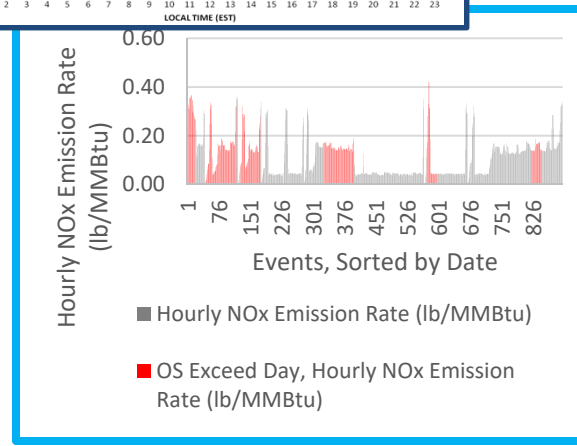
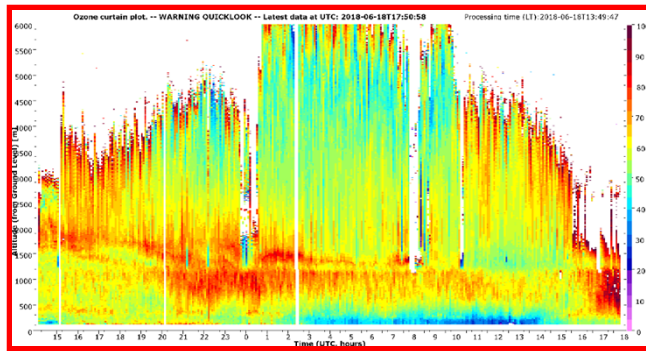
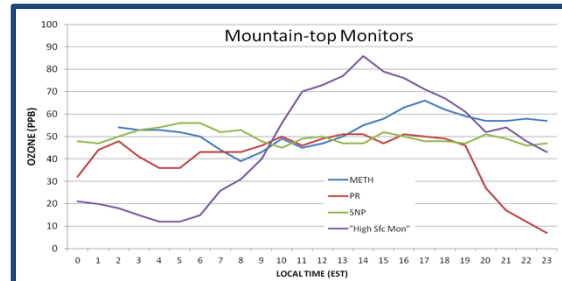
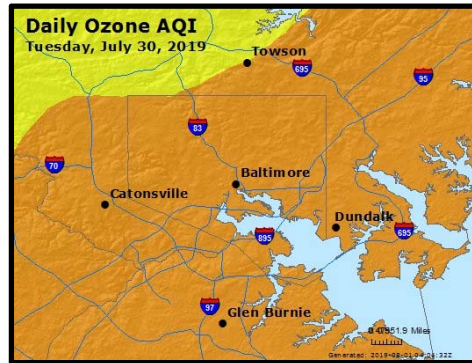




Maryland
Department of
the Environment

Peak Ozone Day Partnership 2020 Season Summary





Overview of Presentation

- The Peak Ozone Day Partnership Program
 - Purpose of Program
 - Moving Towards Attainment
 - Air Quality update
 - How the Program Works
 - 2020 Season Recap
- What our 2020 analyses tells us to date
 - Units that operated on peak day partnership action days - Did cleanest units run?
 - Operation of emergency generators
- Moving Forward
 - Why 2021 is an absolutely critical year
 - Status of potential regulation





Why Peak Ozone Days?

- Four key reasons:
 - Getting closer to attaining the ozone standard each year
 - Public health risks from ozone are highest on the worst days
 - The monitoring attainment test focuses on peak ozone days
 - We get to attainment if the 3 year average of the 4th highest level at individual monitors ... during three consecutive years ... is below 70 ppb
 - A meteorology and emissions perfect storm
 - Peak days for ozone happen when the weather is hot
 - When it's hot ... energy units run the most ... clean and less clean units
- Shaving the ozone peaks will reduce risk, help us towards attainment and reduce future regulatory burden on the energy sector

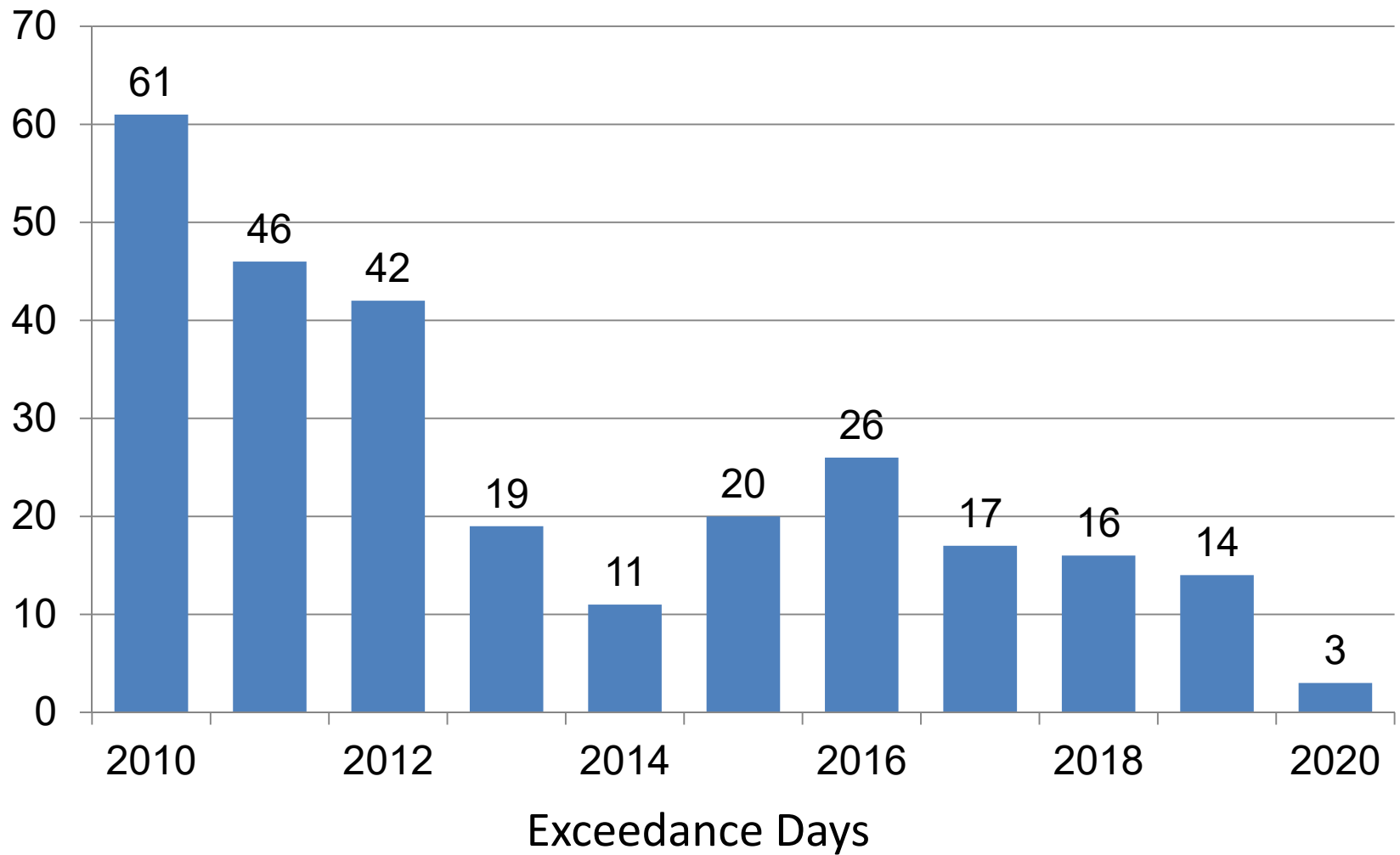


Moving Towards Attainment

- Maryland is very close to attaining the ozone standard
 - Record low ozone levels for Maryland in 2020
 - The Baltimore and Washington Nonattainment Areas are eligible to ask EPA for a 1 year extension to attain the 2015 standard
 - Both are “Marginal” areas where the measured ozone data from 2018, 2019 and 2020 must meet the standard - Both close, but not quite there
 - Imperative that 2021 ozone levels remain low
 - Peak day efforts can be huge factor towards attainment in 2021
- 2020 ozone levels are complicated but a major step forward
 - COVID pandemic and lockdown reduced spring and early summer emissions
 - About a 50% reduction in commuter traffic following stay-at-home order
 - Meteorology also favorable to lower ozone



