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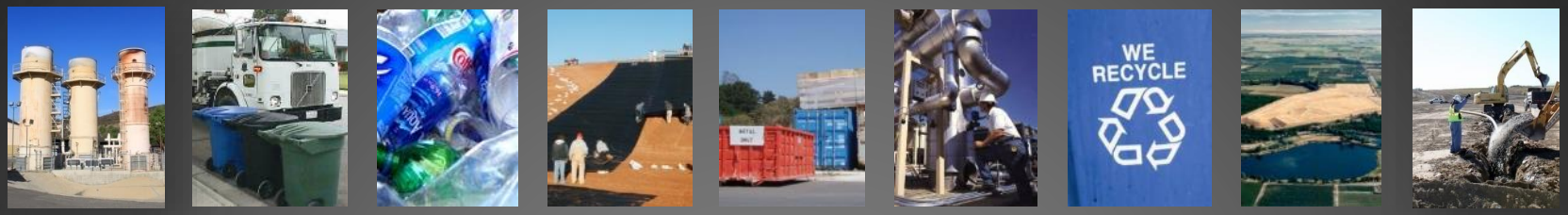


Organics Diversion, Landfill Gas Generation, and Rulemaking

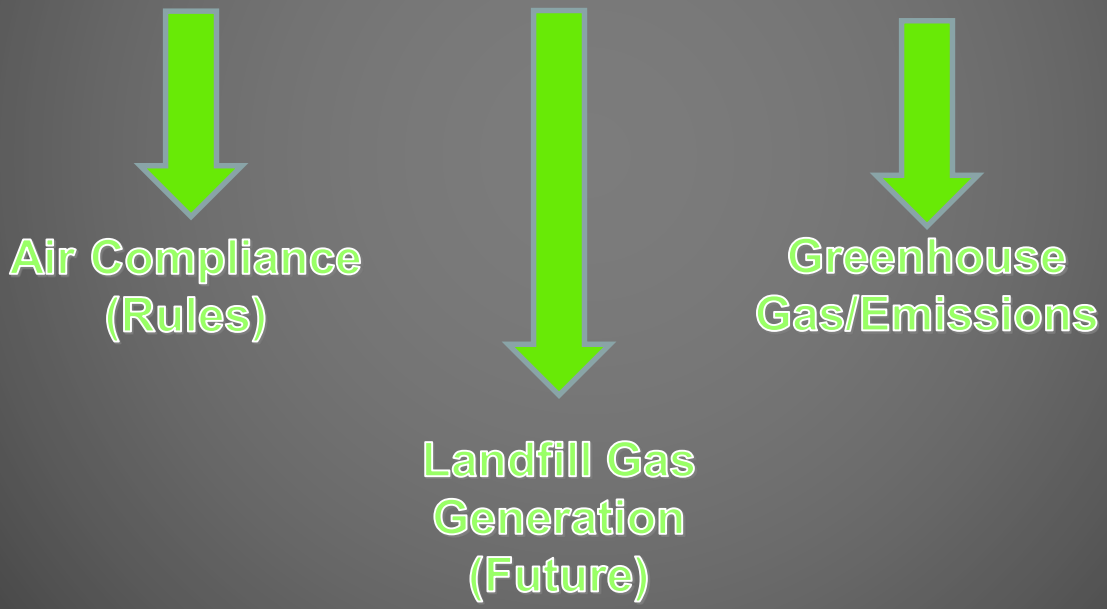
New Mexico Recycling Solid Waste Conference
NMRC
SWANA

September 25, 2018

Presented by:
David Mezzacappa, P.E.

Organics and Landfill Gas/Compliance

ORGANICS DIVERSION



Air Compliance (Rules)

New Source Performance Standards

- Federal rule
- MSW landfills
- Main driver for landfill gas collection and control systems
- Finalized in 1996
- New NSPS proposed in 2014
- New NSPS finalized 2016

