# Data Centers in Oregon:
Modeling Challenges and Future Plans

Oregon DEQ

Kristen Martin
June 21, 2023
NW AIRQUEST Annual Meeting

State of Oregon
Department of Environmental Quality

Why Are We Concerned?

- 31 data centers in Oregon
- 12 new data centers in Oregon since 2020 (and counting)
- 8 modifications (and counting)
- Most data centers have 50-100 diesel generators (up to 179)
- 4 main hubs of activity
- Many within close proximity of each other
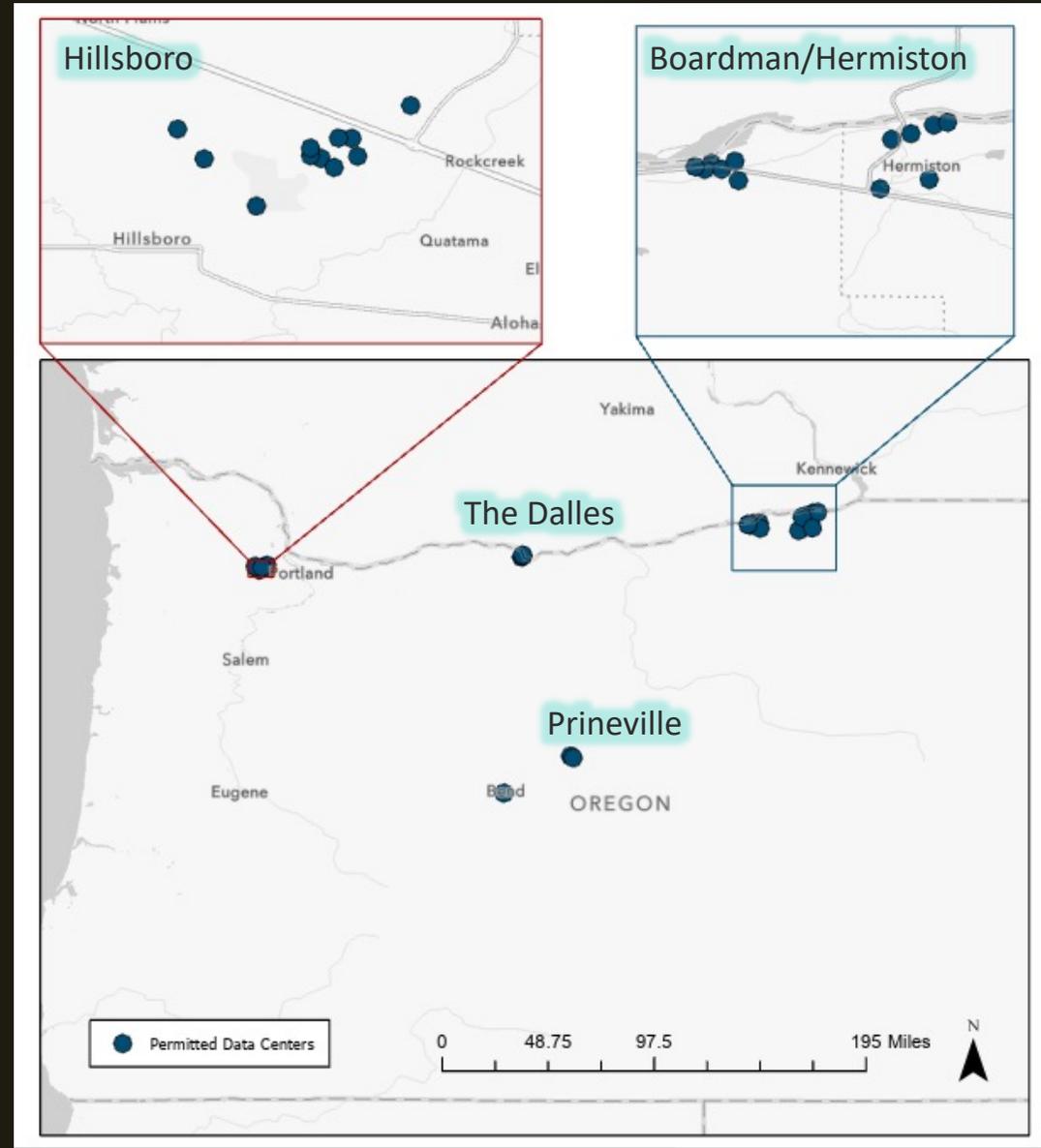
Modeling Triggers

- Most do not trigger state New Source Review
- September 2021 IMD requires all new and modified sources to look at short-term NAAQS impacts
  - High hourly NOx
  - Small footprints in some areas
  - Areas with high background PM2.5
- All new sources required to conduct a CAO risk assessment
  - Level 3 (AERMOD)

Modeling Challenges

Short-term NAAQS

- Oregon does not regulate emergency activities

- Modeling required for regular testing and maintenance

- Intermittent nature of testing (less than 100 hr/year per engine)

- Monte Carlo analysis (thanks Ecology!)

