

# Weather- Proofing Solid Waste Operations & Facilities

## Landfill Management Adaptations

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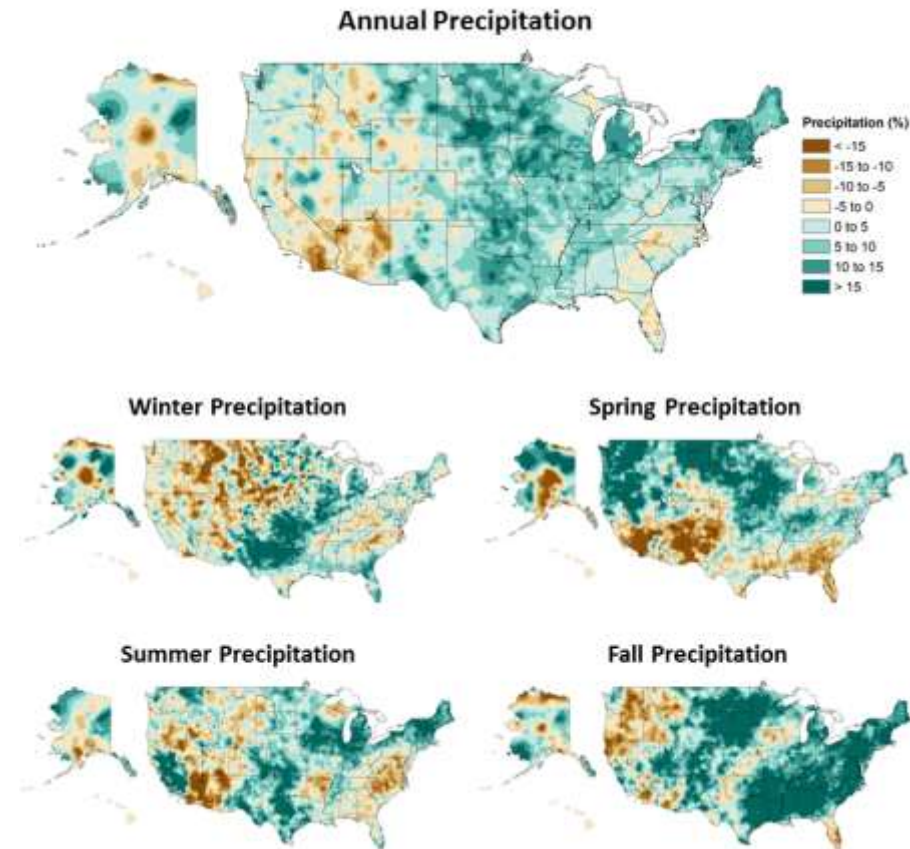
MRN/SWANA-MA 2019 CONFERENCE  
**THE CHANGING CLIMATE OF  
SOLID WASTE & RECYCLING**

# Introduction

- Changing weather patterns
- Debris management
- Effects on LFG
- Landfill management
- Adaptation
- Management plans

# Changing Weather

- NCA4 and IPCC data
- Natural disasters
  - Coastal storms
  - Floods
  - Forest Fires
- Heat waves
- Variability
- High precipitation events
- Annual precipitation increase



[https://science2017.globalchange.gov/img/styles/figure7\\_1-1200.png](https://science2017.globalchange.gov/img/styles/figure7_1-1200.png)

# Debris Management

- Varies by event
  - Floods
  - Coastal storms
  - Forest fires
- Clean-up response
- Temporary storage
- Landfill disposal



<https://www.gannett-cdn.com/-mm-/6dde7c9729efb1af4cbd5c5fa9345d19f58ced49/c=0-202-3595-2233/local-/media/2017/10/08/Naples/Naples/636430729266107669-NDN-1009-INTEKNOW-3.jpg?width=3200&height=1680&fit=crop>

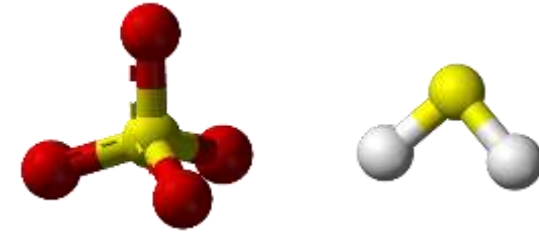
# Debris Management

- Different effects near and regionally
- Planning
  - Effects more far-reaching
  - Importance of debris management plans
- Waste Projections
- Effects to LFG
  - Gas production rates
  - Sulfur



