

# Navigating USEPA Air Rules and EJ Requirements for Wastewater Energy and Biosolids Projects

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# Presentation Agenda

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- **Introduction: What Biosolid Processes Are Regulated**
- **The Regulatory Burden Associated Biosolids Programs**
- **Decoding the Air Rules**
- **PFAS and the Air Emissions Frontier**
- **Environmental Justice Implications**
- **Questions**

# Section 1 Introduction

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## *Biosolids Process Overview*

# Biosolids Processing at Wastewater Treatment Plants



**Biosolids are treated, stabilized, and then reused or disposed through land application, disposal, or incineration.**

## 1. Wastewater Treatment → Sludge Generation

- Solids are separated from wastewater (trash/debris)
- Aerobic treatment of wastewater produces biosolids

## 2. Dewatering

- Removes water to reduce volume
- Example: Filter Press
  - Thermal dryer (produce class A biosolids)

## 3. Stabilization (e.g., Digestion) and Drying

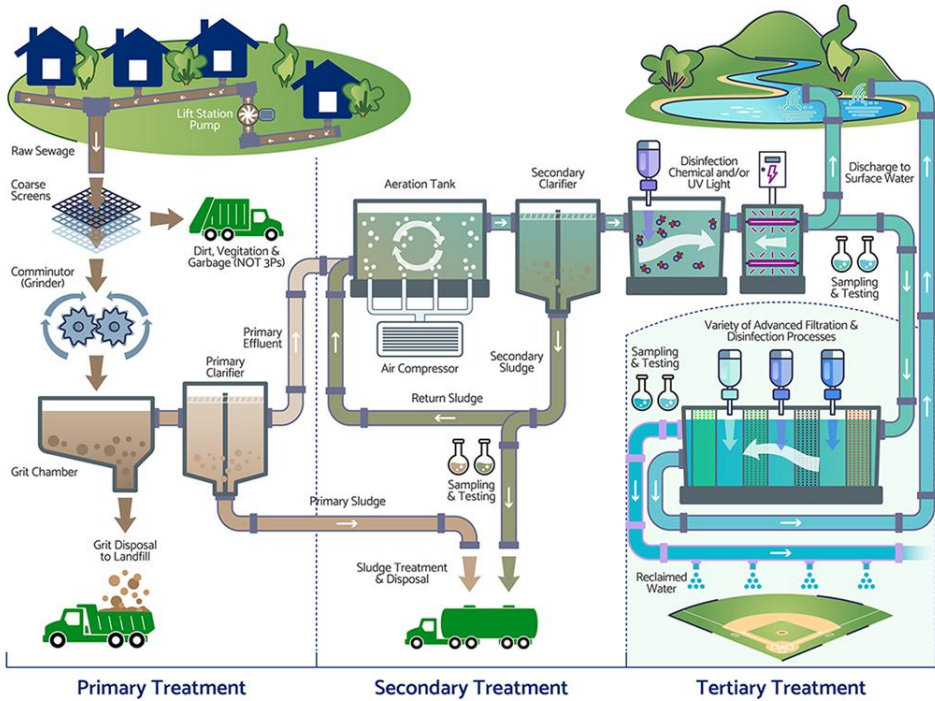
- Reduces pathogens, odors, water content and volume
- Example: Anaerobic digestion
- Convert organics to biogas

## 4. Final Use or Disposal: EPA identifies three primary options:

- Land application (beneficial reuse)
- Surface disposal/landfilling
- Incineration

# How Regulations Apply to Biosolids Processes

Sludge → Dewatering/Stabilization → Drying → Final Use/Disposal



[https://www.mywater.us/images/default-source/site-wide/water-smart/utility-systems-infogram\\_wastewater\\_1200x864.png?sfvrsn=8fba2d5b\\_4](https://www.mywater.us/images/default-source/site-wide/water-smart/utility-systems-infogram_wastewater_1200x864.png?sfvrsn=8fba2d5b_4)