- How to translate modeling to permitting?
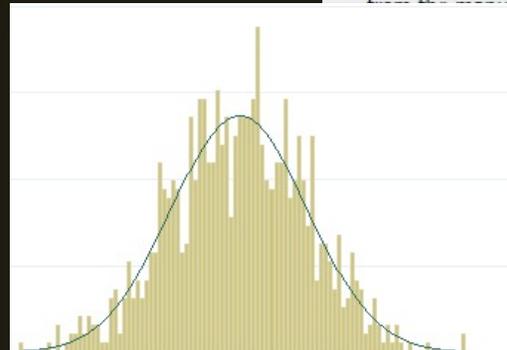
The emergency generator T&M activities will only occur during the hours of 6 am to 4 pm. The following scenarios for T&M are used for the NAAQS analysis:

► Confidence testing: Confidence tests will last 6 minutes for each generator and will be performed at 0% load for all units. Confidence testing will occur biweekly for each generator.
  • For the 104 main generators and 4 house generators, a maximum of a single building (i.e., 26 main generators and 1 house generator) could run simultaneously in any hour. A maximum of one building will be tested in the same day.
  • For the remaining generators (security, industrial water, and industrial water treatment), the test for each generator will occur on the same day, but not within the same hour.
► Preventive maintenance (PM) testing: PM tests will last 10 minutes for each generator and will be performed at 0% load for all units. The PM test will occur once per year per generator.
  • For the 104 main generators, up to three generators will run in any hour. A maximum of 7 generators will be tested in the same day.
  • For the house, security, industrial water, and industrial water treatment generators, the PM test will occur on different days.
► Annual Live Load Test (LLT): Annual LLTs will last four hours for each generator and will be performed at various loads up to 90% load for all units. The annual LLT will occur once per year per generator and will replace one of the biweekly confidence tests for each generator.
  • For the 104 main generators and 4 house generators, only half a building will run at the same time in any hour. A maximum of half a building will be tested in the same day.
  • For the security, industrial water, and industrial water treatment generators, the annual LLT will occur on different days.
► Annual Maintenance testing: Annual maintenance tests will last an hour and 12 minutes at the following operating loads.
  • 0% Load for 5 minutes
  • 80% Load for 2 minutes
  • 25% Load for 5 minutes
  • 50% Load for 5 minutes
  • 100% Load for 50 minutes
  • 0% Load for 5 minutes
Stack dispersion parameters and emission rates are the weighted average rate at each of the corresponding operating loads. Emission factors are only available for 10%, 25%, 50%, 75%, and 100% from the manufacturer. These emission factors are used to determine the emission factor at 80% load ...order polynomial fit if the R² value of the polynomial fit is greater than 0.99. When the fit ...his standard, linear interpolation between the surrounding emission rates is used. Annual ...ts will occur once per year per generator.
  ...main generators, only one generator will run in any hour. A maximum of 2 generators ...d in the same day.
  ...e, security, industrial water, and industrial water treatment generators, the annual ...will occur on different days.

Cleaner Air Oregon

- Most facilities modeled the ranked worst engines to get a facility wide fuel limit

- Identifying homes, businesses, and schools nearby continues to take time

- Uncertainty in Diesel Particulate Matter Toxicity Value

Permitting Considerations

- Frequent permit modifications due to changes that trigger CAO and short-term NAAQS reassessment

- Complex modeling assumptions translated to permit conditions

- Source testing every five years or less

- Climate Protection Program – Best Available Emissions Reduction (BAER)

State of Oregon
DEQ Department of Environmental Quality

Looking to the Future

- Expect many more permitting actions
- Streamline modeling requirements
- New toxicity value for DPM possible
- Primary power concerns
- Public Interest/Comments

Oregon dreams of semiconductor factories, but land and tax breaks are going to data centers instead

Twitter's tax breaks are worth $300,000 for each of its 18 Hillsboro employees.

Mike Rogoway

As Amazon expands in eastern Oregon, regional carbon emissions soar

Mike Rogoway

Oregon's data center clean energy bill dies in committee

Oregon's biggest server farms aren't subject to the state's climate rules.

Mike Rogoway

OREGON TECH

Amazon secures $1 billion in tax breaks for five new data centers in eastern Oregon

Updated: May. 10, 2023, 8:15 p.m. | Published: May. 10, 2023, 5:10 p.m.

State of Oregon
Department of Environmental Quality

How to Steamline?

- Higher Modeling Threshold for engines that install Tier 4 compliant engines
  - Required permit conditions to limit time of day engines can test
  - Must have controls installed (DPF, DOC, SCR)
  - Would remove short-term NAAQS requirement
- Cleaner Air Oregon Tool
  - Similar designs across many data centers
  - Consistent EFs now used
  - Create tool to use DEQ modeling to calculate risk values
  - Would remove additional modeling for CAO

State of Oregon
DEQ Department of Environmental Quality

Cleaner Air Oregon Tool Ideas

Layout (3)	Met Stations (4)	Stack Height (5)	Building Height (5)	Velocity (2)	Temperature (1)	Diameter (1)
Square	Hillsboro	5m	5m	15m/s	600 K	0.5m
North-South	Hermiston	7.5m	7.5m	45 m/s		
East-West	The Dalles	10m	10m			
	Prineville	12.5m	12.5m			
		15m	15m			

= 600 Model Runs

- Tool would match selected inputs to the closest model run
- Enter distance to closest home/school/workplace/ fence line
- Calculate risk and fuel limits

State of Oregon
Department of Environmental Quality

Questions

Kristen Martin
Kristen.Martin@deq.oregon.gov

Title VI and alternate formats

DEQ does not discriminate on the basis of race, color, national origin, disability, age or sex in administration of its programs or activities.

Visit DEQ's Civil Rights and Environmental Justice page.

Español | 한국어 | 繁體中文 | Русский | Tiếng Việt | العربية
Contact: 800-452-4011 | TTY: 711 | deqinfo@deq.state.or.us

State of Oregon
DEQ Department of Environmental Quality