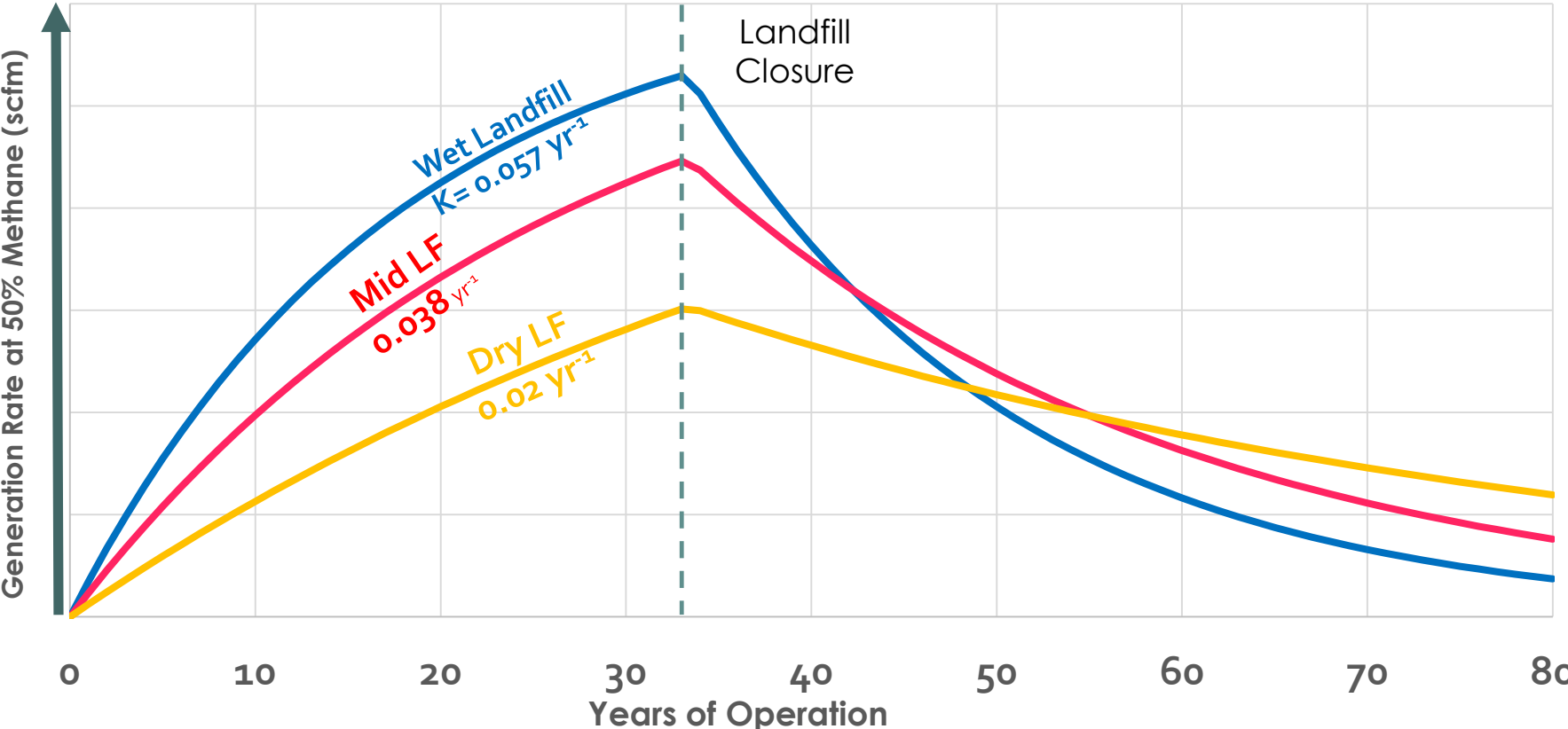
# LFG Effects of Debris

- Building debris
- Drywall and sulfur
  - Gypsum decomposition
  - Odors
  - Regulatory issues
  - Permit limits
- Gas production affected



# Precipitation Changes and LFG

## LFG Generation Rates and Precipitation Changes





# Precipitation Changes and LFG

- Higher gas generation
  - More revenue
  - Odors
  - Migration
- Landfill liquids
  - Well slots
  - Blockages/surging
  - Ponding
- Settlement



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# LFG Adaptation Strategies

- Liquids management
  - Dewatering
  - Re-grade headers
  - Redrills
  - Dual extraction
- Gas expansion
- Supplemental collection
- Intermediate capping
- Migration control/supplemental wells
- Adjust gas model

# Landfill Management

- High precipitation events
- Weather variability
- Changes to landfill liquids
- Erosion risks
- High wind events
- Heat waves



# Adaptations for Management

- Liquids management
- Erosion control
- Leachate modeling
- Wind control
- Slope stability
- Good maintenance practices
- Fix what you know is not working

# Emergency Management

- Importance of emergency management
  - Develop one
  - Check and revise current plan
- Consider staffing
  - Essential v. non-essential
  - Truck drivers
  - Routes
  - Staff are a part of the community
- Waste management is important infrastructure



<https://m.theepochtimes.com/assets/uploads/2018/09/18/interstate-40-i-40-florence-flooding-hurricane.jpg>

# Summary

- Weather patterns changing
- LFG and landfill changes
- Maintaining compliance
- Strategies to address changes
  - Effective/innovative use of existing technology
  - Site-specific
  - Proactive vs. reactive
  - Cadillac or pickup truck solutions
- Adaptation plans
- Management Plans

# Contact Info

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