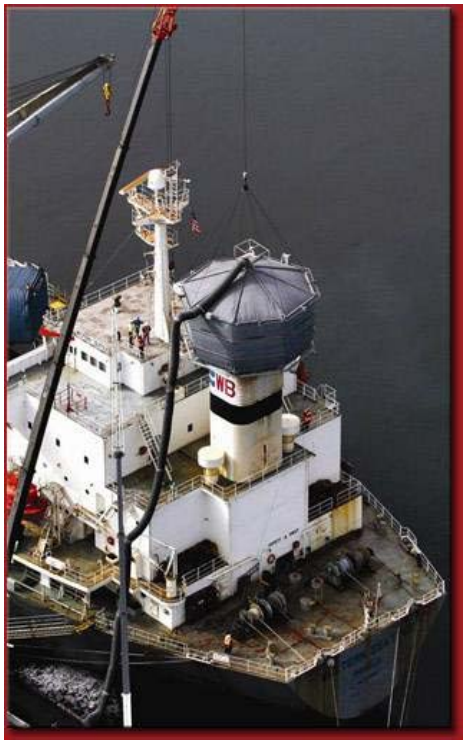
ACTI Advanced Maritime Emission Control System

Technology Manufacturer
Advanced Cleanup Technologies, Inc. (ACTI)

Co-Participants
Port of Long Beach, Port of Los Angeles, South Coast Air Quality Management District, Metropolitan Stevedore Company, Engine Fuel & Emissions Engineering, Inc., Professional Environmental Services

Project Objective

To investigate the technical and commercial feasibility of reducing emissions from ocean-going vessels not configured to use shore power while at berth. The goal was to demonstrate pollution reduction efficiencies equivalent to shore power for nitrogen oxides (NO_x), sulfur oxides (SO_x), and particulate matter (PM).



Technology Description

Advanced Cleanup Technologies, Inc. (ACTI) developed the Advanced Maritime Emissions Control System, or AMECS, as an alternative pollution control method for ocean-going vessels that are not configured to use shore power, also known as "cold ironing," while at berth.

The AMECS design tested during the demonstration used a shroud lifted over the vessel exhaust stack by means of a specially designed crane and deployment arm. The shroud was then lowered over the stack and then cinched to provide a soft attachment between the shroud and the ship's stack. A seal closed the open area between the perimeters of the bonnet and ship's stack to limit the amount of air entering the bonnet as well as to prevent exhaust gases from escaping. The exhaust gases from the ship's auxiliary engines and the boilers were routed through a flexible duct to an Emission Treatment System (ETS) located on the dock adjacent to the vessel's berth. The ETS used multiple exhaust gas treatment technologies, including scrubbers and selective catalytic reduction, to remove both gaseous and particulate pollution.

Results

The AMECS was demonstrated at Metropolitan Stevedore/Port of Long Beach on multiple vessels with varying exhaust stack configurations. Two full-scale emission reduction efficiency tests were conducted, the results of which were independently verified by two testing laboratories. The TAP-sponsored AMECS demonstration and testing project was completed as of July 2008. The demonstration results underwent an independent evaluation by the California Air Resources Board (CARB). As a result of their evaluation, CARB submitted a letter on December 15, 2008, stating their concurrence with the AMECS emissions efficiency testing results.

Benefits

During emissions testing, NO_x and PM emissions were reduced by 99% and 95.5%, respectively. In addition, sulfur oxides (SO_x) were reduced by 99%, and volatile organic compound (VOC) emissions were reduced by greater than 97 percent.

Project Costs

The Ports contributed $299,054 in co-funding to this project with a total project budget of $603,211. Funding included a $55,000 contribution from the South Coast Air Quality Management District (SCAQMD).

Technology Update

Further demonstration of this technology was necessary to determine how it functions in day-to-day operations, including evaluation of costs, durability, integration into operations, etc. SCAQMD coordinated with ACTI in 2012/2013 on a land-based AMECS demonstration at Metropolitan Stevedore's facility on Pier F, which was funded by a grant from U.S. EPA. All emissions testing related to this demonstration was completed in September 2013, per ACTI's agreement with U.S. EPA.

To ensure continuity from the land-based demonstration, SCAQMD took the lead on managing the next phase of the project, working in partnership with ACTI, to conduct further demonstration of the AMECS technology. ACTI's third-generation design is barge-based, instead of the previous design, which was fixed permanently to the wharf. Also, the new system connects to each exhaust stack separately – a "direct connect" system – rather than the previous "sock on a stack" bonnet design that fit over all the exhaust stacks at once.

On October 17, 2015, ACTI received CARB approval for its barge-based emissions control system to be used on container vessels as an alternative compliance option for the CARB Airborne Toxic Control Measure for Auxiliary Diesel Engines Operated on Ocean-Going Vessels At-Berth in a California Port, otherwise known as the Shore Power Regulation. The At-Berth Regulation includes a provision that allows alternative technologies to be used if they achieve emissions control efficiencies similar to those achieved using on-shore grid based electrical power. In order to use the equivalency option, particulate matter and nitrogen oxides control efficiencies for the alternative technology must be determined by testing as specified in the At-Berth Regulation. CARB staff reviewed ACTI's AMECS testing results and approved compliance with the requirements of the At-Berth Regulation. AMECS can now be used as an alternative technology to grid-based shore power for container vessels only. For specific approval conditions, refer to the approval documents at this link: *http://www.arb.ca.gov/ports/shorepower/shorepower.htm*