A large, faint watermark of the EPA logo is centered in the background. It features a stylized flower with three leaves and a circular seal containing the text "UNITED STATES ENVIRONMENTAL PROTECTION AGENCY".

# Issues in Real-world Effectiveness of AESS & Other Idle Reduction Technologies

Abby Swaine, EPA Region 1 – New England  
2023 FRA Workshop on Decarbonization of Rail  
Transportation

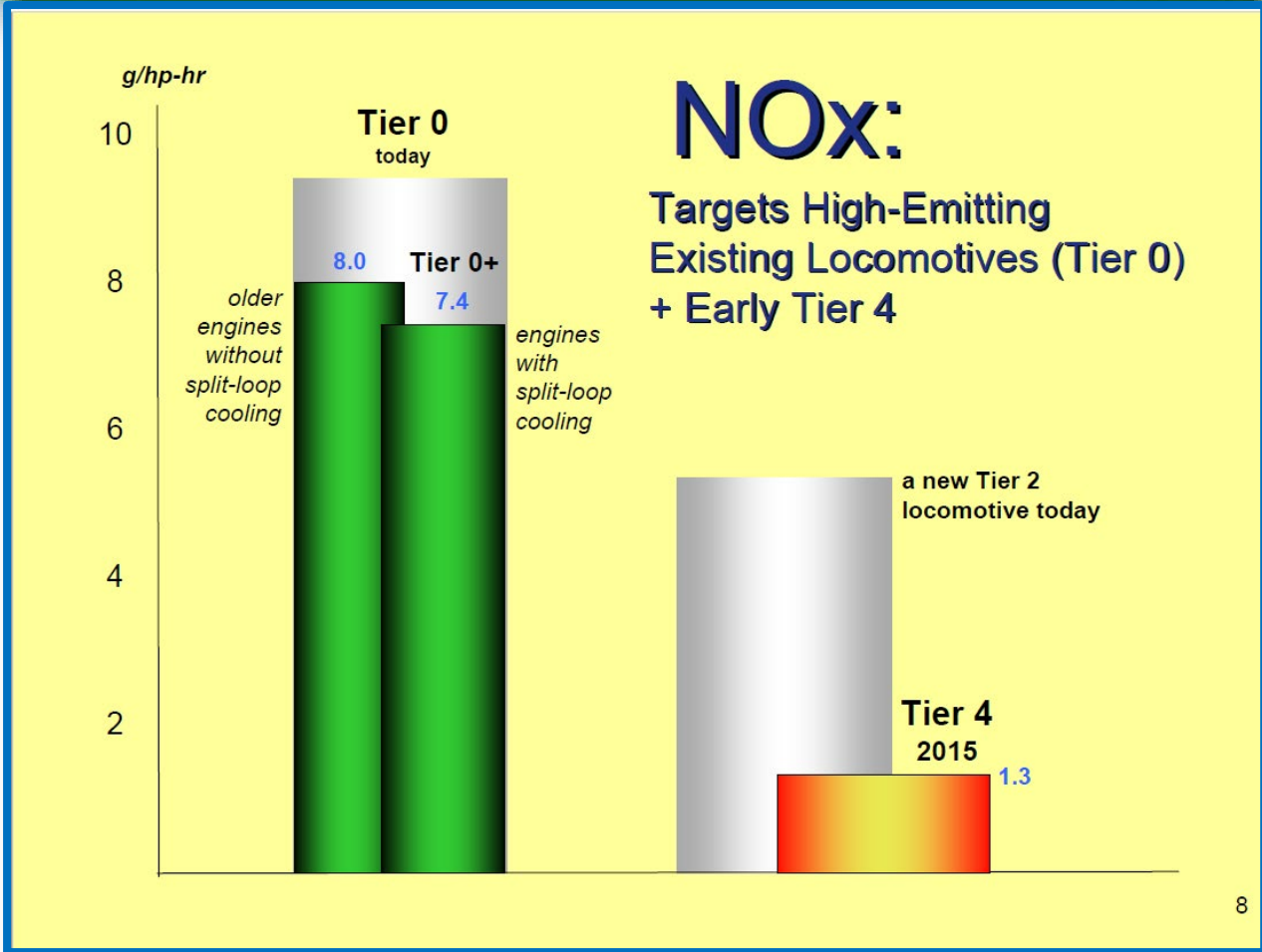


# Context: EPA Regulatory & Voluntary Programs

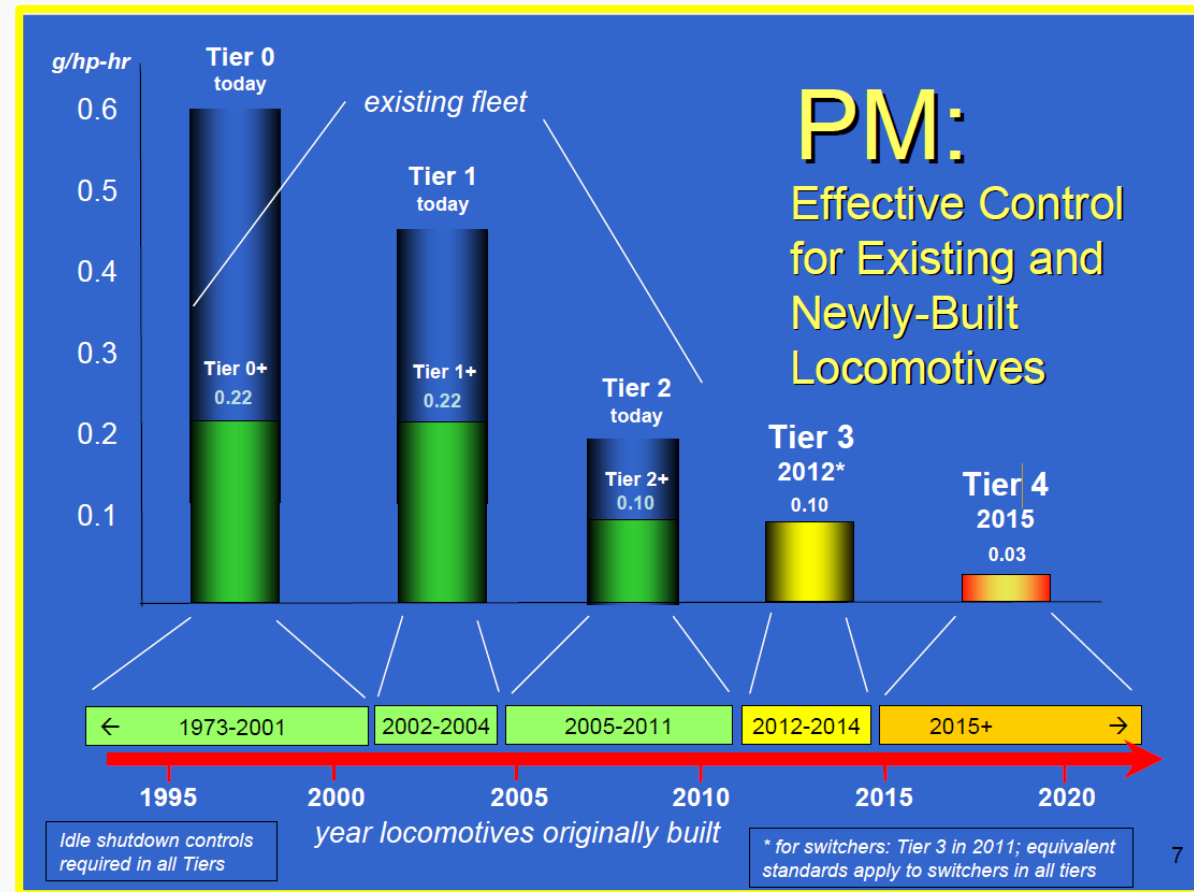
- Locomotive Engine Rule
- Diesel Fuel Standards
- Clean Diesel Program
  - SmartWay
  - Ports Initiative
  - DERA
- Regional Implementation