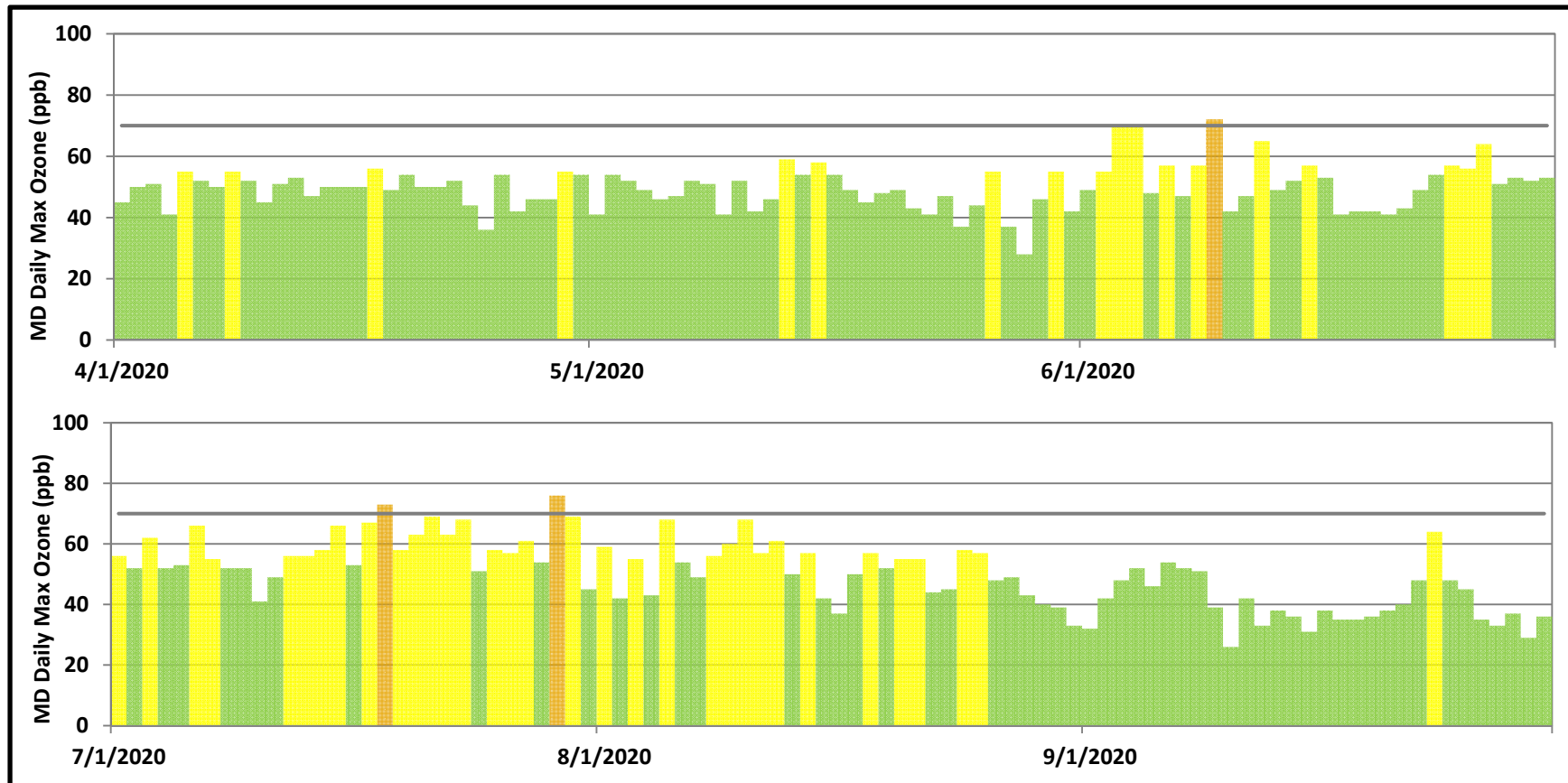
Maryland Bad Ozone Days





Maryland's Air Quality Summer 2020*

Maryland's Air Quality – Summer 2020*



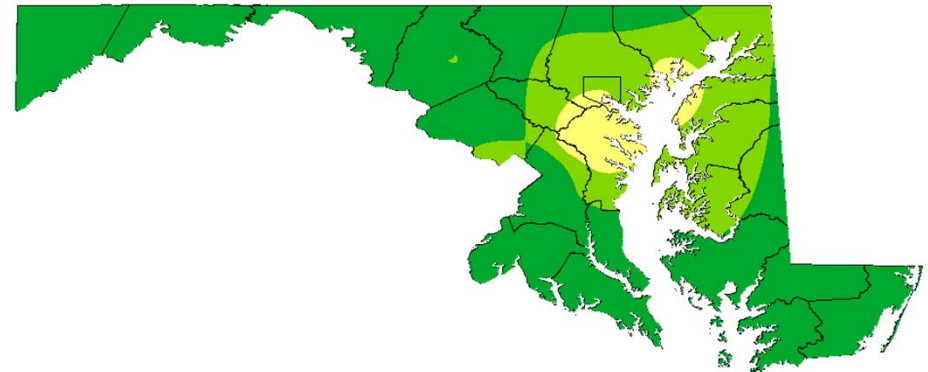
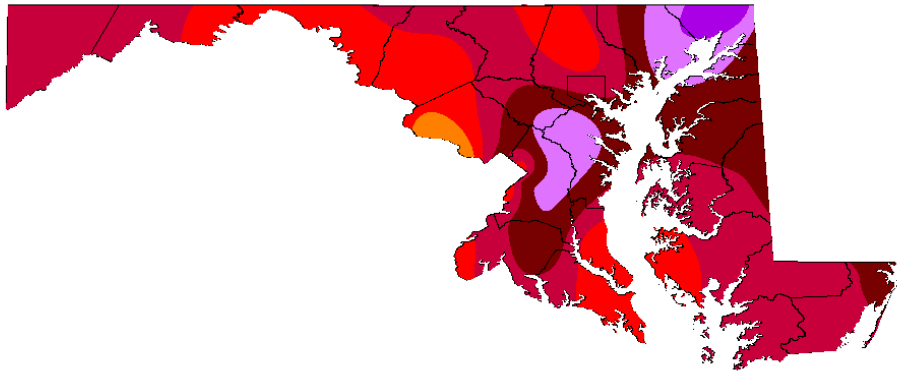
* 2020 data is preliminary