NSPS Rule Proposal and Finalization

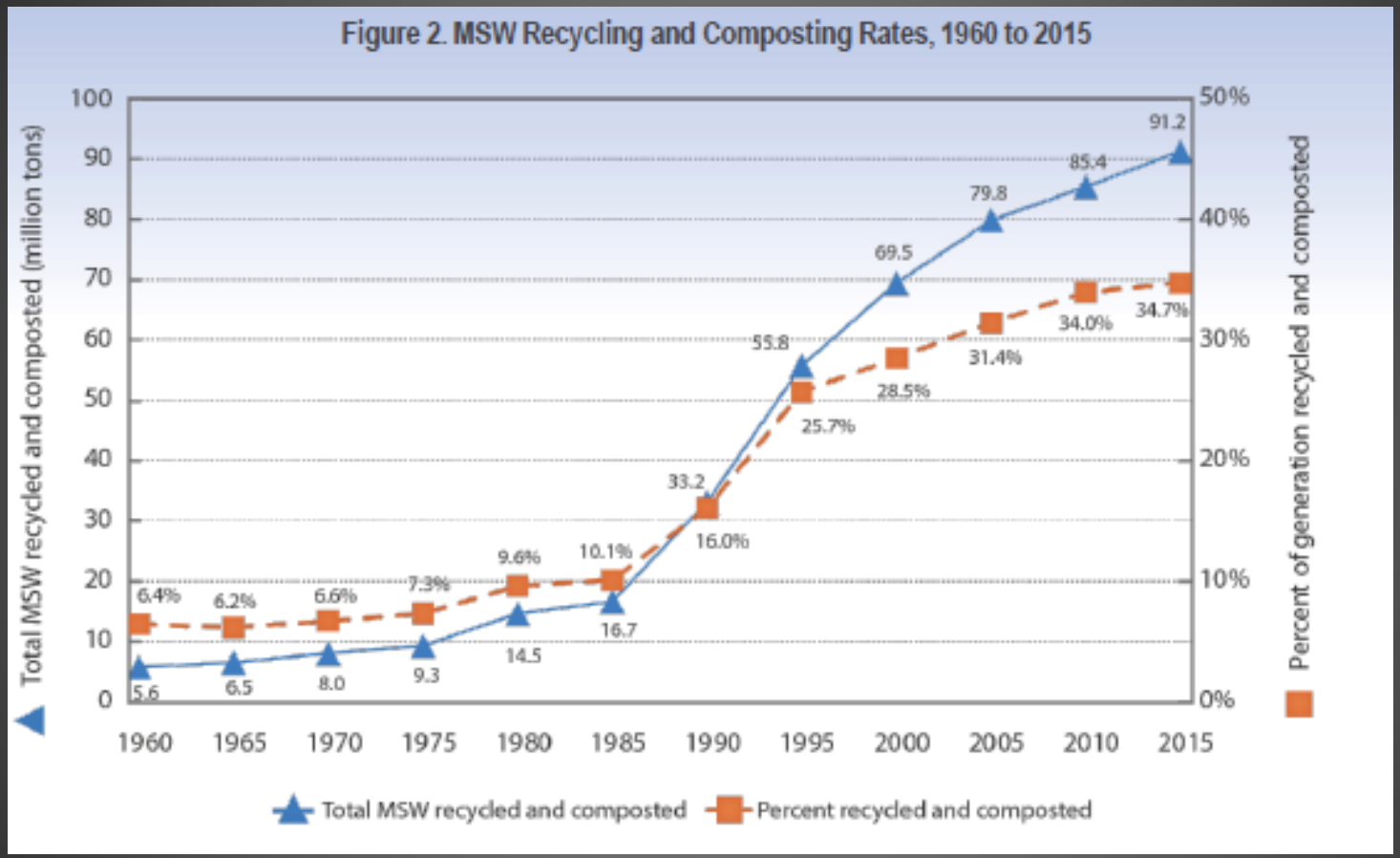
More comments related to organics diversion than any other facet of the 2014 proposed rule

Proposed 2014 NSPS Rule (Finalized 2016)

Modeling Adjustments

- Current rule uses L_o of 170 m^3/Mg
  - 5,458 cubic feet methane per ton of waste
- Proposed adjustments for organic content
  - Between 1990 and 2015
  - From 102.6 m^3/Mg to 75.3 m^3/Mg
  - AP-42 default is 100 m^3/Mg
- GHG rule already allows for L_o adjustments

Nationwide?



U.S. EPA, Advancing Sustainable Materials Management: 2015 Fact Sheet

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2014 EG Rulemaking Notice

- NSPS rule proposed in 2014
- Advanced notice "existing" landfill rules 2014
- Preamble - EPA did not require materials separation in 1996
- Soliciting ideas to encourage organic diversion
- RCRA and local regulations more appropriate vehicle
- Discussed exemption for landfills that diverted 100 percent of organics

2015 EG Rule

- Wide range of comments
  - Many comments against mandating diversion
  - 100% diversion not reasonable
  - Tier 4 and wellhead flexibilities help
  - Invited other flexibilities that might help
- Concluded that organics diversion not part of a well-designed, installed, and operated GCCS
- Bottom line EPA maintained prior stance
- Showed this will be a continued issue in rulemaking

2016 Final NSPS/EG Rules

- Cites flexibilities as ways to allow for GCCS operation with declining gas flow from less organics
- Did discuss organic covers as a way to decrease emissions as similar practice to organic diversion
- Commenters discussed that Tier 4 surface scans would benefit

Yard Waste Bans

- Help drive the composting industry
- In 2013 25 states had yard waste disposal bans
- Seven states, including several in the Southeast and Great Lakes areas allow yard waste in landfills with LFGE
  - Yard waste more fuel for LFGE
  - However more LFG also more GHG
- Industries, groups, and environmentalists on all sides of issue

Landfill Gas Generation

How much will diversion decrease landfill gas reserves?

