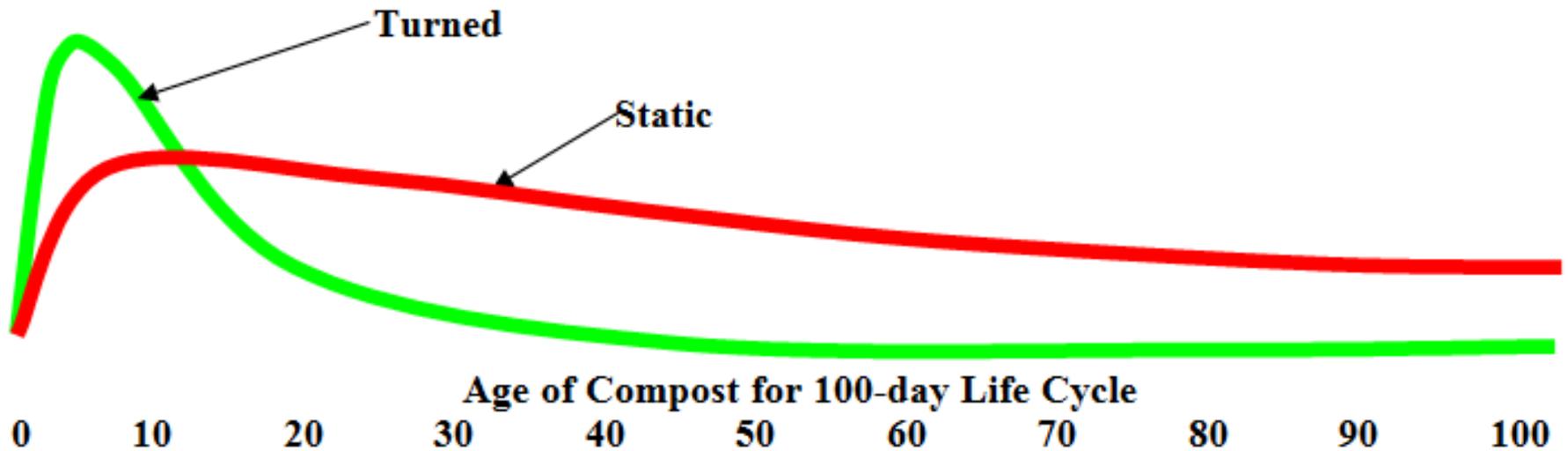
2002 Board Emissions Study

Tierra Verde Industries, Irvine, California

- **High C:N ratio (woody materials)
windrow emitted less VOC than low
C:N ratio (grassy materials)
windrow**
- **Turned pile emitted more VOC than
static pile, but matured faster**
- **Ammonia emissions not a concern
for greenwaste composting**

Hypothetical compost pile emissions: turned vs. static

Conceptual Plot – Hypothetical Emissions for Static vs. Turned Windrows



The previous slide shows a two line plot of conceptual hypothetical emissions for static vs. turned compost windrows.

The x axis shows the compost lifecycle with the compost age from 0–100 days and the y axis is the emissions (no label or scale provided).

- **The static pile line shows a peak at ~ day 5, then emissions slowly decreasing over time.**
- **The turned pile line shows a higher peak than the static pile at ~ day 5, a steep decline until ~ day 20, then a level rate of emissions which are less than those of the static pile.**