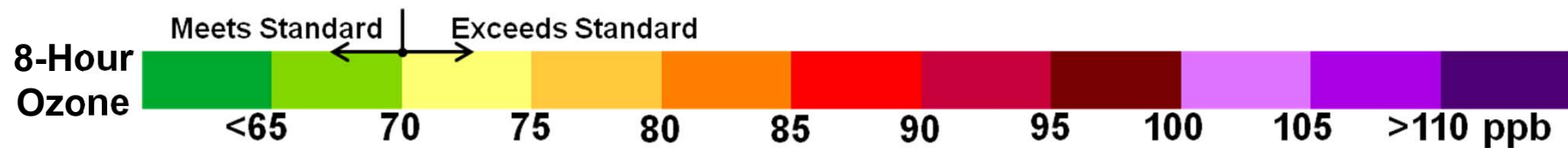
Shrinking Ozone

1990

2020*



The Shrinking Ozone Problem: Lower levels and
Dramatic Spatial Risk Reduction

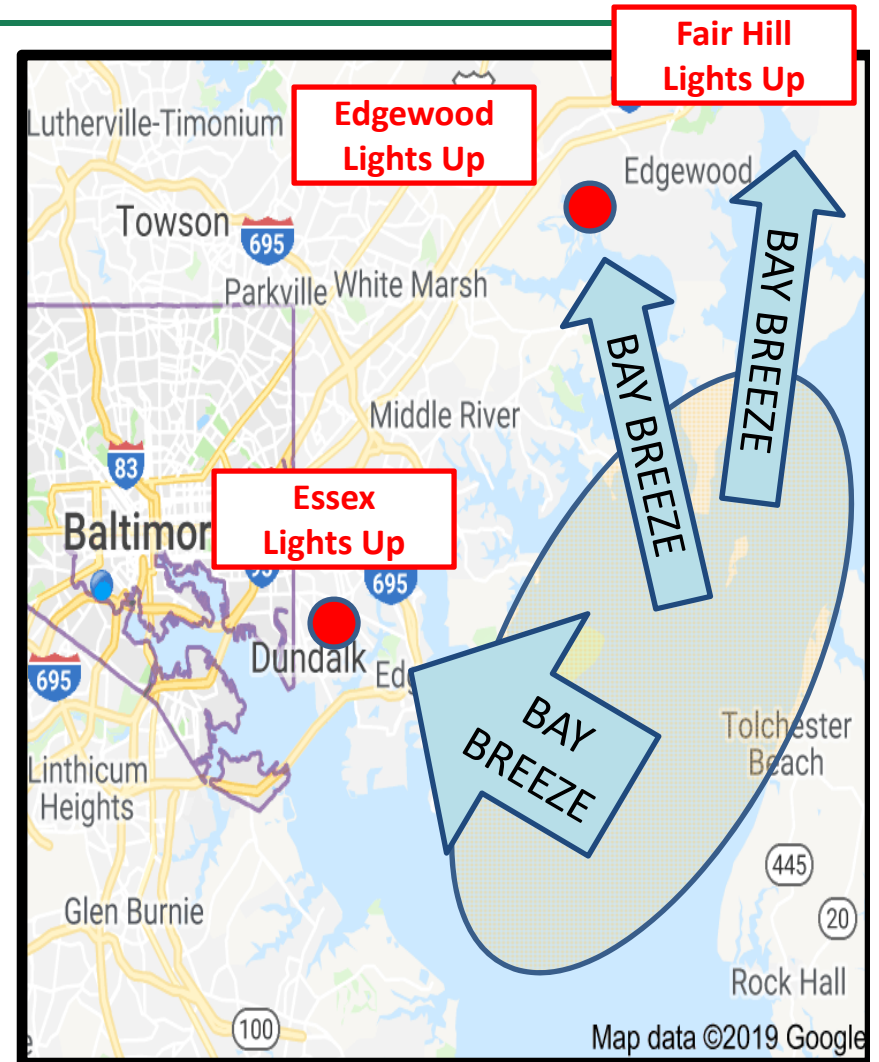


*Preliminary Data: Subject to Change



Our Theory for How High Ozone Days are often Created in MD

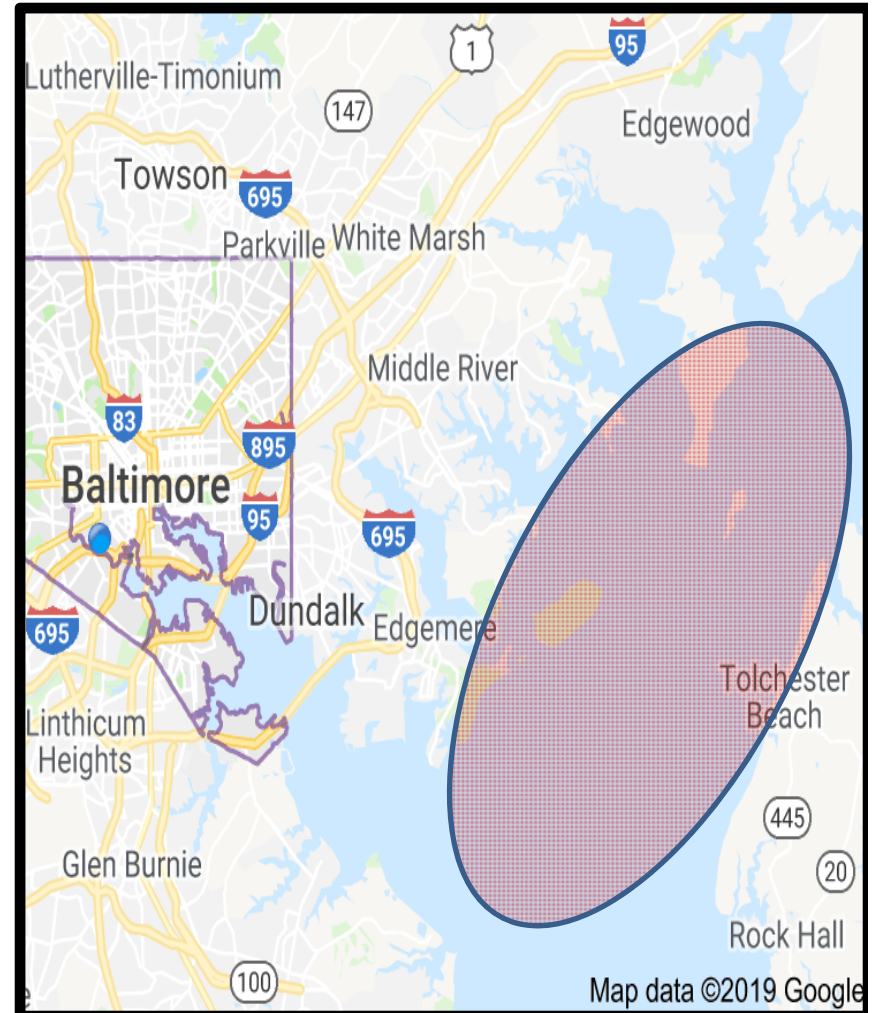
- Linked to our research on the “Land-Water Interface”
 - Why are highest levels of ozone often right near the Bay ... close to water?
- The theory
 1. Ozone builds up over the Bay
 - Transport plays a role ... mobile plays a role ... but
 - How significant are stationary sources that may emit at higher levels on real hot days
 2. In the afternoon, Bay breezes push pollution over the Bay to the west, north, northwest or southwest
 3. Monitors directly downwind of Bay breeze record highest daily ozone





So Where Does the High Ozone Over the Bay Come From?

- We believe there are four major contributing emission sectors to the high ozone we measure over the Bay
 - Some research ... some expert judgment
- The four most likely contributors:
 - Longer distance transport ... probably about half
 - Cars and trucks - VA and MD - I-95 corridor - probably about a third
 - Big and small boats - maybe up to a quarter
 - Close-by HEDD Units - Maybe a quarter



A bright blue sky with a sunburst effect and white clouds. The sun is positioned in the upper right quadrant, creating a strong lens flare effect. The clouds are scattered across the sky, with a denser layer near the horizon.

2020 PEAK DAY PARTNERSHIP

HOW THE PROGRAM WORKS



The Program in Four Simple Steps

1. We forecast that bad ozone is expected in MD
 - Ozone forecasting begins mid-April and ends late-September

2. We send partners notices:
 - Multi-day advance warning notice when we can
 - Call To Action Notice for next day

3. We ask Partners do what they can... extra action... that is reasonable... to help reduce nitrogen oxide (NO_x) emissions on a few days each summer... send operational data to MDE

4. We attain the standard
 - Less risk to the public health
 - Less regulatory burden on partners



Sample Email Notices

Peak Ozone Day Reduction Partnership Program Multi-Day Advance Notice

High Ozone Expected Soon!

Thank you for your participation in MDE's 2020 Peak Ozone Day Reduction Partnership Program designed to reduce nitrogen oxide (NOx) emissions and lower ozone levels on peak ozone days.

Forecast conditions indicate rising ozone concentrations are expected to develop and an ozone air quality exceedance may occur in Maryland on [insert day, date]. Advance forecasts generally provide a good indication that an air quality exceedance may occur. 3-day public forecasts can be found on the MDE website at:
<http://mde.maryland.gov/programs/Air/AirQualityMonitoring/Pages/index.aspx>

As part of this program, please begin thinking about implementing the measures described below to minimize emissions on and before the forecast exceedance day.

Please optimize current NOx emission control technologies to minimize NOx emissions and make all other reasonable efforts to reduce NOx emissions. If feasible, do not run units during peak ozone days or switch to cleaner units.

For your units subject to the emission reduction optimization requirements of COMAR 26.11.38.03A(2), please make all reasonable efforts to run at rates that are at or below the indicator rates listed at COMAR 26.11.38.05A(2).

For Curtailment Service Providers (CSPs), do not advise clients to test or operate on-site generators, unless there is a true energy emergency. Advise clients to take any other reasonable actions that can be performed to reduce NOx emissions.

MDE will issue a Call to Action if the forecast continues to indicate that an air quality exceedance is likely to occur. Any additional efforts to minimize TOTAL NOx emissions prior to the anticipated exceedance day would be greatly appreciated.

If you have any questions about the Peak Ozone Day Reduction Partnership Program contact Randy Mosier at 410-537-4219 or randy.mosier@maryland.gov.

Please do not respond directly to this e-mail. The originating e-mail account is not monitored.

