State of California
AIR RESOURCES BOARD

Executive Order G-25-096

CARB Approval of the METS-3 system used to control emissions from container vessels for compliance with the Control Measure for Ocean-Going Vessels At Berth

Clean Air Engineering Maritime (CAEM)
METS-3

WHEREAS August 27, 2020, the California Air Resource Board (CARB) adopted the Control Measure for Ocean-Going Vessels (OGV) At Berth, California Code of Regulations, title 17, sections 93130 - 93130.22 (2020 At Berth Regulation), which establishes requirements for ocean-going vessels at berth in a California port to reduce oxides of nitrogen (NOx), diesel particulate matter (PM), and reactive organic gases (ROG) emissions from auxiliary engines;

WHEREAS section 93130.5 of the 2020 At Berth Regulation establishes requirements for an emission control strategy to qualify as a CARB Approved Emission Control Strategy (CAECS) that can be used to reduce emissions from ocean-going vessel auxiliary engines and applicable tanker auxiliary boilers while at berth in a California port;

WHEREAS no emission control strategy may be used to comply with the requirements of the 2020 At Berth Regulation unless CARB approves it as a CAECS;

WHEREAS the 2020 At Berth Regulation requires that the emission control strategy, if applicable for auxiliary engines, achieves emission rates of less than 2.8 grams per kilowatt hour (g/kW-hr) for NOx, 0.03 g/kW-hr for PM 2.5, and 0.1 g/kW-hr for ROG demonstrated through testing conducted under a CARB approved Test Plan as specified in section 93130.5(d) of the 2020 At Berth Regulation;

WHEREAS for strategies approved after 2020, greenhouse gas (GHG) emissions from the strategy must be grid-neutral using the grid emission rate for the year that the technology is granted an Executive Order, as specified under section 93130.5(d) of the 2020 At Berth Regulation;

WHEREAS the 2020 At Berth Regulation requires that the emission control strategy, if applicable for tanker auxiliary boilers, achieves emission rates less than 0.4 g/kW-hr for NOx, 0.03 g/kW-hr for PM 2.5, and 0.02 g/kW-hr for ROG demonstrated through testing conducted under a CARB approved Test Plan as specified in section 93130.5(d) of the 2020 At Berth Regulation;

WHEREAS CAEM is subject to the 2020 At Berth Regulation as a CAECS operator;

WHEREAS, CAEM developed METS-3, a barge-based capture and control system to reduce emissions from the auxiliary engines on ocean-going container and automobile roll on, roll off (ro-ro) vessels while at berth;

WHEREAS, METS-3 consists of the following components and subcomponents as specified in the Description of Control Strategy in "METS Emission Test Protocol (Container and Ro-Ro Vessels)" (Test Plan dated May 14, 2024) including: an exhaust capture system using a stack adapter with the ability to change between a one and two stack capture hood, transfer ducting, and a single emission control system comprising of a ceramic particulate filter and catalyst-embedded filter elements to reduce NOx, PM, and ROG;

WHEREAS, CAEM submitted their final Test Plan on May 14, 2024, for the METS-3, and CARB issued CAEM a Test Plan approval letter on June 12, 2024;

WHEREAS, CAEM submitted to CARB the "METS Test Report (Container and Ro-Ro)" (Test Report and request for Executive Order) dated December 24, 2024 and supplemental data on January 30, 2025 and March 7, 2025;

WHEREAS, CARB reviewed and evaluated the Test Report and request for Executive Order for the METS-3 based on the requirements specified in the 2020 At Berth Regulation;

WHEREAS, CARB found the submitted documents indicate METS-3 demonstrates it achieves all of the requirements under section 93130.5(d) of the 2020 At Berth Regulation for use for compliance with the 2020 At Berth Regulation for container vessels, including achieving required emission reductions and grid-neutral GHG emissions at the 2025 grid emissions rate;

WHEREAS, the Executive Officer finds it is appropriate to issue this Executive Order that identifies the operating conditions, recordkeeping, and monitoring requirements for CAEM's use of the METS-3 to allow its use as a CAECS for compliance with the 2020 At Berth Regulation;

WHEREAS, this approval does not constitute an air pollution or land use permit, nor does it relieve the responsibility of CAEM or the end user to comply with all Federal, State, and local laws, rules, and regulations;

NOW, THEREFORE, IT IS ORDERED that the METS-3 is approved for use in demonstrating compliance with the 2020 At Berth Regulation as a CAECS, when used by CAEM as intended and in accordance with the following terms and conditions, and in accordance with all other applicable requirements in the 2020 At Berth Regulation.