Diesel Emissions Reduction Act (DERA) Funding





Note: "today" = 2008





# Why try to minimize idling?

- Uphold the law
- Protect public health
- Attain ambient air quality standards
- Address hotspots
- Improve quality of life (noise, odors)
- Reduce GHGs

Tables from 2020 National Emissions Inventory, Locomotive Methodology

Table 21. 2017-2020 Yard Engine Fleet Composition Comparison

Tier	2020 Locomotive Count	2017 % of Fleet	2020 % of Fleet
0	673	23.61%	23.75%
0+	1,182	25.99%	41.71%
1	0	0.00%	0.00%
1+	26	4.76%	0.92%
2	7	2.33%	0.25%
2+	0	4.64%	0.00%
3	11	10.18%	0.39%
4	23	2.47%	0.81%
NC	912	26.01%	32.18%

Table 19. 2017-2020 Class II/III Fleet Profile Comparison

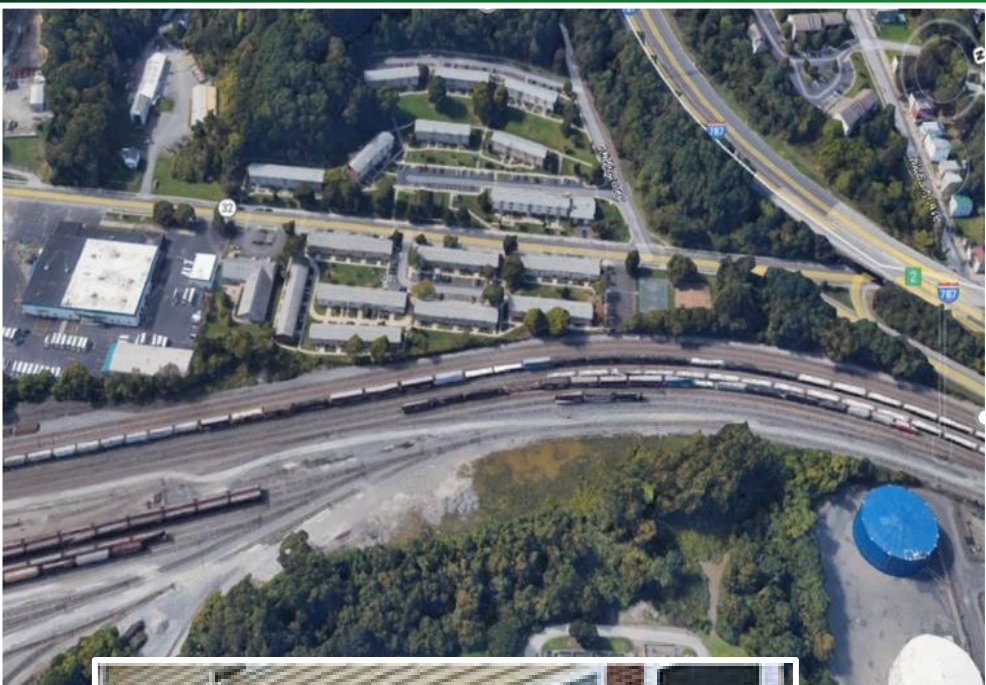
Class II/III Fleet Profiles				
Tier	2017 Locomotive Count	2020 Locomotive Count	2017 % of Fleet	2020 % of Fleet
0	1,379	1,664	44%	48%
1	7	31	0%	1%
2	107	169	3%	5%
3	118	160	4%	5%
4	22	64	1%	2%
NC	1,492	1,359	48%	39%
Total	3,125	3,447	100%	100%