Impacts on Landfill Gas Generation

- Growth in recycling, composting, and conversion of organic wastes results in:
  - Historic and future changes in organic MSW disposal rates and composition
  - Lower LFG generation and recovery rates
  - Reduced methane fuel supply for LFGE projects
  - Implications for GHG emissions reduction

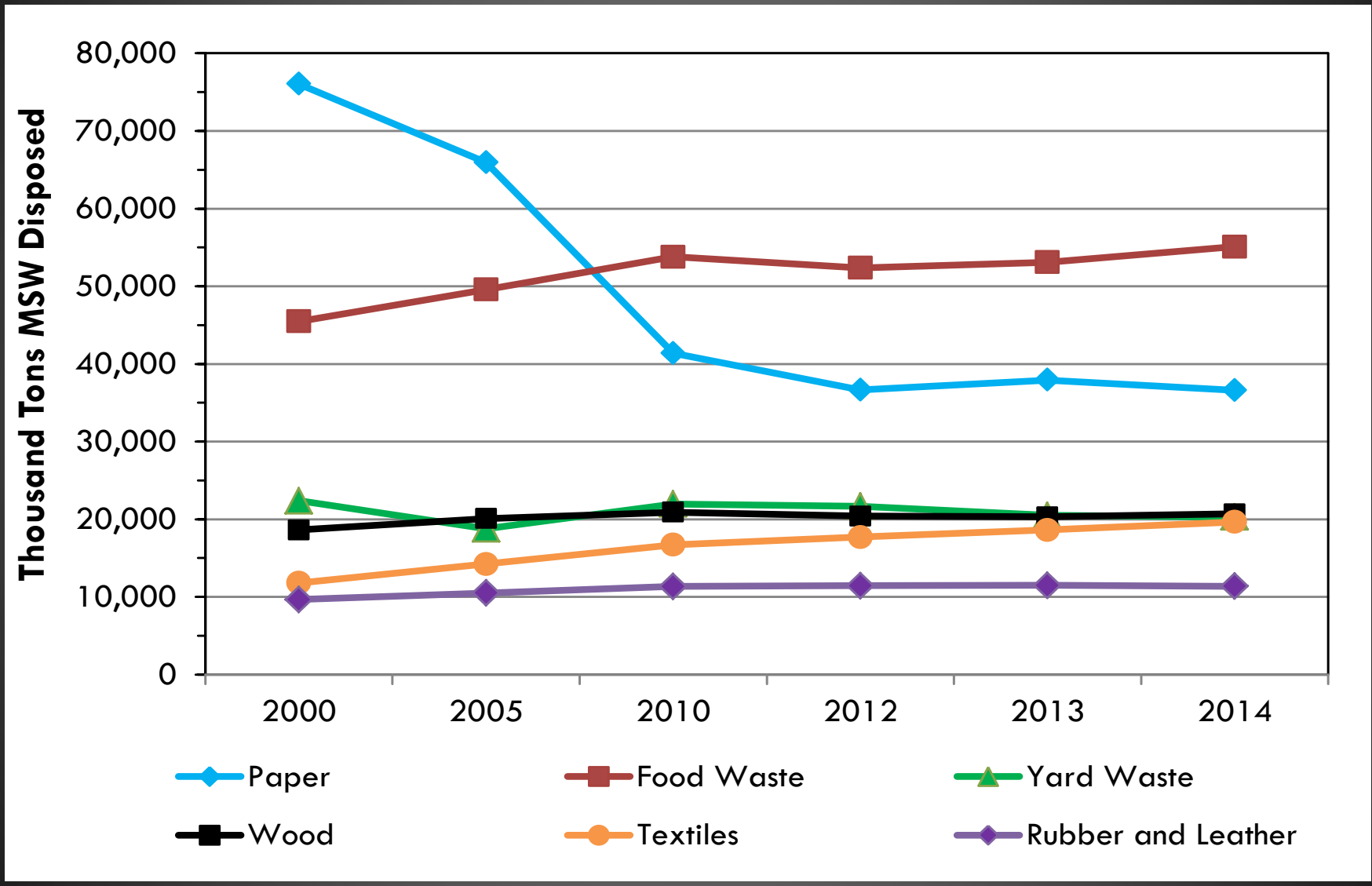
Study Purpose and Methods

- Document historical composition changes in MSW diverted and disposed at U.S. landfills
  - Focus on organic MSW composition (LFG source)
- Forecast organic MSW disposal in U.S. landfills (waste model) under:
  - Baseline scenario, with growth in diversion rates based on recent trends
  - Mid-range and High diversion scenarios with flat and declining organics disposal rates
- Estimate LFG generation (LFG model)
- Evaluate effects of organics diversion scenarios

MSW Composition Data

- U.S. EPA data (Dec. 2016)
  - Composition of U.S. MSW generated, diverted, combusted at WTE facilities, and disposed in landfills during 2000-2014
- EREF (2015) total MSW data correction for 2013 applied to EPA data for all years
  - MSW generation tonnage was 50% higher
  - MSW disposal tonnage was 88% higher
  - MSW WTE tonnage was 31% lower
  - MSW diversion tonnage was 22% higher, but since generation was 50% higher, diversion % of generated tons was lower than EPA shows