APPROVED OPERATING CONDITIONS

Parameter	Value
Ocean-going vessel engine type	One or two auxiliary engine(s)
Ocean-going vessel type	Container vessel
Ocean-going vessel fuel composition limitation	Marine distillate fuel meeting 0.1% sulfur content limit (0.1% sulfur marine gas oil (MGO) or marine diesel oil (MDO))

Parameter	Value
Capture system hood	Single stack capture hood and dual stack capture hood
SCR inlet operating temperature range in degrees Fahrenheit (ºF)	350 – 700ºF
Ocean-going vessel engine maximum continuous rating (MCR) in kilowatts (kW)	1,760 kW
Ocean-going vessel allowable operating range for one stack (kW)	296 kW to 609 kW
Allowable exhaust flow rate for one stack in standard cubic feet per minute (scfm)	5,216 to 6,426 scfm of engine exhaust
Ocean-going vessel total allowable operating range for two stacks (kW)	443 kW to 678 kW
Allowable exhaust flow rate for two stacks in standard cubic feet per minute (scfm)	6,022 to 7,456 scfm of engine exhaust
Maximum engine exhaust temperature requirements	1,000ºF
Differential pressure across each filter (“H2O)	-2 to -20
Static pressure at the capture system inlet (“H2O)	Minimum of -0.2
Other parameters that affect performance	Filter face velocity less than 0.03 m/s
GRID Neutral Target – CA CO2e state output emission rate from eGRID2023 in pounds per megawatt hour (lb/MWh)	402.5 lb/MWh
Maximum CAECS auxiliary generator operating load (kW)	200 kW
CAECS auxiliary generator renewable diesel carbon intensity limit in grams of carbon dioxide equivalent per megajoule of fuel (g CO2e/MJ)	46 g CO2e/MJ fuel
Maximum ammonia slip emissions in parts per million by volume, dry basis (ppmdv)	5 ppmdv averaged over 60 minutes

OPERATIONAL REQUIREMENTS

BE IT FURTHER ORDERED, CAEM will operate the METS-3 following the notification and operational requirements per sections 93130.12(b)(1) and 93130.12(b)(2) of the 2020 At Berth Regulation:

1. At least seven calendar days before a vessel’s arrival, the operator of the CAECS must coordinate in writing with the vessel operator and terminal operator for the use of the strategy and supply the vessel operator with information about the compatibility with the vessel and terminal of the CAECS.

2. During each visit, the operator of the CAECS shall:
    a. Begin controlling emissions within two hours of vessel "Ready to Work";
    b. Record inlet and outlet levels of emissions during the visit;
    c. Continue controlling emissions until at least one hour before "Pilot on Board"; and
    d. Ensure vessels are operating on CARB compliant distillate marine fuel.

MONITORING REQUIREMENTS

BE IT FURTHER ORDERED, for every 1,000 hours of operation (and at a minimum annually), CAEM shall submit data to the Executive Officer from the continuous emission monitoring system (CEMS) for each visit the CAECS is operated, to verify that the emission reduction levels are maintained, paying the applicable Certification Fee for the 2020 At Berth Regulation (California Code of Regulations, Title 13, Division 3, Chapter 16, Article 7, sections 2913 and 2914) for each visit.

BE IT FURTHER ORDERED, the CEMS parameters submitted to the Executive Officer must follow the parameters and measurement methods listed in CAEM's Test Plan submitted on May 14, 2024.

BE IT FURTHER ORDERED, within 30 days of a vessel departure, for every visit where METS-3 is used as a CAECS, CAEM shall report to CARB visit information as required by section 93130.12(b)(3) of the 2020 At Berth Regulation.

BE IT FURTHER ORDERED, within seven days of a vessel departure, CAEM shall report to their vessel operator customers the information necessary for vessel operators to submit their visit information to CARB as required by section 93130.7(e)(4) of the 2020 At Berth Regulation, including the following:

1) Emissions control start date and time
2) Emission control end date and time
3) Details on any delays or interruptions while controlling emissions and the times that emission reductions were uncontrolled during the visit.

BE IT FURTHER ORDERED, when vessel operators submit visit information to CARB as required by section 93130.7(e)(4) of the 2020 At Berth Regulation, the vessel operator must also report the following information per the compliance instructions for section 93130.7(e)(4)(Q):

1) Total power generated by vessel's auxiliary engines while at berth in kW-h. Data must be recorded at a minimum once an hour.

BE IT FURTHER ORDERED, within seven days of a vessel departure, CAEM shall report to their terminal operator customers the information necessary for terminal operators to submit their visit information to CARB as required by section 93130.9(d)(5) of the 2020 At Berth Regulation, including the following:

1) Emissions control start date and time;

2) Emission control end date and time;
3) Details on any delays or interruptions while controlling emissions and the times that emission reductions were uncontrolled during the visit.

BE IT FURTHER ORDERED, CAEM shall maintain the METS-3 in accordance with the section "5. Maintenance" of CAEM's Test Plan.