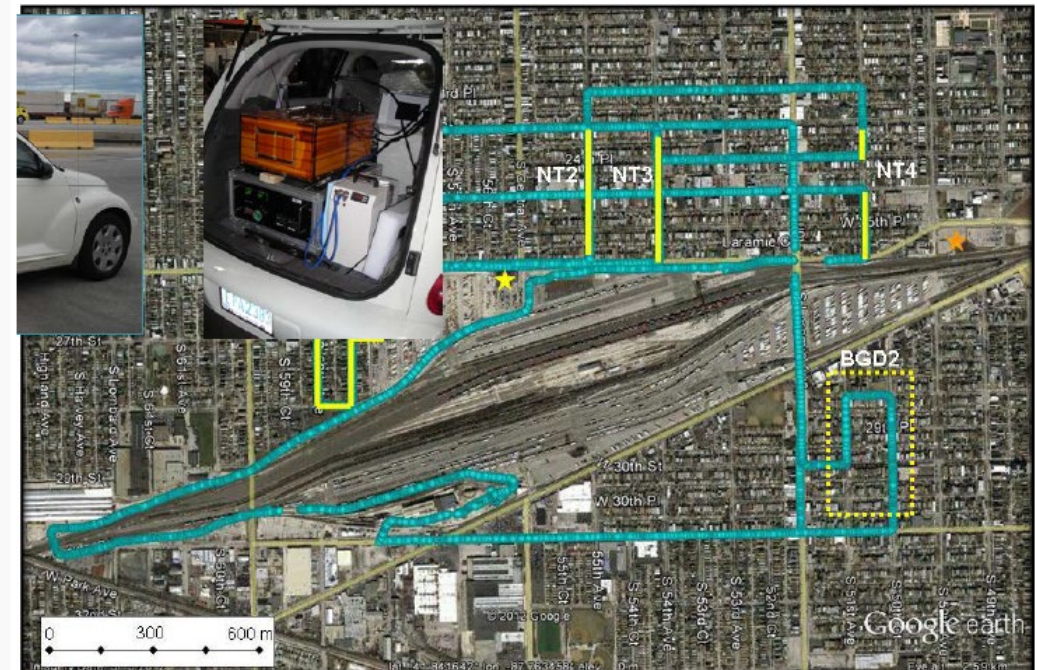
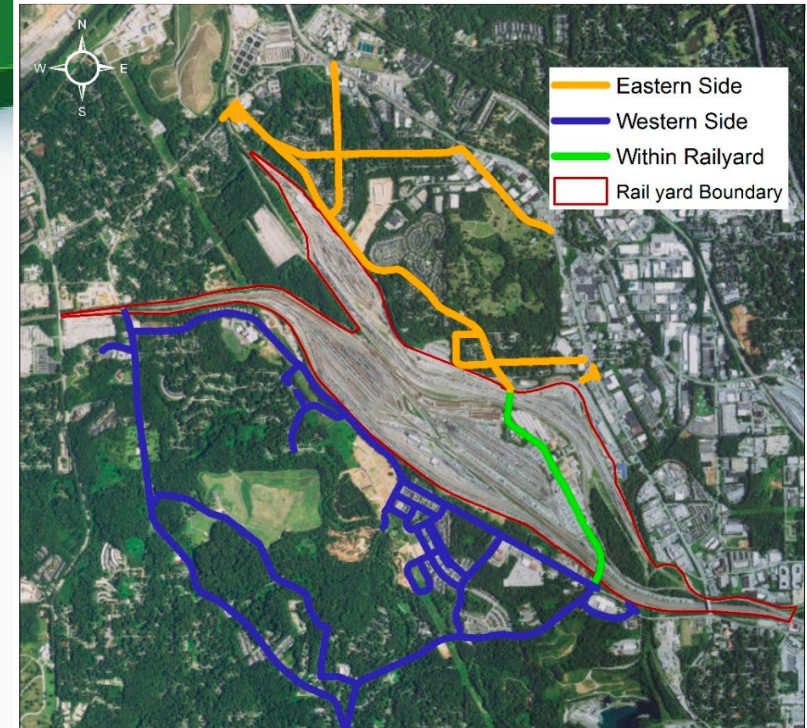
METRIC		<b>SWITCH</b> (defined by duty cycle & low HP) (CA: 1,500-2,000 HP)	<b>LINE HAUL</b> (defined by duty cycle & high HP)	LINE HAUL DOING SWITCH (defined by duty cycle only) (CA: 3,000-4,000 HP)
On-Duty Time (hr/yr)	CA	3,000	5,000	3,000 (inferred)
	EPA	4,450	4,350	4,450 (inferred)
Total Idling Time (hr/yr)	CA	1,800 (60% of on-duty time)	2,000 (40% of on-duty time)	1,800 (inferred)
	EPA	2,660 (60% of on-duty time)	1,650 (40% of on-duty time)	2,660 (inferred)
<b>Discretionary Idling Time (hr/yr)</b> (EPA: "low idle" time)	CA	900 (50% of total idling time)	?	900 (50% of total idling time)
	EPA	1,330 (50% of total idling time)	825 (50% of total idling time)	
<b>Reduction (%) in Total Idling Time &amp; Fuel Consumption due to AESS</b>	CA	<b>10-11</b>	<b>3</b>	10-11
	EPA	<b>50</b>	<b>50</b>	50