Process Stage	What Happens	Applicable Regulations
Dewatering	Removes water prepares for reuse/disposal	40 CFR Part 503
Sludge Treatment (digestion, stabilization)	Reduces pathogens, stabilizes material	40 CFR Part 503 (pathogen & vector requirements)
Surface Disposal / Landfilling	Placement in disposal sites	40 CFR Part 503 (design, pollutant limits)
Land Application	Applied to land as fertilizer/soil conditioner	40 CFR Part 503 (pollutants, pathogens, management practices)
<u>Thermal Processing</u>		
Drying	Heating sludge to remove water	40 CFR Part 503 40 CFR Part 61 (mercury)
Incineration	Thermal destruction of sludge	40 CFR Part 503 Part 60 (air emissions) Part 61 (e.g., mercury for dryers)

# Historic Biosolid Disposal

## Reilly in New York to Mark End of Sewage Sludge Dumping

[EPA press release - June 30, 1992]

EPA Administrator William K. Reilly is participating today in an event in New York City marking the end of dumping sewage sludge in the ocean.

Attached is an EPA Region 2 press release on the event.

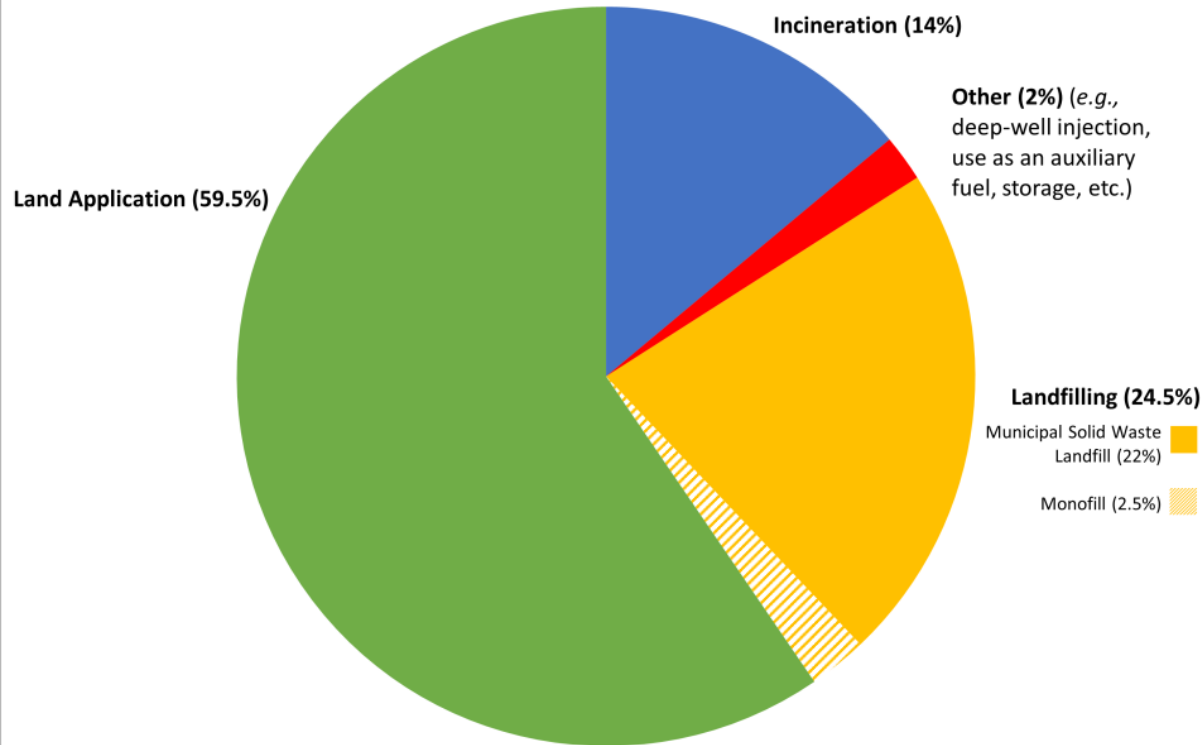
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United States  
Environmental Protection Agency  
Region 2  
For Release: June 30, 1992