2000-2014 U.S. Organic MSW Disposal Rates



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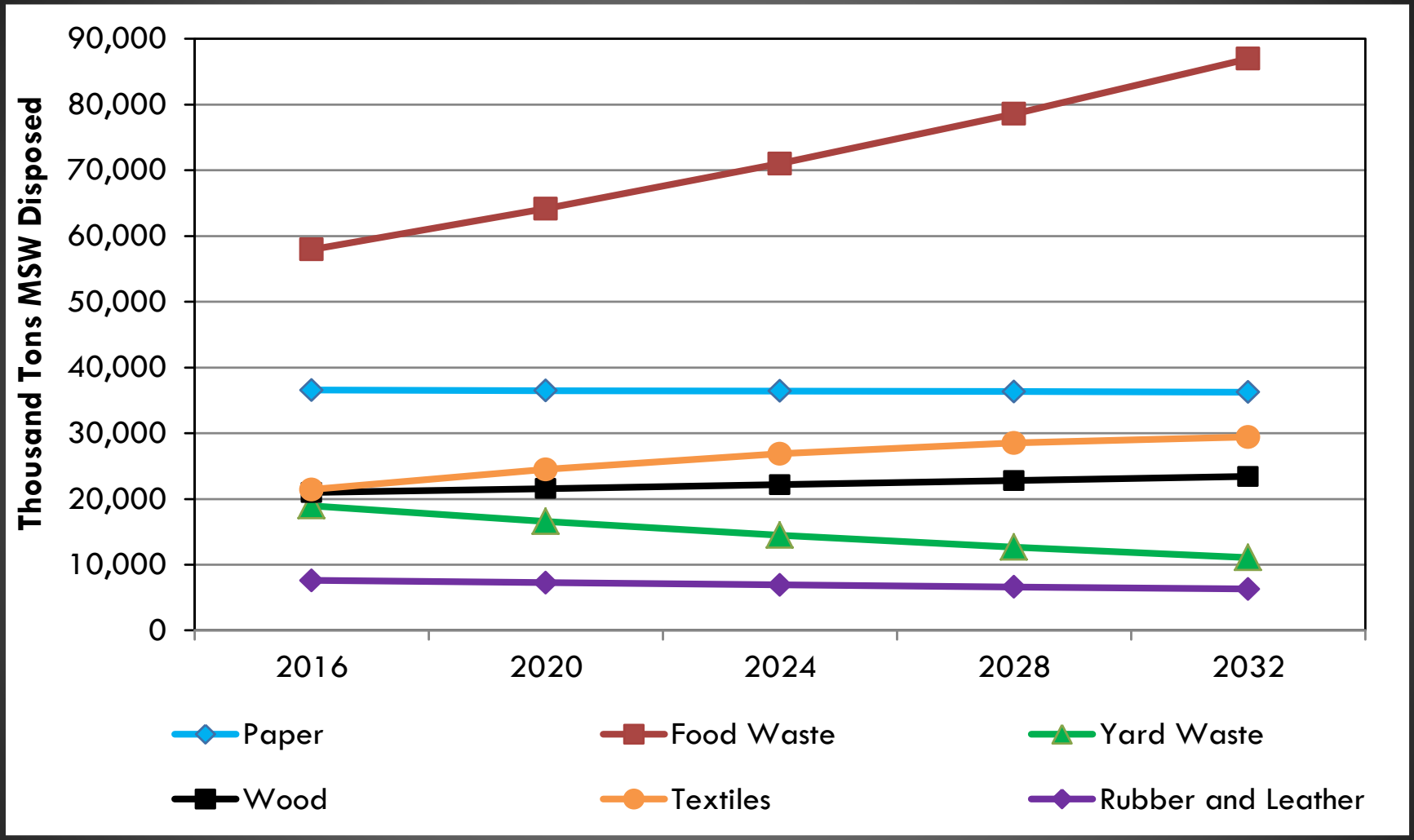
Baseline U.S. Organic MSW Disposal Forecast