Peak Ozone Day Reduction Program Call-to-Action Notice

Curtail NOx Emissions Tomorrow if Possible!

Thank you for your participation in MDE's 2020 Peak Ozone Day Reduction Partnership Program designed to reduce nitrogen oxide (NOx) emissions and lower ozone levels on peak ozone days.

An ozone air quality exceedance day is forecast to occur in Maryland tomorrow, [insert day, date]. As requested, MDE is asking you to take all reasonable steps to minimize NOx emissions. Taking actions to minimize NOx emissions the day before and the day of a predicted ozone exceedance helps to reduce the possibility of poor air quality occurring in the region.

At a minimum, MDE is asking you to consider implementing the measures described below:

Please optimize current NOx emission control technologies to minimize NOx emissions and make all other reasonable efforts to reduce NOx emissions. If feasible, do not run units during peak ozone days or switch to cleaner units.

For your units subject to the emission reduction optimization requirements of COMAR 26.11.38.03A(2), please make all reasonable efforts to run at rates that are at or below the indicator rates listed at COMAR 26.11.38.05A(2).

For Curtailment Service Providers (CSPs), do not advise clients to test or operate on-site generators, unless there is a true energy emergency. Advise clients to take any other reasonable actions that can be performed to reduce NOx emissions.

Any efforts to minimize TOTAL NOx emissions would be greatly appreciated.

MDE kindly requests a summary report in Excel format the day following each Call to Action. In the report, please submit the hourly operating data for each Call to Action Day including: hourly averages of NOx Rate, MWg generated (as applicable), Heat Input (MMBTU), and urea injection rate (as applicable). Please also provide the daily NOx tons emitted. Note any special actions taken to minimize NOx emissions and note any malfunctions impacting NOx emissions during Call to Action days. If possible, include the anticipated reduction in NOx emissions attributable to actions taken. For CSPs, please indicate that clients were not called to test or operate on-site generators. If on-site generators operated, provide reason, hours of operation and the tons of NOx generated during the event

Information may be sent to Susan Nash at susan.nash@maryland.gov.

If you have any questions about the Peak Ozone Day Reduction Partnership Program contact Randy Mosier, MDE 410-537-4219 or randy.mosier@maryland.gov.



MDE's Ask of Existing Partners

- Our basic ask: Continue to do everything you can to minimize NOx emissions on the day of ... and the days leading up to ... forecasted ozone exceedances
- Our simple specific asks:
 - For units subject to the emission reduction optimization requirements of COMAR 26.11.38.03A(2) ... please make all reasonable efforts to run at rates that are at or below the indicator rates listed at 26.11.38.05A(2)
 - For Municipal Waste Combustors (MWC), optimize the use of your current control technologies to minimize NOx emissions and make all other reasonable efforts to reduce NOx emissions
 - For other units that are not subject to COMAR 26.11.38, MDE asks that they not operate or limit their operating time, and make all reasonable efforts to minimize NOx emissions if required by PJM to operate
 - Report to MDE after each call-to-action notice



MDE's Ask of Newer Partners

Curtailment Service Providers

- Our basic ask: Do everything you can to minimize NOx emissions from your clients on the day of... and the days leading up to... forecasted ozone exceedances
- MDE ask for CSPs:
 - Do not advise clients to perform any type of testing for on-site generators
 - Do not advise clients to operate on-site generators
 - Unless there is a true energy emergency
 - Advise clients to take any other reasonable actions that can be performed to reduce NOx emissions
 - Report to MDE after each call-to-action notice



Data We Need from Sources After Each Call-To-Action Notice

Day After Reporting from Partners

- Work with your MDE contact - Data in EXCEL spreadsheet form including hours operated, hourly averages for the forecast day of NOx Rate, MWg generated and Heat Input (MMBTU), and urea injection rate as applicable
- Include any notes - malfunctions, extra things done to minimize NOx, avoided NOx emissions, etc.
- Include the tons of NOx generated during the event
- For CSPs, please indicate that clients were not called to test or operate on-site generators
 - If on-site generators operated, provide reason, hours of operation and the tons of NOx generated during the event
- MDE will monitor PJM actions via PJM web site





Units in the Peak Day Program

Unit	COMAR 26.11.38 (MDs Optimization Reg)	MWC	Other Unit
Brandon Shores Units 1 and 2	×		
Chalk Point Units 1 and 2	×		
Chalk Point Unit GT2			×
Dickerson Units 1, 2, and 3	×		
H.A. Wagner Units 1, 2, 3 and 4	×		×
Morgantown Units 1 and 2	×		
Morgantown GT3, GT4, GT5, and GT6			×
Perryman CT1, CT3 and CT4			×
Vienna 8			×
Westport CT5			×
Montgomery County RRF		×	
Wheelabrator Baltimore, LP		×	

Total - 29 units that are likely to impact the Baltimore, Washington and Philadelphia nonattainment areas



CSPs in the Peak Day Program

Company	Active in 2020	Not active in 2020
AEP Energy Partners, Inc.		✘
Constellation New Energy		✘
CPower	✘	
Energy Connect		✘
Enel X	✘	
Galt Power		✘
Innovative Power		✘
Mid Atlantic Power Partners		✘
NRG Curtailment Solutions	✘	
Tenaska Power		✘
Viridity		✘



2021 Potential New Partners

Unit	COMAR 26.11.38 (MDs Optimization Reg)	MWC	Other Unit
Chalk Point GT 3, 4, 5, & 6			×
Dickerson GT 2 & 3			×
H.A. Wagner Unit 2			×
Chalk Point 3 & 4			×

A bright sun shining through a blue sky with white clouds. The sun is positioned in the upper right quadrant, casting rays across the sky. The clouds are scattered and vary in density, with some appearing as soft, white puffs and others as more defined, layered formations. The overall scene is bright and clear, suggesting a sunny day.

2020 REGULATORY HELPERS AND PJM DEACTIVATIONS



2020 Regulatory Helpers

- COMAR 26.11.38 - Control of NO_x Emissions from Coal-Fired Electric Generating Units (EGUs)
 - By 2020 all coal-fired EGUs must:
 - Be controlled with state-of-the-art Selective Catalytic Reduction control technology ... or
 - Convert to natural gas ... or
 - Meet very stringent system wide emission limits equivalent to SCR controls on all units
 - These requirements are anticipated to push energy generation to cleaner units on peak ozone days





2020 Regulatory Helpers

- COMAR 26.11.08.10 - NO_x Requirements for Large Municipal Waste Combustors
 - Beginning May 1, 2019 – Large MWCs began meeting updated NO_x RACT 24-hour block average emission rates
 - Beginning May 1, 2020 – Large MWCs will meet new NO_x RACT 30-day average emission rates to further ensure consistent long-term operation of NO_x control technologies
- NO_x control technologies under review for additional emission reductions at Large MWCs





PJM Deactivations

- Maryland Peak Day units deactivated in 2020:
 - Westport 5
 - Shutdown confirmed June 1, 2020
 - Wagner 2
 - Ceased coal combustion June 1, 2020
 - Will no longer burn coal, but will continue to burn NG for on-site utilities
 - Notch Cliff GT1 – GT8
 - Shutdown confirmed June 1, 2020
 - Dickerson Units 1, 2 and 3
 - Ceased coal use on July 30, 2020; PJM retirement date of August 3, 2020
- Chalk Point Units 1 and 2 propose retirement dates of June 1, 2021
- Will increase the use of cleaner units operating during peak days

A bright blue sky with a sunburst effect and white clouds. The sun is positioned in the upper right quadrant, creating a strong lens flare effect. The clouds are scattered across the sky, with some larger, more prominent ones on the left and right sides. The overall scene is bright and clear.

2020 PEAK DAY PARTNERSHIP

WHAT HAPPENED? WHO DID WHAT?