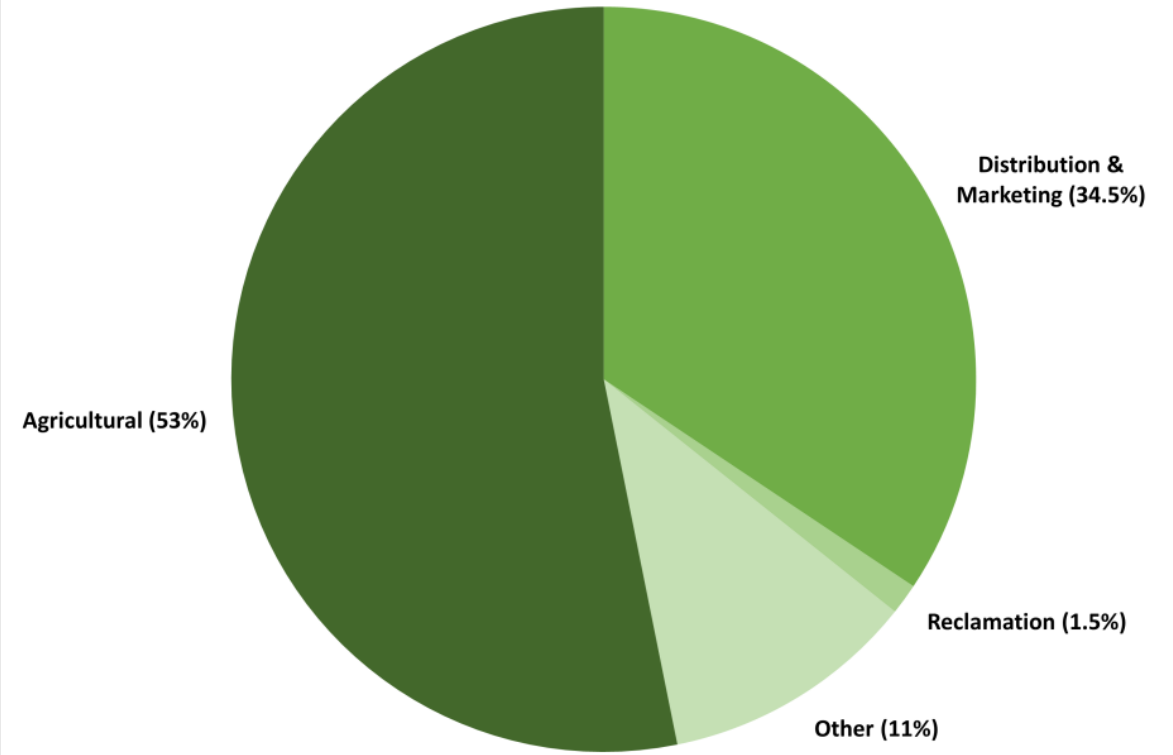
**EPA Declares End of Ocean Dumping as New York City Ceases; EPA Committed to Long-Term Beneficial Alternatives**

# Biosolid Use

Sewage Sludge Use & Disposal from  
2024 Biosolids Annual Reports



Reported End Use of Land Applied Sewage Sludge from  
2024 Biosolids Annual Reports



<https://www.epa.gov/biosolids/basic-information-about-sewage-sludge-and-biosolids#basics>

## **Section 2: The Regulatory Burden**

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***Why Biosolids Programs Cannot Navigate Air Rules Alone***

# Federal Framework for Biosolids and Air Emissions

## Two Federal Laws:

- Clean Water Act (CWA) → Regulates Biosolids
- Clean Air Act (CAA) → Regulates Air Emissions

Regulation	Law	What it controls
40 CFR Part 503	CWA	Biosolids management
40 CFR Part 60	CAA	Emissions from equipment (including biosolids incinerators)
40 CFR Part 61	CAA	Hazardous air pollutants



***Part 503 = biosolid regulation***

***Part 60 = incinerator regulations***

***Part 61 = controlling toxic pollutants***

***Utilities may be required to comply with all three regulations simultaneously.***

# How the Regulations Stack Together



## **Standards for the Use or Disposal of Sewage Sludge (40 CFR Part 503 Subpart E)**

- Establishes requirements for the final use of biosolids including:
  - Surface Disposal
  - Land Application
  - Incineration