18% increase in organic MSW disposal between 2016 and 2032

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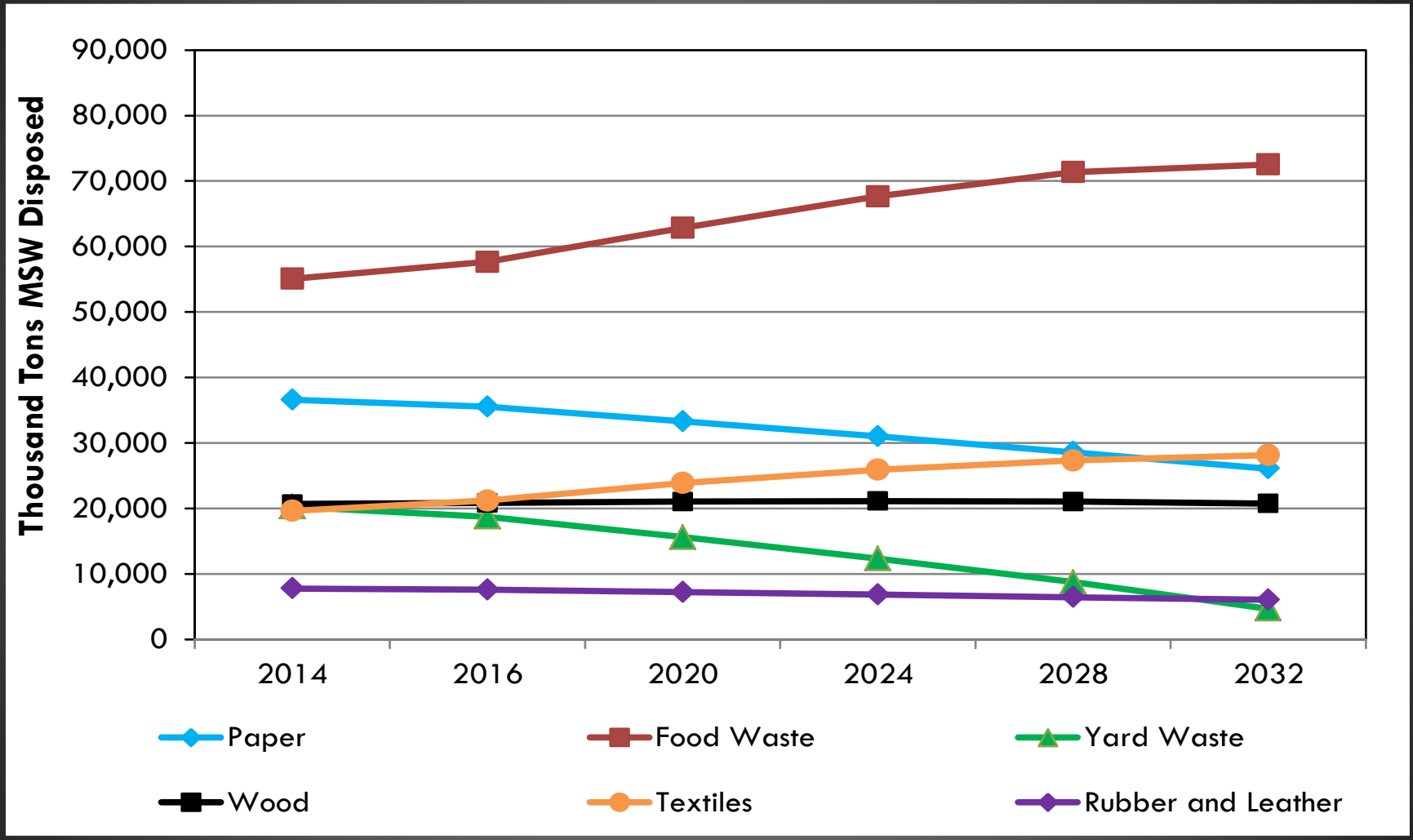
Mid-Range Disposal Scenario



2% decrease in organic MSW disposal between 2016 and 2032

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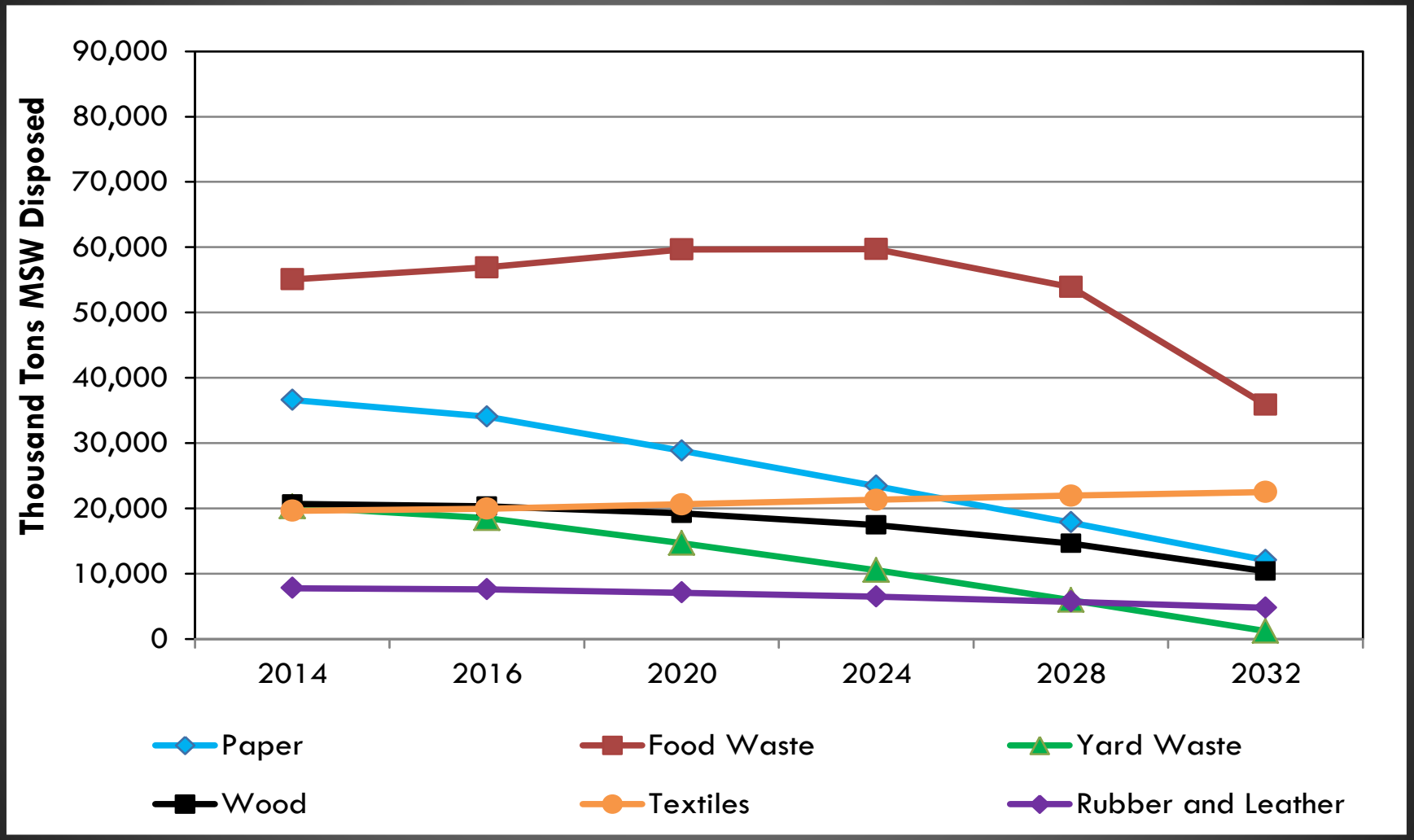
High-Range Disposa Scenario