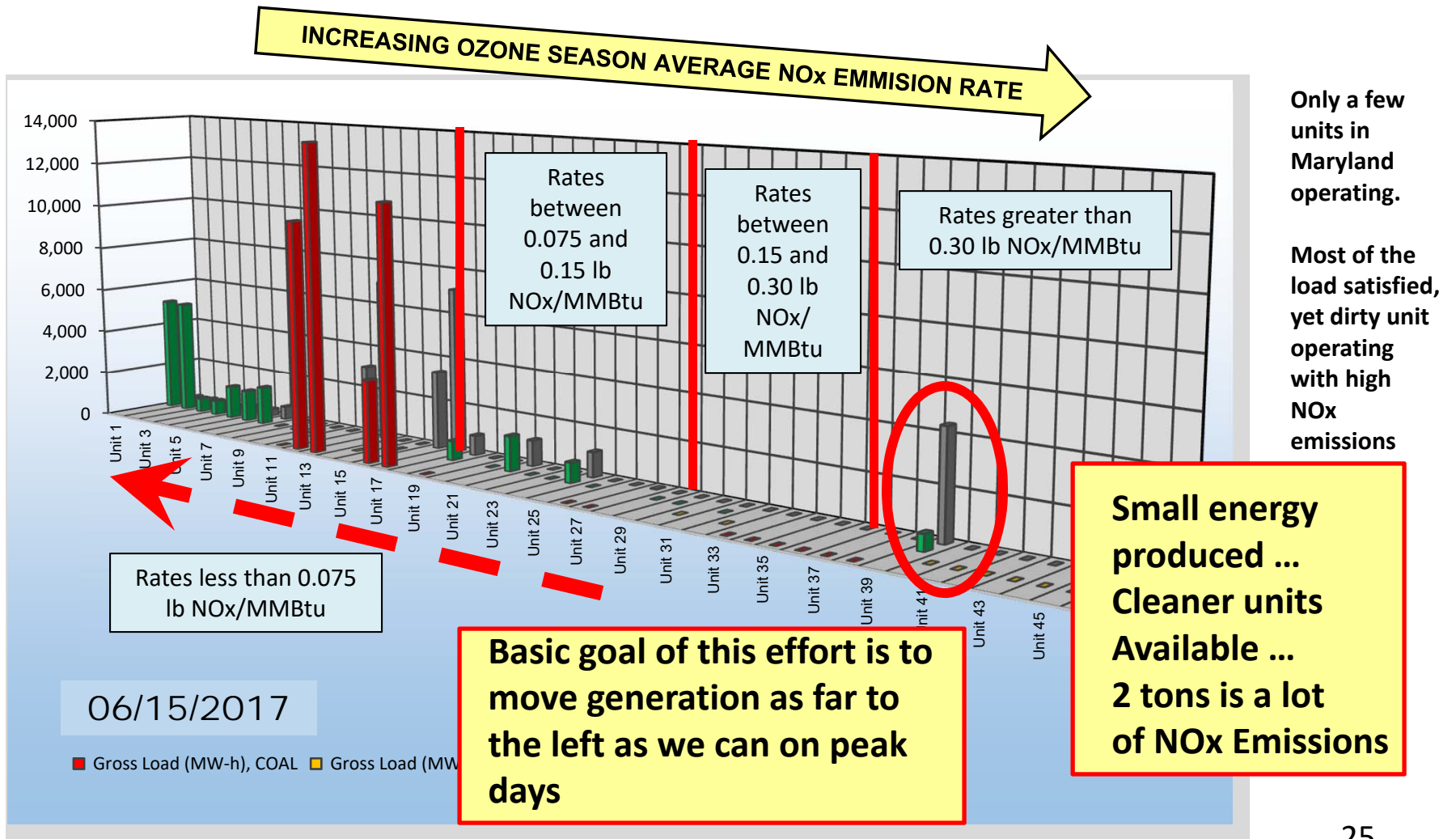
Five Action Days Called

Date Forecast	Forecast MD Max O3 (ppb)	Actual MD Max O3 (ppb)	Hit/False Alarm
June 9 th	73	72	Hit
July 18 th	75	73	Hit
July 27 th	71	61	Voluntary Action? False Alarm?
July 30 th	72	69	Voluntary Action? False Alarm?
August 10 th	72	68	Voluntary Action? False Alarm?



Who Emitted ... At What Rates

Emissions Data Collection and Analysis





June 9 Operational Data

Units That Did Not Run

Unit	Comment
Brandon Unit 2	Did Not Operate
Wagner Units 2 and 4	Did Not Operate
Morgantown Unit 2	Did Not Operate
Morgantown GT3, 4, 5 and 6	Did Not Operate
Chalk Point Unit 2	Did Not Operate
Chalk Point GT2	Did Not Operate
Dickerson Unit 3	Did Not Operate
Vienna 8	Did Not Operate
Perryman CT1, 3 and 4	Did Not Operate
Wheelabrator Unit 3	Did Not Operate
MCRFF Unit 3	Did Not Operate
Westport CT5	Shutdown

**CSPs did not
dispatch demand
response customers
or call for test
operations**

- 18 of 29 units did not operate



June 9 Operational Data

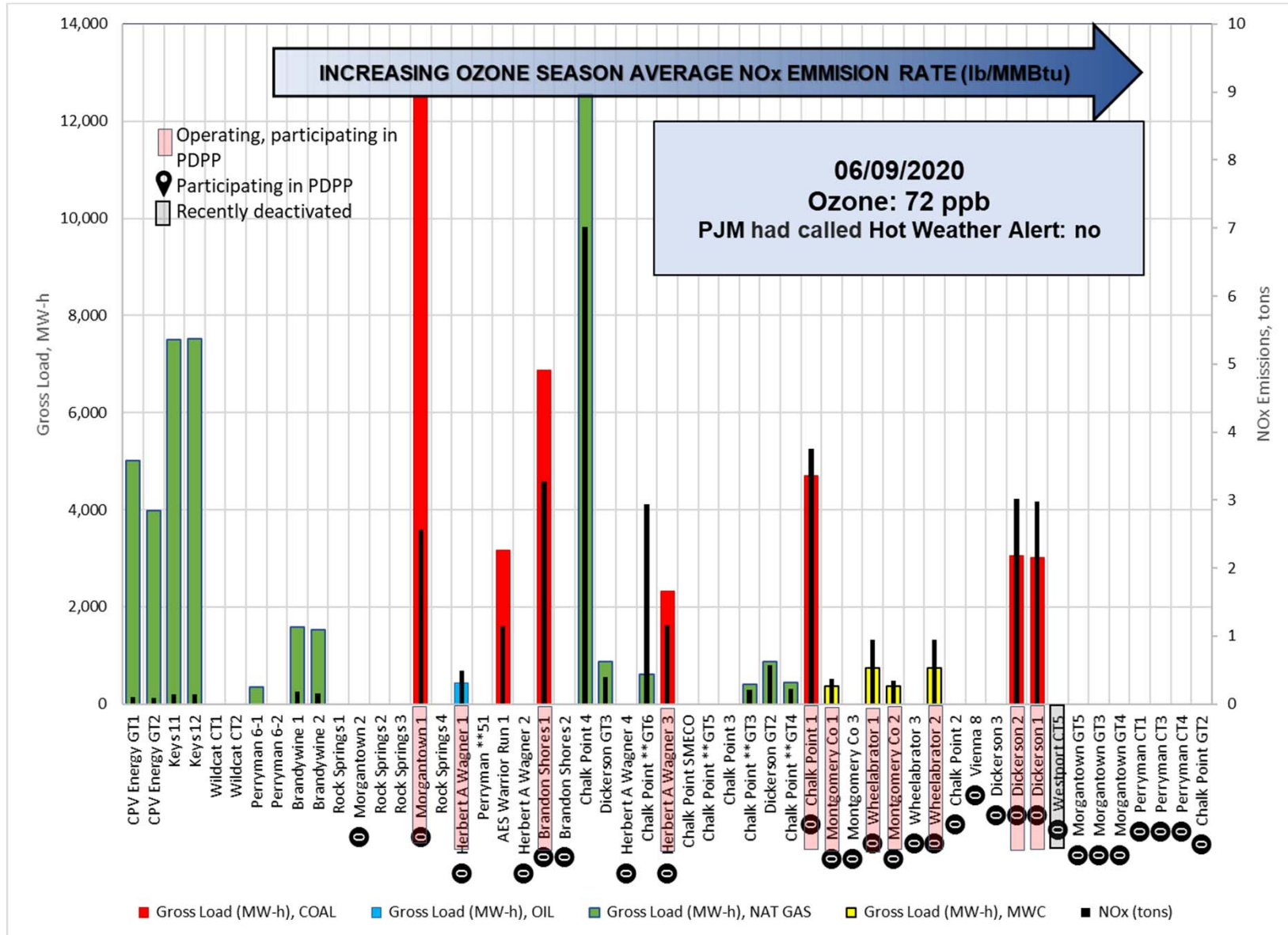
Units That Ran

Unit	Duration	Rate	Comment
Brandon Unit 1	24 hours	0.09 lb/mmBTU	3.27 tons of NOx – Startup
Wagner Unit 1	24 hours	0.08 lb/mmBTU	0.49 tons of NOx
Wagner Unit 3	19 hours	0.12 lb/mmBTU	1.17 tons of NOx - Startup
Morgantown U1	24 hours	0.04 lb/mmBTU	2.6 tons of NOx
Chalk Point U1	22 hours	0.13 lb/mmBTU	3.8 tons of NOx
Dickerson U1&2	24 hours	0.20 lb/mmBTU	6.0 tons of NOx – combined stack

Unit	Duration	Rate	Comment
Wheelabrator			Facility-wide total:
Unit 1	24 hours	140 ppm	
Unit 2	24 hours	141 ppm	1.88 tons of NOx
MCRFF			Facility-wide total:
Unit 1	24 hours	62 ppm	
Unit 2	24 hours	61 ppm	0.6 tons of NOx



June 9 - Are the Right Units Running?