BE IT FURTHER ORDERED, the Executive Officer may request that the METS-3 be tested annually using the test methods specified in the 2020 At Berth Regulation to demonstrate the overall percentage of the emission reduction being achieved, and the results of such testing shall be provided to the Executive Officer within 30 days of testing per section 93130.5(j) of the 2020 At Berth Regulation.

MALFUNCTION REPORTING AND RECORDKEEPING REQUIREMENTS

BE IT FURTHER ORDERED, CAEM shall report within 24 hours to CARB, by electronic means, any malfunction that is expected to create emissions in excess of any applicable emissions limitation for a period greater than one hour and shall retain for five years all records pertaining to the malfunction pursuant to section 93130.12 of the 2020 At Berth Regulation.

BE IT FURTHER ORDERED, CAEM shall report within 24 hours to CARB, by electronic means, any malfunction with the CEMS system for a period greater than one hour which makes the emission control unverifiable and shall retain for five years all records pertaining to the malfunction pursuant to section 93130.12 of the 2020 At Berth Regulation.

BE IT FURTHER ORDERED, a delay or interruption in emissions control caused by a malfunction is eligible for remediation for the hours of uncontrolled emissions only when CARB is notified by CAEM according to the provisions of section 93130.12(c) of the 2020 At Berth Regulation.

BE IT FURTHER ORDERED, CAEM shall submit a corrective action report within seven calendar days after a malfunction has been corrected as pursuant to section 93130.12(d) of the 2020 At Berth Regulation.

BE IT FURTHER ORDERED, records made pursuant to section 93130.12 of the 2020 At Berth Regulation shall be kept for a minimum of five years and CAEM shall submit information to CARB according to section 93130.19 of the 2020 At Berth Regulation.

BE IT FURTHER ORDERED, this approval is subject to the following conditions:

- CAEM must submit documentation, within 30 days upon request, to CARB showing METS-3 is being maintained and the maintenance schedule in section "5. Maintenance" of CAEM's Test Plan is being adhered to.
- CAEM must keep records, including purchase receipts, for a minimum of five years, for renewable diesel purchases demonstrating the fuel used on the METS-3 complies with the Approved Operating Conditions in this Executive Order.
- CAEM must communicate with the vessel operator and ensure the vessel is only operating one or two auxiliary engine(s) while the METS-3 is controlling emissions.

- Delays or interruptions in emissions control caused by a malfunction, or when the operational requirements in section 93130.12(b)(2) of the 2020 At Berth Regulation are not met may result in enforcement actions and ultimately revocation of the EO unless the visits are made compliant through use of the Remediation Fund or with a Vessel Incident Event (VIE) or Terminal Incident Event (TIE).

DESIGN CHANGES AND EXTENSIONS

BE IT FURTHER ORDERED, no changes are permitted to METS-3 design, or approved operating parameters set forth in CAEM's application, test plan, and this Executive Order and its appendices, unless CARB is notified and approves in advance per section 93130.5(i)(2) of the 2020 At Berth Regulation. Design changes include changes to any part of the METS-3 system including the exhaust capture hood, ducting, control equipment, CEMS equipment, and deployment platform. The changes must be approved in writing by the Executive Officer and any applicable Certification Fees for the 2020 At Berth Regulation (California Code of Regulations, Title 13, Division 3, Chapter 16, Article 7, sections 2913 and 2914) must be paid before the modifications may be used for compliance with the 2020 At Berth Regulation. The Executive Officer may revoke this Executive Order, if the system fails to demonstrate that the expected percentage of emissions reductions are being achieved or if the METS-3 design or approved operating parameters are changed without prior notification and approval by the Executive Officer.

BE IT FURTHER ORDERED, this Executive Order shall have a duration of five years from the date it was executed, unless it is revoked by CARB as set forth in section 93130.5(l) of the 2020 At Berth Regulation. As specified in section 93130.5(i)(1), at least six months prior to the expiration of this Executive Order, CAEM may apply for an extension by submitting an extension application to the Executive Officer asserting that the strategy has not changed and is still effective, following the requirements specified in section 93130.5(d) as provided in section 93130.5(i)(1) of the 2020 At Berth Regulation, after paying any applicable Certification Fees for the 2020 At Berth Regulation (California Code of Regulations, Title 13, Division 3, Chapter 16, Article 7, sections 2913 and 2914).

BE IT FURTHER ORDERED, marketing of the METS-3 using any identification other than that shown in this Executive Order or marketing of the METS-3 for an application other than those listed in this Executive Order shall be prohibited unless prior approval is obtained from CARB.

BE IT FURTHER ORDERED, this Executive Order does not relieve CAEM from complying with all other applicable regulations.

BE IT FURTHER ORDERED, this Executive Order may be revoked if the Executive Officer determines that METS-3 does not comply with any of the requirements in this Executive Order.

Executed at Sacramento, California, this 3rd day of June, 2025.

Bonnie Soriano, Branch Chief
Freight Activity Branch
Transportation and Toxics Division