45% decrease in organic MSW disposal between 2016 and 2032

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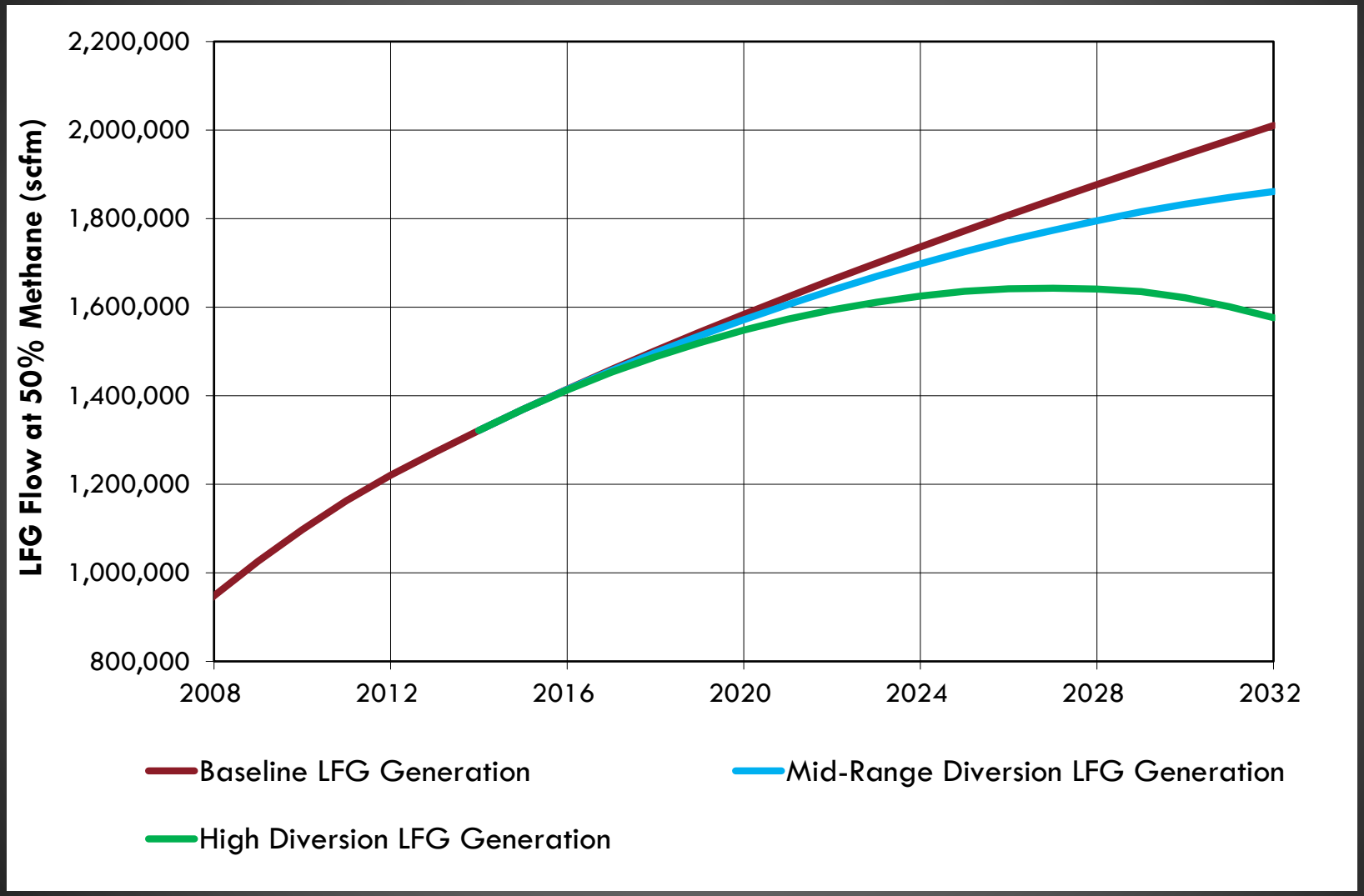
LFG Generated from U.S. MSW Disposed 2000-2032