July 18 Operational Data

Units That Did Not Run

Unit	Comment
Wagner Units 1, 2 and 4	Did Not Operate
Morgantown GT3, 4, 5 and 6	Did Not Operate
Chalk Point GT2	Did Not Operate
Dickerson Unit 3	Did Not Operate
Vienna 8	Did Not Operate
Perryman CT1, 3 and 4	Did Not Operate
Westport CT5	Shutdown

- 14 of 29 units did not operate

CSPs did not dispatch demand response customers or call for test operations



July 18 Operational Data

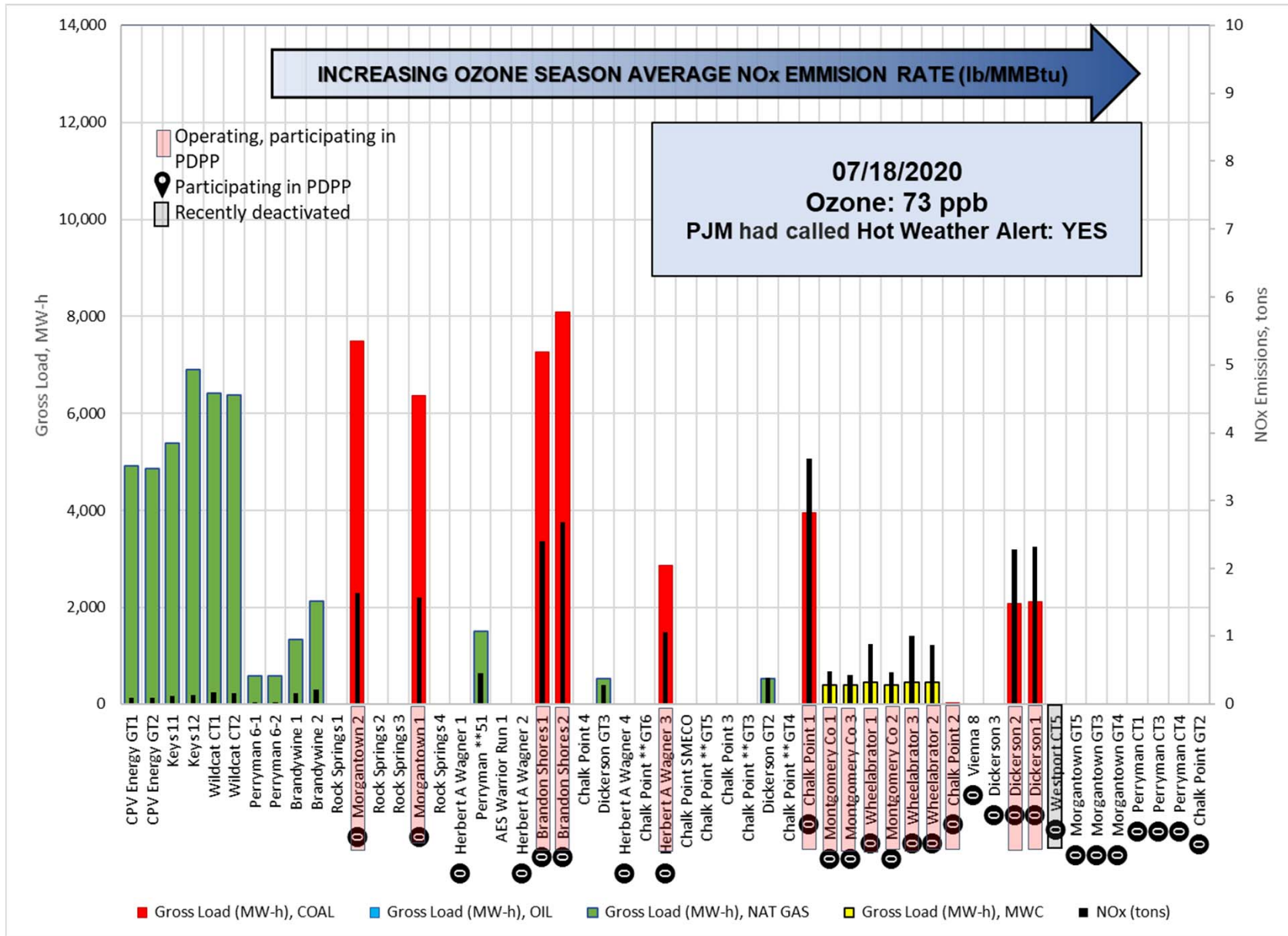
Units That Ran

Unit	Duration	Rate	Comment
Brandon Unit 1	24 hours	0.06 lb/mmBTU	2.40 tons of NOx – Startup
Brandon Unit 2	24 hours	0.07 lb/mmBTU	2.68 tons of NOx
Wagner Unit 3	24 hours	0.06 lb/mmBTU	1.05 tons of NOx
Morgantown U1	24 hours	0.04 lb/mmBTU	1.6 tons of NOx
Morgantown U2	24 hours	0.04 lb/mmBTU	1.6 tons of NOx
Chalk Point U1&2	24 hours	0.13 lb/mmBTU	3.6 tons Nox–combined/U 2 Startup
Dickerson U1&2	24 hours	0.21 lb/mmBTU	4.6 tons of NOx – combined stack

Unit	Duration	Rate	Comment
Wheelabrator			Facility-wide total:
Unit 1	24 hours	140 ppm	
Unit 2	24 hours	133 ppm	2.73 tons of NOx
Unit 3	24 hours	140 ppm	
MCRFF			Facility-wide total:
Unit 1	24 hours	85 ppm	
Unit 2	24 hours	84 ppm	1.4 tons of NOx
Unit 3	24 hours	76 ppm	



July 18 - Are the Right Units Running?





July 27 Operational Data

Units That Did Not Run

Unit	Comment
Wagner Units 2 and 4	Did Not Operate
Morgantown Unit 1	Did Not Operate
Morgantown GT3, 4, 5 and 6	Did Not Operate
Chalk Point GT2	Did Not Operate
Dickerson Units 1 & 3	Did Not Operate
Vienna 8	Did Not Operate
Perryman CT1, 3 and 4	Did Not Operate
MCRFF Unit 1	Did Not Operate
Westport CT5	Shutdown

