

Coalition For A Safe Environment



Environmental Justice Organization Assessment of the Proposed Control Measure for Ocean-Going Vessels at Berth & Public Comments

December 5, 2019

PRESENTED BY

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Executive Director

Coalition For A Safe Environment

- **Supports the proposed Control Measure For Ocean-Going Vessels At Berth**
- **We request the measure include both At-Berth and At-Anchor**
- **Emissions from Ocean-Going Vessels are significant**
- **Ship emissions significantly impact the environment & global warming**
- **Ship emissions significantly impact public health & have not all been assessed**
- **The number of ships visiting California ports is increasing every year**
- **We believe that all categories of ships should be included: An even playing field**
- **We do not support exempting Bulk Ships or any category as proposed**
- **All categories of ships are major air polluters, tons per day**
- **We do not support exempting smaller ports**
- **We support Electric Shorepower**
- **We prefer Ship Emissions Capture & Treatment (SECT) Technologies**
- **Electric Shorepower & SECT Technologies are feasible**
- **Electric Shorepower & SECT Technologies are cost effective**

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- **Electric Shorepower & SECT Technologies are proven technologies**
- **Electric Shorepower & SECT Technologies are valid Mitigation Measures**
- **We do not support exempting smaller ports**
- **Various grants are available to small ports: C&T, Prop 1, DERA**
- **Small ports can afford SECT Technologies: Purchase / Monthly Lease**
- **We do not support the proposed implementation schedule 2021-2029**
- **Sufficient SECTS can be built to meet demand & delivered by 2025**
- **All Ports & Shipping Companies have had 5 years to gear-up**
- **All Ports & Shipping Companies can use SECT until their electrical infrastructure is built**
- **All Ports & Shipping Companies are responsible for the future planning, addressing all potential non-compliance circumstances & contracting of SECT services: Fines shall be doubled daily until compliance**
- **We do not support minimum Annual Thresholds because SECT is available**
- **Numerous European Ports Currently Offer & Require Shorepower**

We Prefer Ship Emissions Capture & Treatment Technologies

Ship Emissions Capture & Treatment Technologies (SECT)

- ~ Use existing state-of-the art off-the-shelf proven technologies**
- ~ Do Not require any modification of a ship**
- ~ Do Not require any modification of terminal infrastructure**
- ~ Do Not require any shorepower & not subject to power outages**
- ~ Do Not require any additional special permits**
- ~ Can be built Stationary On-Dock or Mobile On-Barge**
- ~ Work on any category class of ship**
- ~ Are a capital equipment tax write-off**
- ~ Capture & Treat Emissions from both Auxiliary Engines & Boilers**
- ~ Shorepower only Eliminates Emissions from Auxiliary Engines**

We support the AMECS Technology Because

- **AMECS is already CARB approved: Executive Order AB-15-02**
- **The AMECS SECT is more cost-effective than shorepower**
- **The AMECS has built & operated three proven SECT Technologies**
 - ~ **On-Dock**
 - ~ **Ship-Side Barge**
 - ~ **Ship At-Anchor Barge**
 - ~ **Currently Building a SPUD Barge for Liquid Bulk Tanker Ships**
- **AMECS has serviced 226 ships to date**
- **AMECS On-Dock has serviced 65 ships to date**
- **AMECS Ship-Side Barge has serviced 159 ships to date**
- **AMECS At-Anchor Barge has serviced 2 ships to date**
- **AMECS has commercially operated without incident for close to 3,000 hrs.**
- **AMECS meets US Coast Guard & OSHA safety, structural & stability standards**
- **AMECS has undergone risk evaluations by both the American Bureau of Shipping (ABS) and Det Norske Veritas (DNV)**
- **AEG has the capacity to build sufficient AMECS systems to meet any schedule**



Advanced Maritime Emissions Control System (AMECS)

**AMECS Captures And Cleans Airborne Emissions
From Auxiliary Engines & Auxiliary Boilers**

**AMECS Consists Of Two Major System Components
The Exhaust Capture System & Emissions Treatment System**

1st Generation

AMECS Bonnet Exhaust Capture System

2nd Generation

AMECS Direct Connect Exhaust Capture System

Confirmed Emissions Control Efficiencies

PM 94.5% NOX 99% SO2 98.5% VOC 99.5%



**Evaluation of the
Advanced Maritime
Emissions Control
System (AMECS)**

AMECS Demonstration
at the Port of Long
Beach, California

Table 22. Emissions Reduced per Vessel

Vessel Type	PM ¹ ton/yr	NOx ton/yr	VOC ton/yr	TOTAL ² ton/yr	SOx ³ ton/yr
Auto Carrier	135.8	72.7	2.4	210.9	70.2
Bulk	42.3	22.9	0.8	65.9	21.6
Container Ship	242.0	135.0	4.5	381.5	117.4
General Cargo	34.7	17.2	0.6	52.5	19.8
Passenger	386.7	197.4	6.2	590.3	164.9
Reefer	194.8	106.8	3.6	305.2	97.3
Roll-on/Roll-off	102.7	61.1	2.0	165.8	44.5
Tanker	237.2	74.4	2.8	314.4	197.0

¹ Moyer weighting factor of 20 was applied to the PM emissions reduced.