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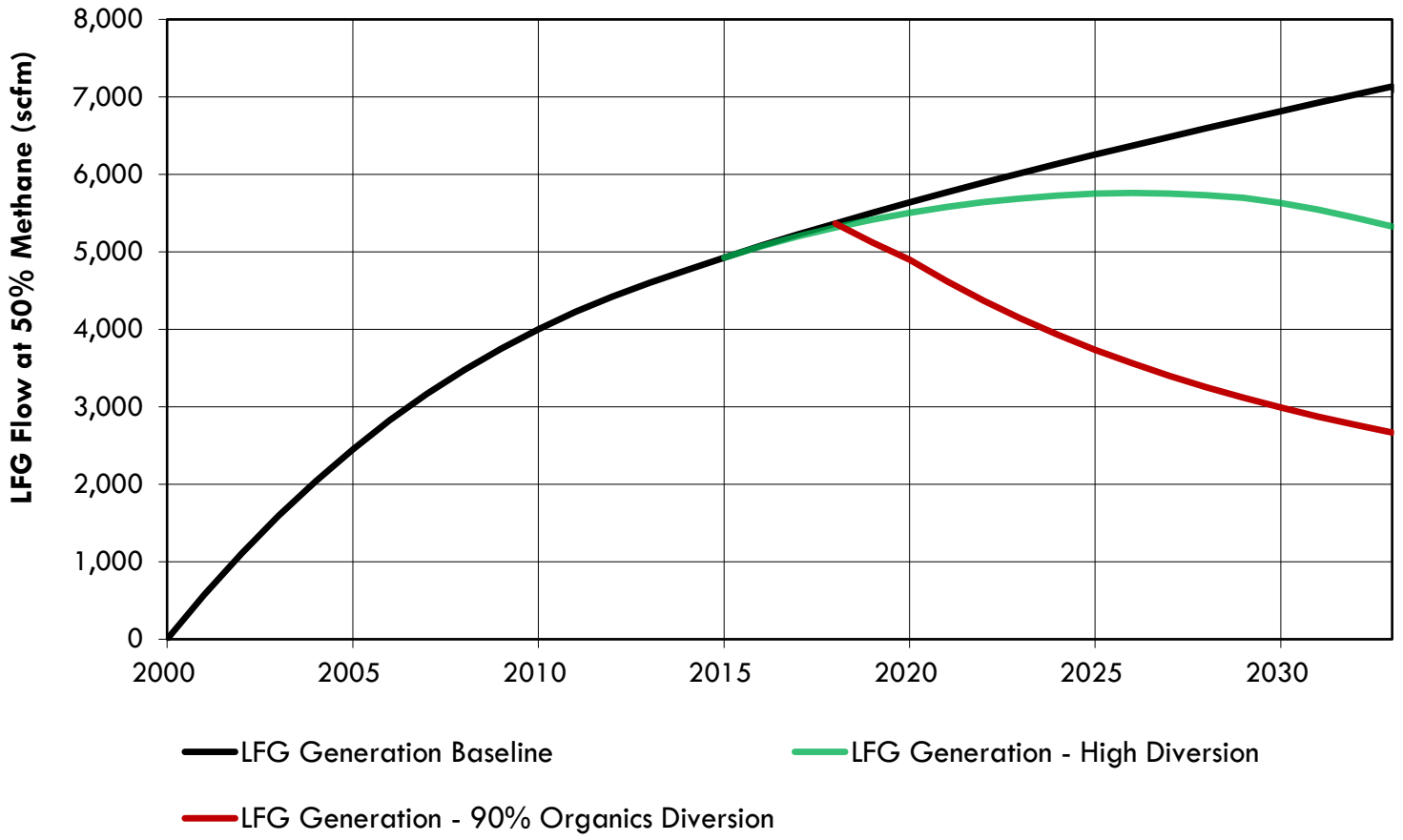
LFG Generation – Wet Climate Site Baseline Disposal = 19M Tons 2000-2032 vs. High Diversion vs. 90% Organics Diversion



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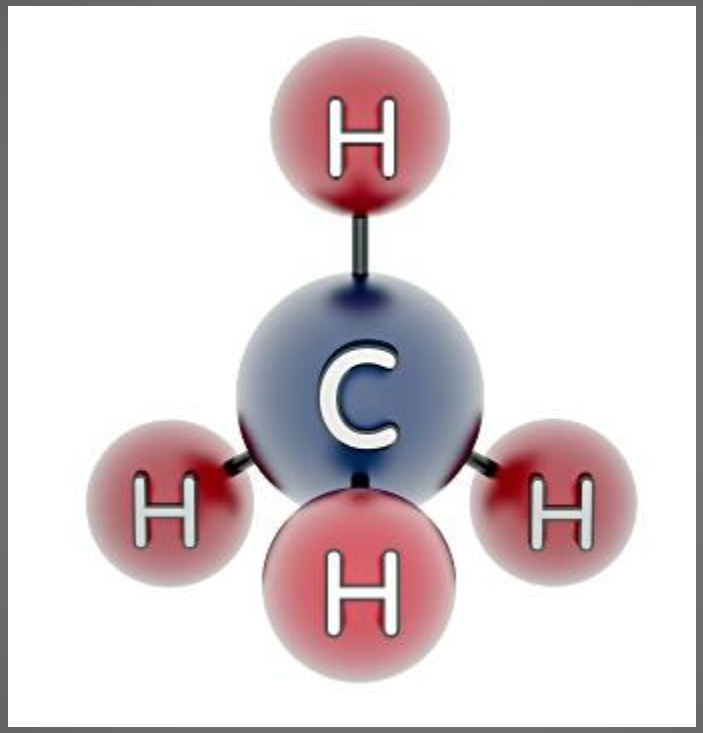
Impacts of Waste Diversion