## **National Emission Standards for Hazardous Air Pollutants (40 CFR Part 60)**

- The nine-pollutant MACT framework:
  - Subpart LLLL for new SSIs (construction after Oct 14, 2010),
  - Subpart MMMM for existing SSIs; implemented via state plans or EPA federal plan

## **Standards and Performance for New Stationary Sources (40 CFR Part 61)**

- The hidden exposure: Mercury limits that apply explicitly to thermal dryers, not just incinerators,
  - no construction date cutoff

# Part 503 — Biosolids Rule (Clean Water Act)

Subpart D applies to B and C — not incineration

Sub part	Function
B	Land application
C	Surface disposal
D	Pathogen & vector control
E	Incineration

***Part 503 controls how biosolids are handled—not detailed air emissions.***

## Land Application:

- Site restrictions
- Pathogen limits
- Soil loading limits

## Surface Disposal:

- Containment (site design, monitoring)

## Incineration:

- Sludge feed limits
- Furnace operation
- Total Hydrocarbons (combustion indicator)
- Monitoring and reporting

# Part 60 — NSPS (Clean Air Act)

*Part 60 is equipment-based.*

Subpart	Applied to
LLLL	New incinerators
MMMM	Existing incinerators

## Regulates emissions from industrial equipment

- Applies to many source types (not just biosolids)

## For biosolids:

- Applies to Sewage Sludge Incinerators (SSIs)

## Part 60 establishes enforceable numerical emission limits for:

- Cadmium
- Carbon monoxide (CO)
- Hydrogen chloride (HCl)
- Lead
- Mercury
- Nitrogen oxides (NOx)
- Particulate matter (PM)
- Dioxins/furans
- Sulfur dioxide (SO<sub>2</sub>)

## Part 60 requires:

- Use of Best Demonstrated Technology (BDT) (NSPS concept)
- Installation and proper operation of air pollution control devices (APCDs)

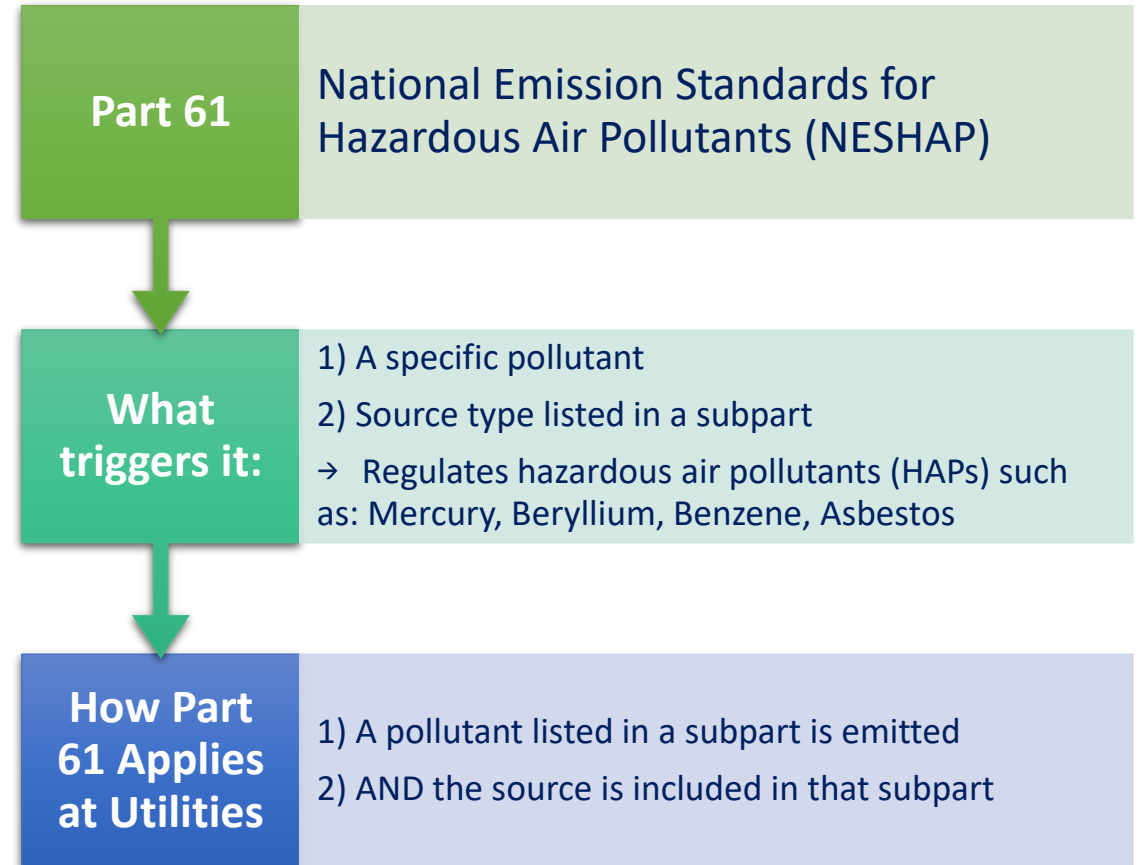
## Based on Part 60 structure and SSI rule references:

- Fabric filters (baghouses) → PM control
- Wet or dry scrubbers → acid gases (HCl, SO<sub>2</sub>)
- Activated carbon injection → mercury, dioxins
- Electrostatic precipitators (ESP) → particulates
- Selective non-catalytic reduction (SNCR) → NOx

# Part 61 — NESHAP (Hazardous Air Pollutants)

*Part 61 regulates hazardous pollutants through pollutant-specific subparts, and for mercury, EPA explicitly includes both sludge incinerators and sludge dryers.*

Subpart	Pollutant	Key point
C	Beryllium	May apply to thermal processes
E	Mercury	Applies to sludge incinerators AND dryers



# Section 2: PFAS and the Air Emissions Frontier

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*What the 2025 Science Tells Us — and What Regulators Haven't Caught Up To Yet*

# PFAS Regulatory Status: Where We Stand in 2026

- **No federal numeric PFAS limits yet:** EPA's January 2025 draft risk assessment for PFOA/PFOS is the first step toward regulation under 40 CFR Part 503
- **25,000+ public comments received:** Draft assessment covers land application, surface disposal, and incineration — not MSW landfills (RCRA jurisdiction)
- **State action is already here:** ME and CT have banned PFAS-containing biosolids outright; MI and NY use 20 µg/kg PFOS/PFOA as the land application trigger; CO, MN, WI, MD and others are enacting tiered frameworks — 10+ states now regulate independently of federal action.
- **Federal lawsuit pending:** Farmer v. EPA (June 2024) seeks to compel numeric standards for biosolids; moving slowly through courts
- **The bottom line:** Utilities planning biosolids programs today face an unresolved federal standard and a patchwork of state requirements — with no clear national floor in sight



# PFAS and the Air Emissions Frontier: What the 2025 Science Shows



► [Water Environ Res. 2025 Oct 20;97\(10\):e70149. doi: 10.1002/wer.70149](#)

## Fate of PFAS Through a Biosolids Drum Dryer With Regenerative Thermal Oxidizer Emissions Control

[John J Ross](#)<sup>1,✉</sup>, [Alex Seidel](#)<sup>1</sup>, [Embrey Bronstad](#)<sup>1</sup>, [Farokh Kakar](#)<sup>1</sup>, [Mary Lou Romero](#)<sup>1</sup>, [Martha J M Wells](#)<sup>2</sup>, [Lloyd J Winchell](#)<sup>1</sup>, [Katherine Y Bell](#)<sup>1</sup>, [Don Song](#)<sup>3</sup>

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PMCID: PMC12536579 PMID: [41114454](#)