- 16 of 29 units did not operate

CSPs did not dispatch demand response customers or call for test operations



July 27 Operational Data

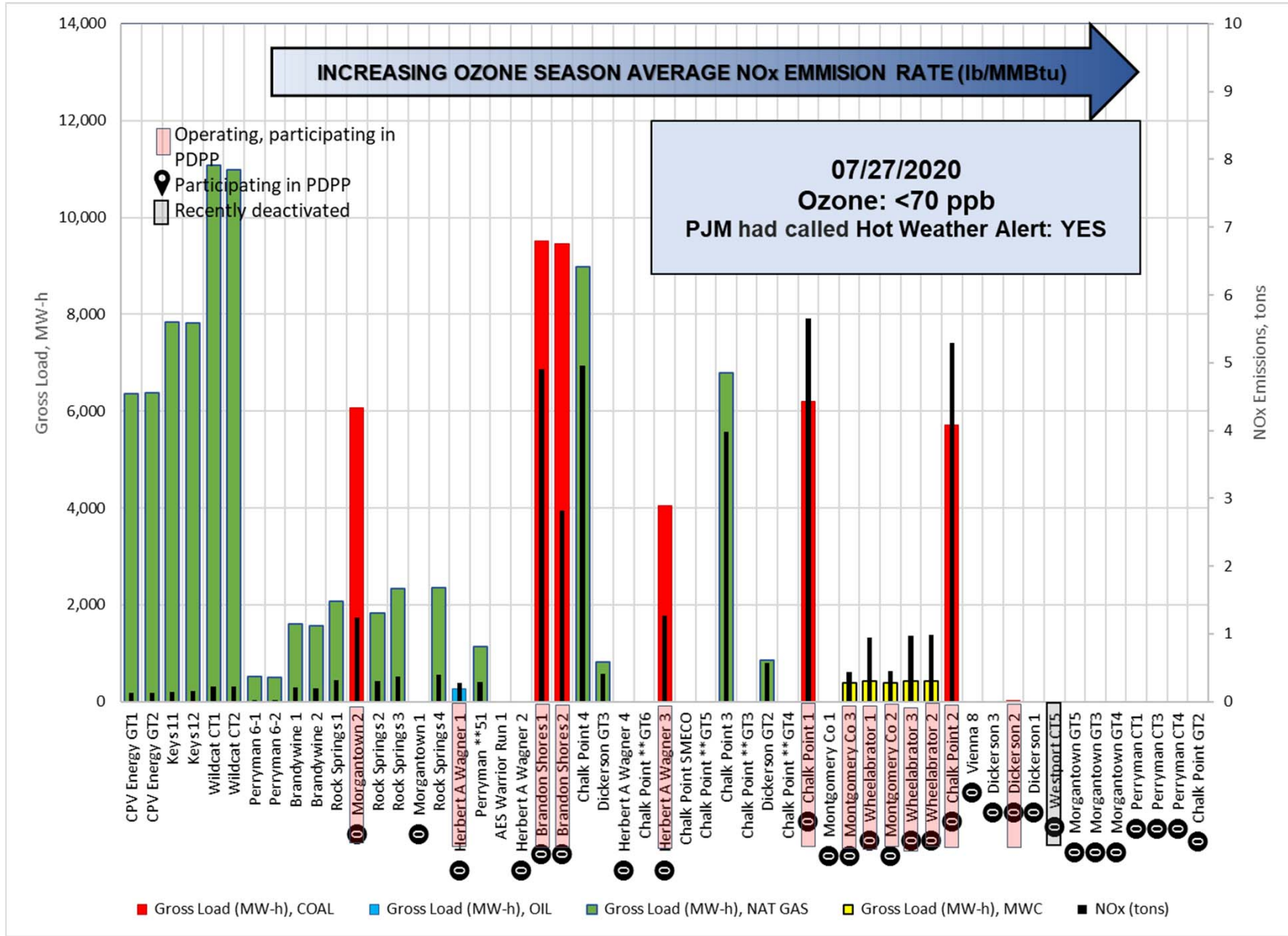
Units That Ran

Unit	Duration	Rate	Comment
Brandon Unit 1	24 hours	0.12 lb/mmBTU	4.90 tons NOx – Startup/low load
Brandon Unit 2	24 hours	0.06 lb/mmBTU	2.82 tons of NOx
Wagner Unit 1	19 hours	0.07 lb/mmBTU	0.28 tons of NOx – Startup/Shut
Wagner Unit 3	24 hours	0.09 lb/mmBTU	1.27 tons of NOx - Startup
Morgantown U2	24 hours	0.04 lb/mmBTU	1.2 tons of NOx
Chalk Point U1&2	24 hours	0.17 lb/mmBTU	11 tons of NOx - combined
Dickerson Unit 2	2 hours	0.007 lb/mmBTU	0.001 tons of NOx – combined stack

Unit	Duration	Rate	Comment
Wheelabrator			Facility-wide total:
Unit 1	24 hours	144 ppm	2.9 tons of NOx
Unit 2	24 hours	142 ppm	
Unit 3	24 hours	140 ppm	
MCRFF			Facility-wide total:
Unit 2	24 hours	78 ppm	0.8 tons of NOx
Unit 3	24 hours	77 ppm	



July 27 - Are the Right Units Running?





July 30 Operational Data

Units That Did Not Run

Unit	Comment
Wagner Units 1 and 4	Did Not Operate
Morgantown Unit 1	Did Not Operate
Morgantown GT3, 4, 5 and 6	Did Not Operate
Chalk Point Unit 2	Did Not Operate
Chalk Point GT2	Did Not Operate
Dickerson Unit 3	Did Not Operate
Vienna 8	Did Not Operate
Perryman CT1, 3 and 4	Did Not Operate
MCRFF Unit 1	Did Not Operate
Westport CT5	Shutdown

- 16 of 29 units did not operate

CSPs did not dispatch demand response customers or call for test operations



July 30 Operational Data

Units That Ran

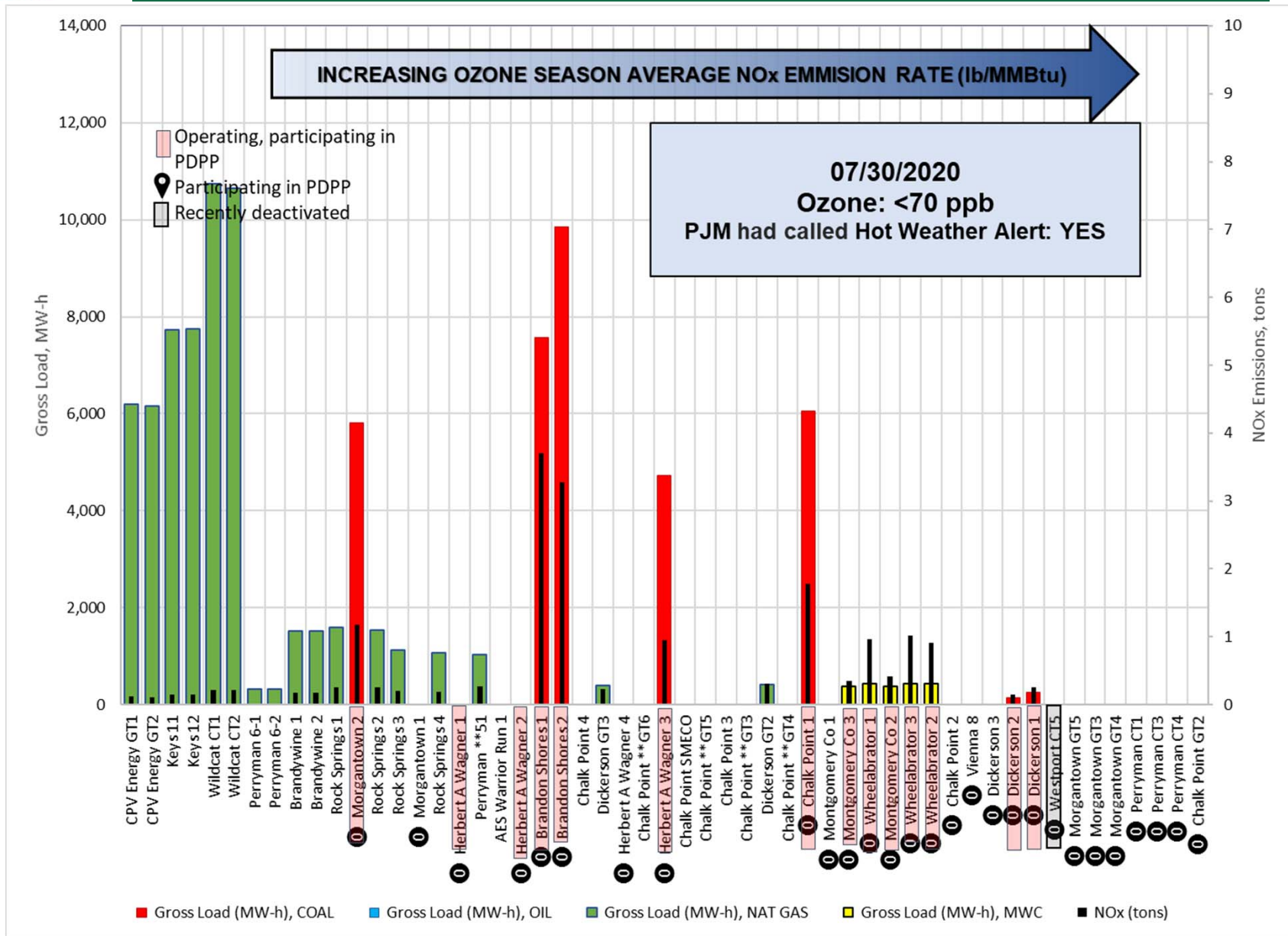
Unit	Duration	Rate	Comment
Brandon Unit 1	24 hours	0.10 lb/mmBTU	3.70 tons of NOx - Shutdown
Brandon Unit 2	24 hours	0.07 lb/mmBTU	3.28 tons of NOx
Wagner Unit 2	12 hours	0.03 lb/mmBTU	0.01 tons of NOx – ran on NG
Wagner Unit 3	20 hours	0.05 lb/mmBTU	0.96 tons of NOx - Shutdown
Morgantown U2*	24 hours	0.04 lb/mmBTU	1.2 tons of NOx
Chalk Point U1	23 hours	0.06 lb/mmBTU	1.8 tons of NOx
Dickerson U1&2	5 hours	0.21 lb/mmBTU	0.4 tons of NOx – combined stack