- Waste diversion is a long-term GHG emissions reduction strategy (leading us to final section)
  - Historical WIP limits effects of future diversion on emissions reduction
  - High diversion rate increases required to bend down LFG generation curve
  - Large effects at national scale are many years away
- Individual sites can have more immediate impacts with organics bans

Importance of Landfill Methane

- Landfill methane collection & combustion yields large, immediate GHG emissions reduction
- Maximize reductions by achieving high collection efficiency & by methane utilization
- Using the landfill gas to offset other types of power generation

Greenhouse Gas/Emissions



California Methane/GHG Rules

- AB 32 California Global Warming Solutions Act (2006)
  - Mandatory GHG reporting rule
  - Cap-and-trade
  - Compliance offset program (not landfills, nothing voluntary)
  - Driver for AB 341/AB 1826 (mandatory recycling)
  - Renewable power to 50% by 2030
- SB 32, codified a 2030 GHG emissions reduction target of 40% below 1990 levels

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Landfill Methane Rule

~90% of CA landfills - required gas systems

- Requires owners and operators of certain uncontrolled MSW landfills to install GCCS, and requires existing and newly installed GCCS to operate in an optimal manner
- Example: Landfills that received waste after 1977, with >450,000 (tons capacity), and certain LFG heat input capacity must install GCCS or quarterly surface monitoring shows no measured concentration of LFG >200 ppm
- NSPS is much higher (2.5 million Mg capacity/500 ppm)

California Methane/GHG Rules

SB 1383
Implementation started 1/1/2018

Short-lived climate pollutants (SLCP):

- Landfill methane emissions via diversion of organic material from the waste stream

Emission Reduction Targets Below 2013 levels by 2030

- Methane (CH4) by 40%
- Hydrofluorocarbons (HFC) by 40%
- Anthropogenic Black Carbon by 50%
- Reduce organics waste in landfills

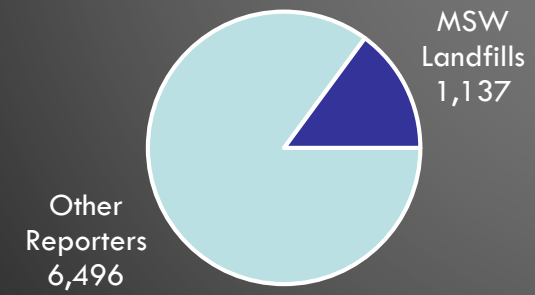
- Targeted organics disposal
  - A 50% reduction in the level of the statewide disposal of organic waste from the 2014 level by 2020
  - A 75% reduction in the level of the statewide disposal of organic waste from the 2014 level by 2025
  - 20% of edible food to be recovered for human consumption

Upshot of These Rules

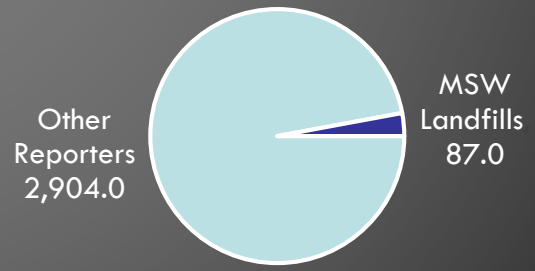
- Greenhouse gas emissions reductions are the goal
- As such, organics have no place in landfills
- Almost all landfills should be collecting and destroying their gas efficiently

Landfills in the USEPA GHGRP

- MSW Landfills Report under Subpart HH
  - Some under Subpart C as well (turbines, engines, etc.)
- 14.9% of Reporting Facilities make up only 2.9% of Reported Emissions



2016 Total Reporting Facilities



2016 Reported Emissions MMTCO2e

Landfills in the GHG Inventory

- Inventory shows significant decrease in landfill emissions since 1990
- Variance between Inventory and GHGRP data of around 22% on average
- Industry recommends:
  - Use of GHGRP validated emissions information
  - Use of OX factors from GHGRP
  - Use of reported HH-6 or HH-8 from reporter selection
  - Use of 7% estimate for non-reporting sites

Summary

- Organics diversion will continue to impact landfill air rules
  - Less with current administration (can change quickly!)
- Organics diversion impacts LFG generation
  - Takes a lot
- Greenhouse gas may drive organics diversion requirements
  - More efficient collection most effective

QUESTIONS?

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