² Total emissions only include PM, NOx, and VOC for cost effectiveness calculations.

³ SOx emissions reduced is provided in this table for informational purposes only.

AEG Has Continued To Improve Its Emissions Treatment System Technology (ETS)



AMECS 1 ETS



AMECS 2 ETS

Articulated Arm Can Reach Any Height And Length Of All Ships



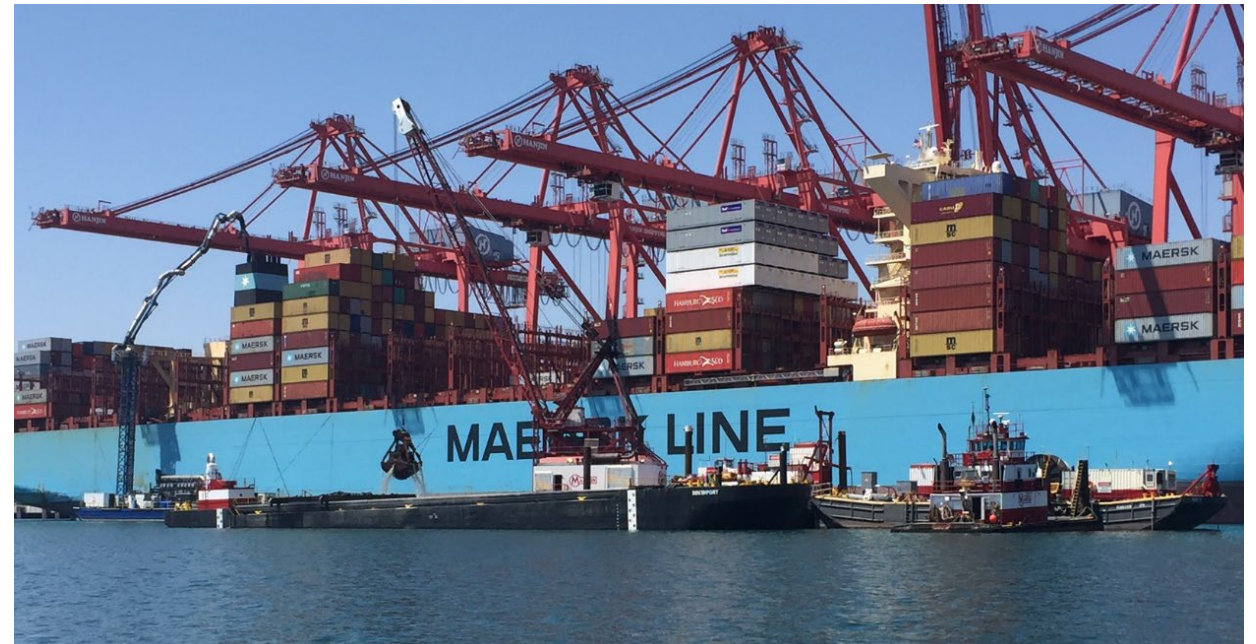
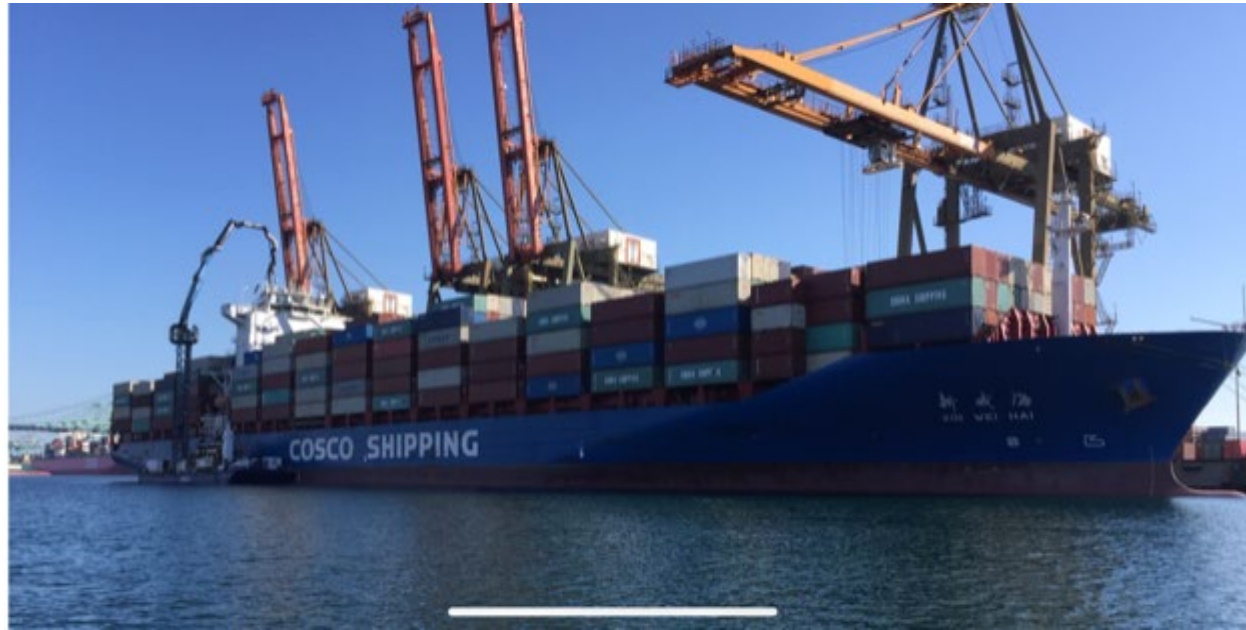
First Generation On-Dock AMECS Bonnet System