CA = California Air Resources Board Estimates, ca. 2015; some info based on GE, EMD & Chicago studies.  
 EPA = Regulatory Impact Analysis, 2008 Locomotive Rule.  
 THIS IS NOT AN OFFICIAL EPA PRODUCT.





# AIR SENSOR TOOLBOX







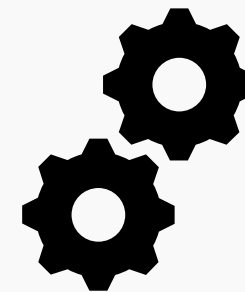
# WHY *DO* LOCOMOTIVES IDLE?





# Mechanical

- Equipment issues
    - breakdowns (locomotives, cars)
    - weak batteries
    - worn starters
    - leaky brake lines\*
    - worn compressors
  - Safety/maintenance issues
    - avoid doing FRA tests
    - maintain brake pressure readiness to avoid pre-trip failure
  - Lack of idle reduction technology (AESS, APU, shore power, yard air)
    - incompatible with engine (age, type) or facility layout
    - not installed
    - insufficient to address locomotive / crew needs
    - Malfunctioning
- \* worse on a long train

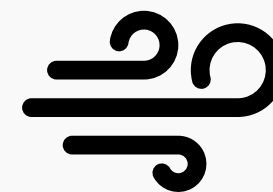






# Meteorological

- freezing temps
- windy/wet/cold weather effects on exposed parts (some models)
- excessively hot temps
- delicate cab electronics need tighter temp control
- stranding due to snow or heat-warped rails





# Spatial

- configuration
- capacity
- order
- road crossings & shared track
- construction-related delays





# Operational

- Operator issues
  - yard or crew not adhering to operating plans or service bulletins
  - plans and bulletins outdated, confusing, too conservative, tardy, etc
  - crew comfort in hot or cold weather
  - crew don't understand loco or idle equipment operation (especially when power sharing?)
  - crew don't understand protocols
  - crew noncompliant (crew change or layover location, shutdown protocol, etc)
- Train scheduling
  - line congestion and tight schedule windows (freight, passenger)
  - cascading delays
  - premature arrival, delayed departure
  - fire or police officials order a train held short of destination
- Crew scheduling
  - hours of service expire
  - not enough operators
  - staffing practices (e.g., avoid paying overtime)





# How EPA has tried to reduce idling

- Loco Engine Rule: outreach and enforcement
- DERA awards
- Ports Initiative: rail BMPs, inventory & strategies
- Field work