- **60% of targeted PFAS removed from the biosolids solids:** On a total molar basis, PFAS in the dried product was 40% of what entered in the dewatered feed — meaning thermal drying actively reduces PFAS loading in the solid product, which can help utilities fall below state land application thresholds
- **PFAS in the exhaust gas was six orders of magnitude lower than in the feed:** The scrubbed exhaust stream contained negligibly small amounts of targeted PFAS compared to the dewatered feed; scrubber water showed no PFAS accumulation
- **Regenerative Therman Oxidizers destruction/removal efficiency: 93.5% to 99.3%:** The range reflects uncertainty around HFPO-DA (GenX), a thermally unstable and measurement-prone compound; excluding HFPO-DA, PFAS DRE reached 99.3% — RTO plus activated carbon injection (ACI) is the current best-practice air control pathway

# PFAS and the Air Emissions Frontier: What the 2025 Science Shows



- **The critical unresolved question: Transformation products?**
  - 60% of PFAS mass left the feed solids, but less than 0.002% appeared in the measured gas phase — the gap suggests PFAS may be transforming within the dryer's internal recirculation loop into products not yet characterized or regulated
- **No federal air emission standard for PFAS from dryers or SSIs exists today:**
  - EPA's January 2025 draft risk assessment covers land application and incineration in biosolids, but does not address air pathway PFAS from thermal dryers; this is a live regulatory gap with no compliance floor
- **The implication for Air Pollution Control design decisions:**
  - Utilities commissioning thermal dryers today utilizing RTO and ACI systems are required to size systems without a regulatory target
  - Building in extra capacity may better position utility when a standard arrive
  - Retrofitting existing systems are typically more expensive

# **Section 3: Environmental Justice**

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***Federal Rollback, State Action, and Permitting Implications***

# Environmental Justice: The Federal Pullback and What It Really Means

- **Federal EJ is functionally suspended:** Jan–Mar 2025: Trump EOs revoked E.O. 12898, 14008, 14096; EPA shut all EJ offices; EJScreen taken offline Feb 5, 2025
- **State EJ law is alive and binding:** 34 states have statutory or regulatory authority to consider EJ in permitting decisions (EDF 2025); 8 states have enacted cumulative impact laws directly binding on air and waste permit applicants: NJ, NY, CT, MA, and CA lead with the most operationally demanding requirements for utility projects
- **New Jersey is one of the most stringent in the country:** 2020 law requires cumulative impact analysis for new/expanded facilities near overburdened communities — applies directly to WWTP air permit applications