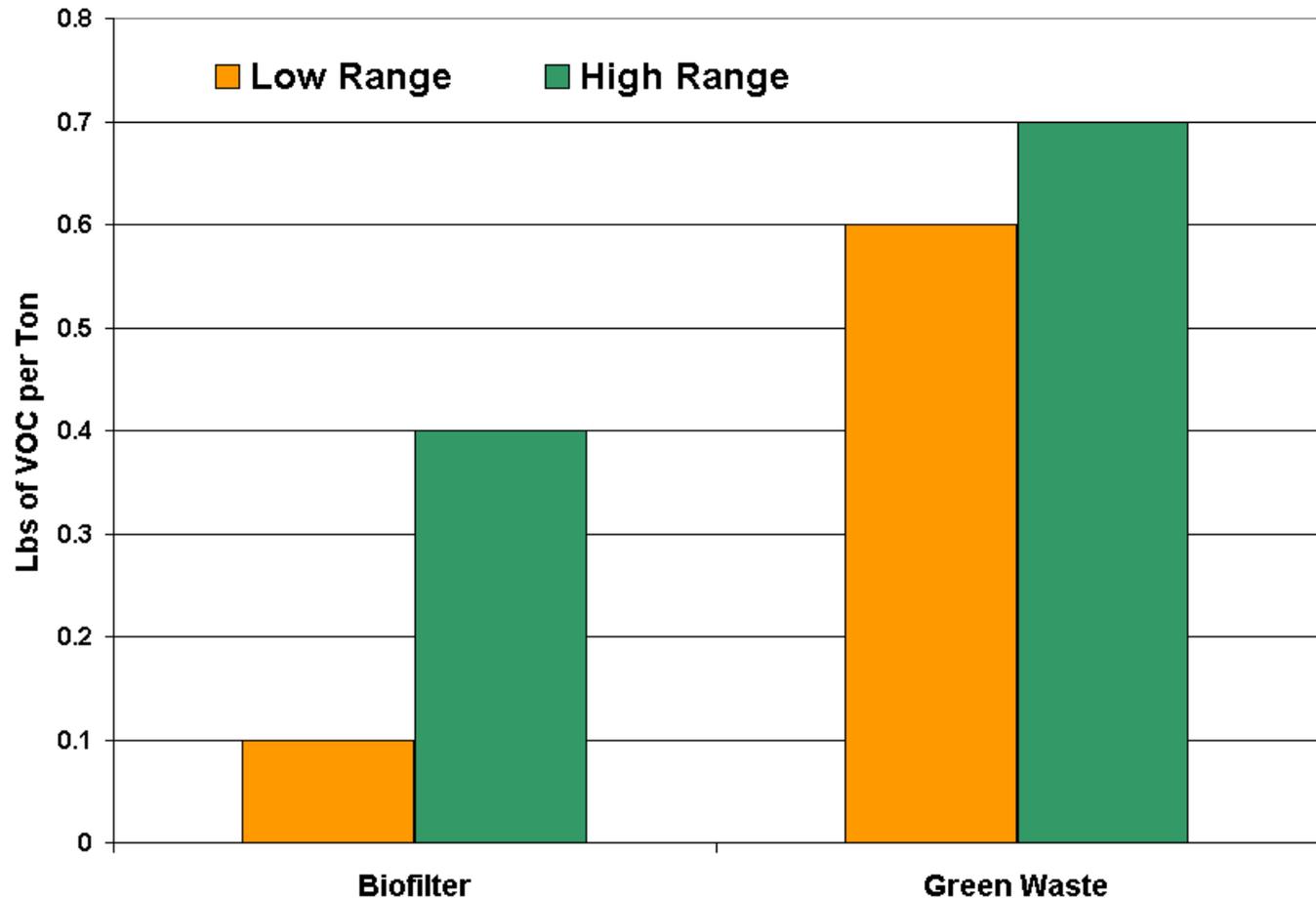
2006 CIWMB Emissions Study

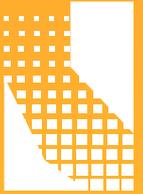
City of Modesto Compost Facility

- **Measure life-cycle (60 days) VOC emissions for greenwaste and 15% food waste windrows**
- **Test two potential emissions-reducing best-management practices (BMPs)**
 - Additives: one feeds microbes; other forms crust on windrow (Cost: \$1.50 per ton)
 - Pseudo-biofilter: Cover “active” windrows with a layer of finished compost (60 cents per ton)

Pseudo-Biofilter Compost Cap Works

Two-week
emissions
reductions
between
42 - 83 %



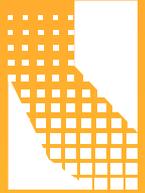


The previous slide is a histogram showing a comparison between low and high range emissions for windrows with and without a finished compost pseudo biofilter cap.

- The title for the y axis is “pounds of VOCs per ton (0-0.8 tons)”
- The low range and high range emissions with the pseudo-biofilter are shown as 0.1 and 0.4, respectively
- The low range and high range emissions for green waste compost without the pseudo-biofilter are 0.6 and 0.7, respectively.
- Therefore, the two-week study period emissions reductions are between 42-83%

Compost & Climate change

- California must reduce greenhouse gas production 25% by 2020 (AB 32)
- Composting can reduce methane emissions from landfills and N₂O emissions from agriculture
- Methane 21x worse than CO₂
- N₂O 296x worse than CO₂

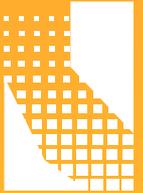


Economic Technology Advancement Advisory Committee Recommendations

- **Remove barriers to composting**
 - “Composting offers an environmentally superior alternative to landfilling these same organics”
- **Reduce agricultural emissions through composting**
 - “Compost has been proven to reduce the demand for irrigation, fertilizers and pesticides, while increasing crop yields...”

Organics Life Cycle Analysis

- **Big-picture accounting for major organic diversion strategies**
- **Quantify greenhouse gas (GHG) benefits and debits of composting production AND use**
- **Critical to Board's AB 32 efforts**
- **Final report mid 2009**



Thank you

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