Port of Long Beach



AMECS Barge System At-Dock Direct-Connect Stack Exhaust Capture System

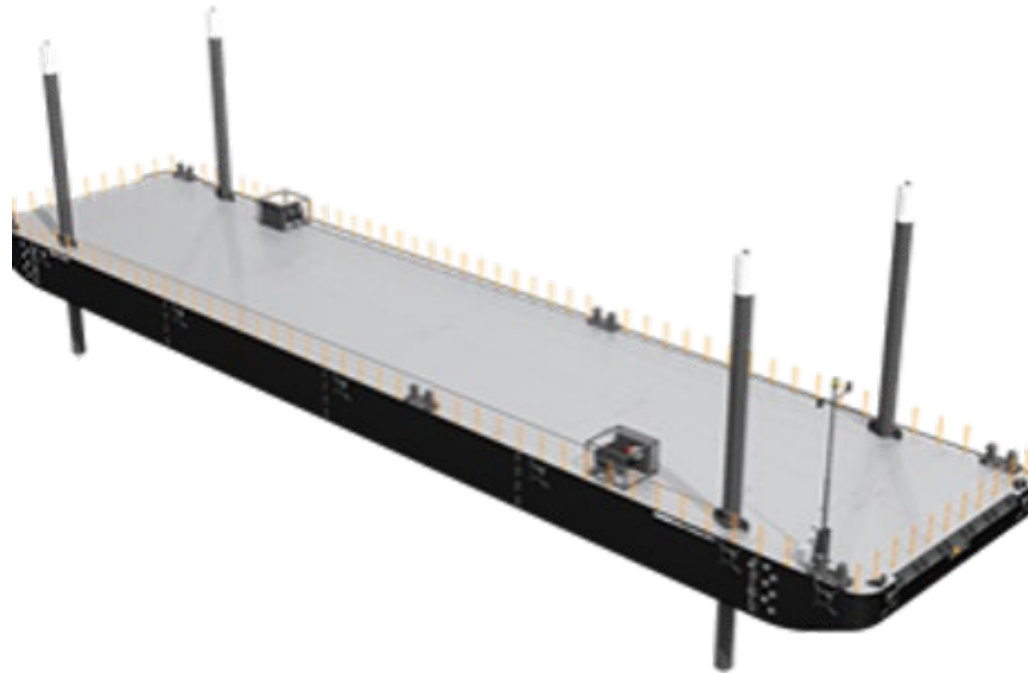




AMECS Barge System At-Ancor Direct-Connect Stack Exhaust Capture System

AMECS Spud Barge 2020

A Spud Barge is moored or anchored to the ocean floor by through-the-deck steel shafts in each corner which are lowered to the ocean floor to provide stability so that the barge does not move or shift due to the ocean waves or current. The shafts or round cylindrical pipes are referred to as spuds.



AMECS vs Shore Power Cost Comparison

Assumptions Based on California Air Resources Board (CARB) and Environ Study Data

- * Capital cost to retrofit a ship for shore power (\$1.1 million to \$1.7 million per CARB):
- * Cost differential between self-generating power and shore power purchase: \$60/MWH
- * Personnel cost of connecting to shore power with port and ship personnel: \$3,360/ visit

Additional Assumptions

- * Cost of Capital (3-year horizon): 10% WACC
- * O&M Cost of AMP at 15% per annum (\$165,000 to \$255,000 per year): \$165,000
- * Number of visits into California port per year: 10
- * Average stay per visit: 40 hours/ visit
- * Number of Hours at Berth per year: 400 hours/ yr.
- * Number of Hours connected to shore power (92.5% of 400): 370

AMECS Annual Cost Data

Shore Power Cost

- * Cost of AMP system plus Installation @ 10% WACC with a 3-year amortization: \$442,326**
- * Cost of Price Differential Between self-generation and grid power (370 X \$60): \$22,200**
- * Cost of Shore Side Personnel Used for Shore Power \$3360 X 10): \$33,600**
- * Cost of O&M for ship based AMP system and circuitry at 15% per annum: \$165,000**

Total Shore Power Annual Cost: \$ 663,126/ yr.

AMECS Cost

- * Cost of AMECS system per hour: \$1,200/ hour**

Total AMECS Annual Cost: (400 hours at Pier XYZ \$ 1,200/ hour): \$ 480,000/ yr.



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