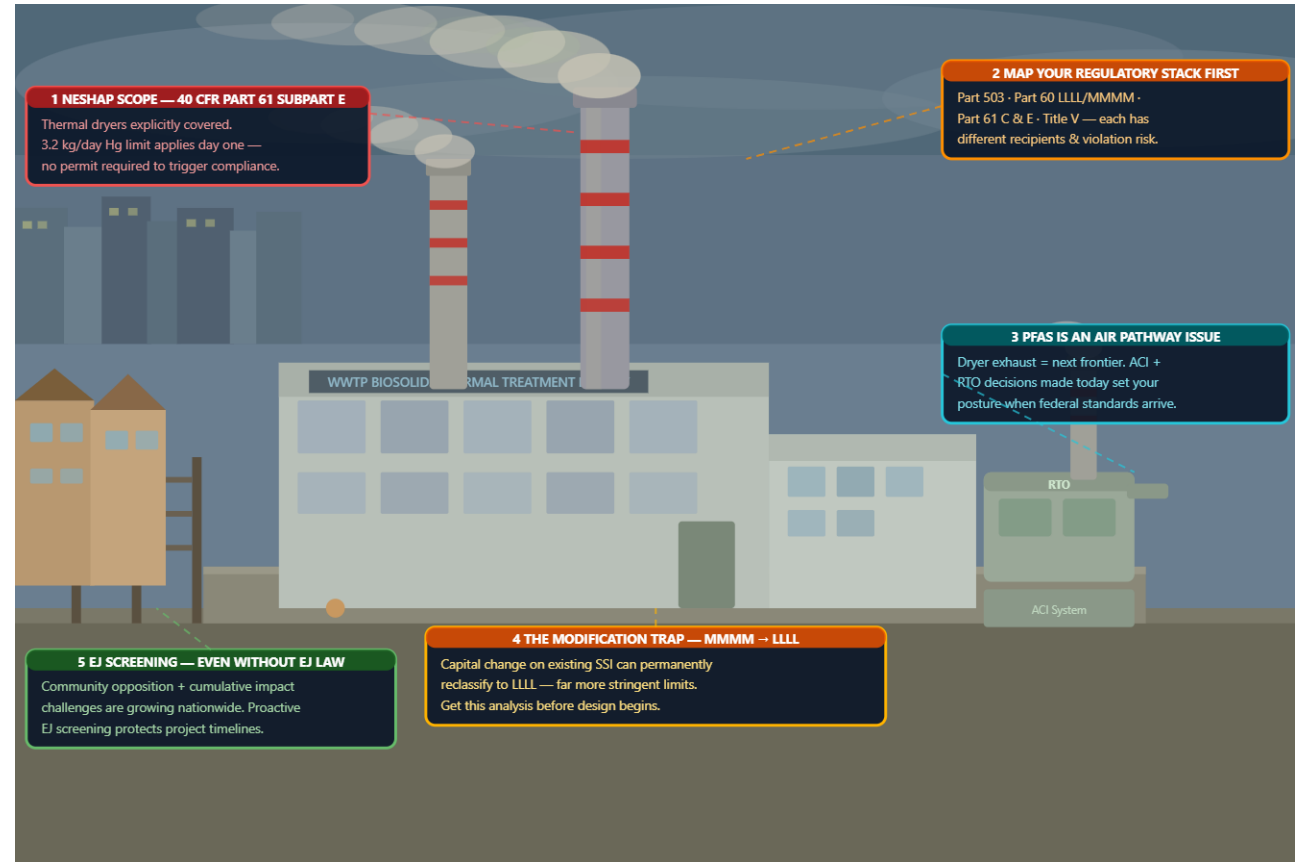
# State EJ Laws: What Utility Clients in These States Must Know Now

- **New Jersey (2020):** Mandatory cumulative impact analysis for air permit applications in overburdened communities; enhanced public participation requirements; hardest EJ permitting law in the US.
  - <https://dep.nj.gov/ej/administrative-order-meetings-notices>
- **New York (2022 + 2025 SEQRA updates):** CLCPA requires climate justice screening; proposed SEQRA amendments integrate EJ into all environmental reviews; NYSDEC announced EJ reg updates Jan 2025
- **Connecticut (2023, PA 23-202):** Directs DEEP to develop cumulative impact regulations; workshops with industry and EJ stakeholders ongoing through 2025
- **California:** CalEnviroScreen used in CARB air permits; CalRecycle EJ office established 2022; most developed state-level EJ infrastructure in the country
- **Other States also have EJ requirements including CO, PA, MA, etc.**
- **The consulting implication:** For utilities in these states, EJ analysis is not optional — it belongs in the air permit application from day one, not as an afterthought



# Key Takeaways: What Utilities Should Do Right Now

- **Do not assume your dryer is outside NESHAP scope:** 40 CFR Part 61 Subpart E covers thermal dryers explicitly — the 3.2 kg/day mercury limit applies from day one of operation, no permit needed to trigger compliance
- **Map your regulatory requirements before engineering begins:** Part 503, Part 60 LLLL or MMMM, Part 61 Subparts C and E, Title V — each has different recipients, timelines, and violation consequences
- **Evaluate PFAS as an air pathway issue, not just a biosolids issue:** Your dryer's exhaust is the next frontier; ACI and RTO design decisions made today will determine your compliance posture when federal standards arrive
- **Check the modification trap before any capital project:** An existing sludge incinerator under MMMM can be permanently reclassified to LLLL by a physical or operational change that exceeds compliance scope — get this analysis done first
- **Engage EJ analysis early — even in states without an EJ law today:** Community opposition and permit challenges citing cumulative impacts are growing; proactive EJ screening protects project timelines



# Questions & Discussion

## Thank you for your time

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**THANK YOU**

For your attendance and attention. Any questions?



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