* Morgantown Units 1 and 2 postponed scheduled Capacity Test

Unit	Duration	Rate	Comment
Wheelabrator			Facility-wide total:
Unit 1	24 hours	141 ppm	
Unit 2	24 hours	141 ppm	2.89 tons of NOx
Unit 3	24 hours	139 ppm	
MCRFF			Facility-wide total:
Unit 2	24 hours	70 ppm	
Unit 3	24 hours	60 ppm	0.7 tons of NOx



July 30 - Are the Right Units Running?





August 10 Operational Data

Units That Did Not Run

Unit	Comment
Wagner Units 2 and 4	Did Not Operate
Morgantown GT3, 4, 5 and 6	Did Not Operate
Chalk Point Units 1 and 2	Did Not Operate
Chalk Point GT2	Did Not Operate
Dickerson Units 1, 2 and 3	Did Not Operate
Vienna 8	Did Not Operate
Westport CT5	Shutdown

- 14 of 29 units did not operate

CSPs did not dispatch demand response customers or call for test operations



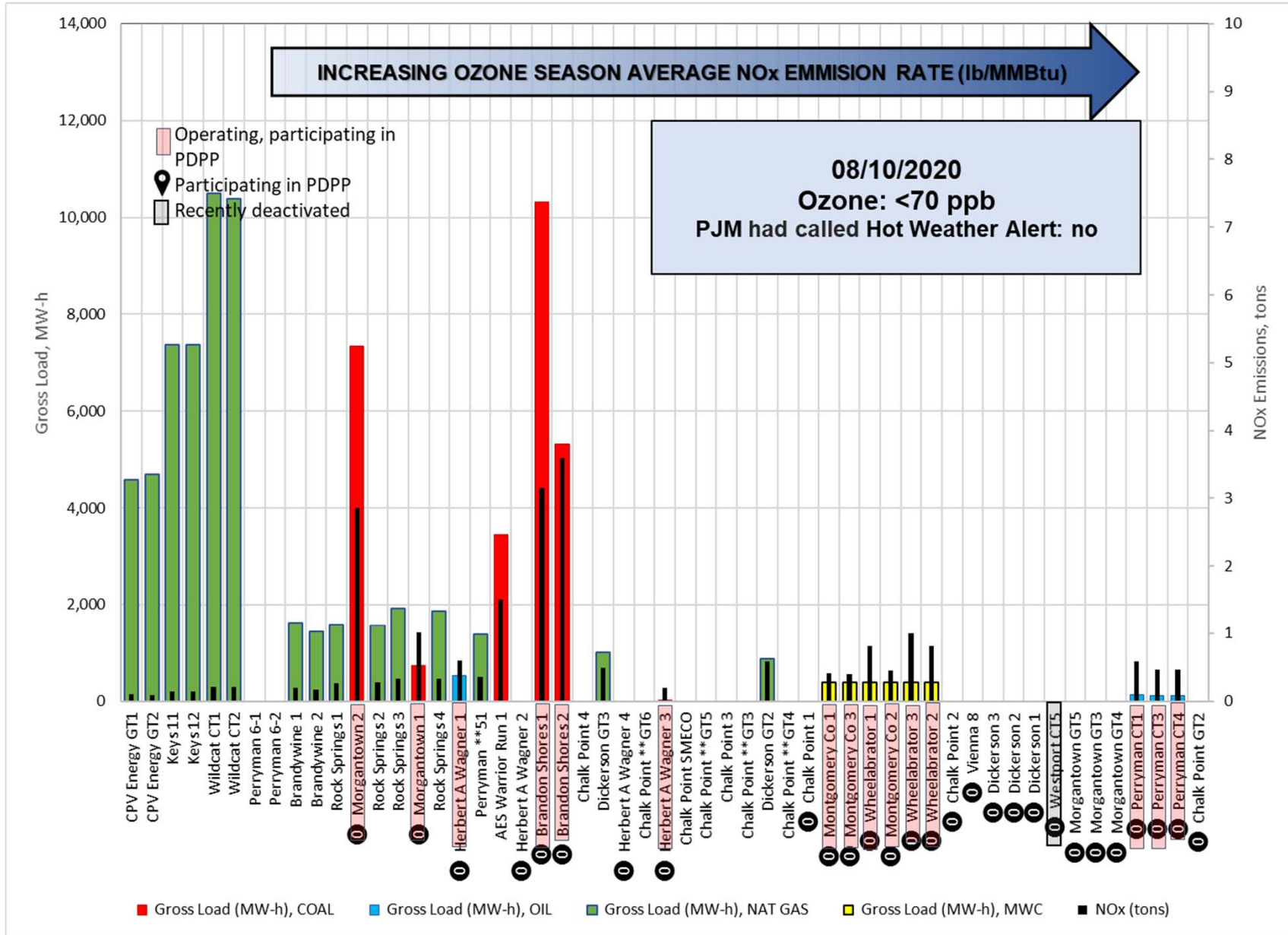
August 10 Operational Data

Units That Ran

Unit	Duration	Rate	Comment
Brandon Unit 1	24 hours	0.06 lb/mmBTU	3.15 tons of NOx
Brandon Unit 2	24 hours	0.12 lb/mmBTU	3.61 tons of NOx - Startup
Wagner Unit 1	17 hours	0.09 lb/mmBTU	0.6 tons of NOx - Startup
Wagner Unit 3	10 hours	0.12 lb/mmBTU	0.20 tons of NOx - Startup
Morgantown U1	14 hours	0.17 lb/mmBTU	1.0 tons of NOx - Startup
Morgantown U2	24 hours	0.08 lb/mmBTU	2.9 tons of NOx - Startup
Perryman CT1	4 hours	0.58 lb/mmBTU	0.58 tons of NOx
Perryman CT3	4 hours	0.48 lb/mmBTU	0.47 tons of NOx
Perryman CT4	4 hours	0.47 lb/mmBTU	0.46 tons of NOx
Unit	Duration	Rate	Comment
Wheelabrator			Facility-wide total:
Unit 1	24 hours	144 ppm	
Unit 2	24 hours	143 ppm	2.63 tons of NOx
Unit 3	24 hours	143 ppm	
MCRFF			Facility-wide total:
Unit 1	24 hours	70 ppm	
Unit 2	24 hours	82 ppm	1.3 tons of NOx
Unit 3	24 hours	81 ppm	



August 10 - Are the Right Units Running?



A vibrant blue sky with a bright sun in the upper right quadrant, casting rays across the scene. Large, fluffy white clouds are scattered across the middle of the frame. The overall atmosphere is clear and bright.

MOVING FORWARD



Moving Forward

Peak Day Partnership

- Over the past several years, many partners have made significant efforts to minimize NOx emissions on days where MDE has asked for additional efforts - We thank you
 - Others have not always made the same kind of effort
- If we continue to see sources with high emission rates running on peak ozone days during the ozone season of 2021, we plan to move forward with “Peak Day” regulations in 2022



What a Potential Regulation Would Look Like

- Likely to focus on a select number of sources or sectors
 - It is unlikely that the regulation would affect all small and large sources involved in the energy supply process
 - Data from the summers of 2018, 2019, 2020 and 2021 will drive source coverage
- Would apply on any day forecasted to be a code yellow, orange, red or purple ozone day
 - May prohibit any covered generation unit with a NO_x emission rate greater than something like 0.09 lb/MMBTU from operating
 - May prohibit CSPs from instructing clients to test or operate on-site generators
 - Will include provisions to address true energy emergencies

Questions ... Comments ... Discussion