**Ports Initiative** CONTACT US


[EPA Ports Initiative Home](#)  
[About EPA Ports Initiative](#)  
[Technical Resources](#)

[Ports and Goods Movement Emission Inventories](#)  
[National Port Strategy Assessment](#)  
[EPA & Port Everglades Partnership](#)  
[Shore Power Technology](#)  
[Best Clean Air Practices](#)  
[Port-wide Planning](#)  
[Diesel Trucks](#)

## Rail Facility Best Practices to Improve Air Quality

[Best Clean Air Practices](#) | [Port-wide Planning](#) | [Drayage Trucks](#) | [Rail Facilities](#) | [Ocean-Going Vessels](#) | [Cargo-Handling Equipment](#) | [Harbor Craft](#)

This webpage is one in a [series of pages](#) that provide information on best practices at ports to reduce diesel pollution and associated health impacts. Select another topic from menu above to explore other sector best clean air practices.



Rail facilities — including those at ports and other intermodal freight terminals — play an important role for freight operations, the economy and air quality. Emissions sources at

Idle reduction technologies not only reduce emissions but also save fuel.


## Genesee & Wyoming Railroad Services Inc. to Address Clean Air Act Violations in Settlement with United States

The Company Estimates it will Spend \$42 Million to Correct Violations and Offset Associated Environmental Harm

January 24, 2023

### Ports Emissions Inventory Guidance:

*Methodologies for Estimating Port-Related and Goods Movement Mobile Source Emissions*



**EPA** United States Environmental Protection Agency



# The Limits and Promise of AESS

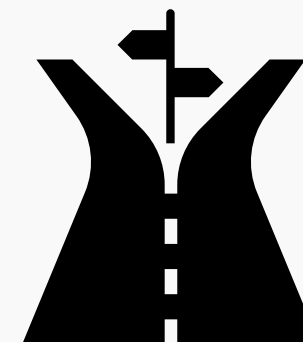
- Limits
  - Inherent
  - As applied
- Promise
  - 2<sup>nd</sup> generation
  - Optional add-ons
  - Combination with other IR: DWS, SCS, APU

The screenshot shows the EPA website page titled "Verified Technologies for SmartWay and Clean Diesel". The page includes the EPA logo, a search bar, and navigation links for "Environmental Topics", "Laws & Regulations", "Report a Violation", and "About EPA". The main content area features a "Verified Technologies for SmartWay and Clean Diesel Home" link, a "Clean Diesel Technology" link, and a "SmartWay Technology" link. The primary heading is "SmartWay Verified List of Idling Reduction Technologies (IRTs) for Locomotives", with sub-links for "Learn about" and "Verified list". Below this, a paragraph states: "The table below shows SmartWay Verified IRTs for locomotives." A list of technology types follows: "Technology types include: • AESS (Automatic Engine Shut-down/Start-up Systems) • APU/GS (Auxiliary Power Units and Generator Sets) • FOH aka DFH (Fuel Operated Heaters aka Direct Fired Heaters) • SCS (Shore Connection Systems)".



## Where do we go from here?

- Allow more state control over discretionary idling?
- Work more closely with STB on environmental impact statement review?
- Better characterize railyard equipment, activity and emissions to estimate impacts?
- Help RRs achieve sustainability goals in a way that matters locally, through...
  - Staffing facilities adequately and managing personnel
  - Maintaining & upgrading equipment
  - Improving yard configuration and management
  - Self-monitoring & planning
  - Communicating with communities
- *Your ideas welcome!* [otag@epa.gov](mailto:otag@epa.gov)





A large, faint watermark of the EPA logo is centered in the background. It features a stylized flower with three leaves and a circular top, surrounded by the text "UNITED STATES ENVIRONMENTAL PROTECTION AGENCY" in a circular arrangement.

# Thank You

Abby Swaine

EPA Region 1 – New England

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