

Attachment 1: Description of Emission Reduction Measure Form

Please fill out one form for each emission reduction measure. See instructions in Attachment 2.

Title: RTG Crane Energy Regeneration System

Type of Measure (check all that apply):

- | | |
|-------------------------------------------------------|-----------------------------------------------------------|
| <input checked="" type="checkbox"/> Direct Regulation | <input type="checkbox"/> Market-Based Compliance |
| <input type="checkbox"/> Monetary Incentive | <input type="checkbox"/> Non-Monetary Incentive |
| <input type="checkbox"/> Voluntary | <input type="checkbox"/> Alternative Compliance Mechanism |
| <input type="checkbox"/> Other Describe: | |

Responsible Agency: Air Resources Board

Sector:

- | | |
|-------------------------------------------|-----------------------------------------------------------------------------------|
| <input type="checkbox"/> Transportation | <input type="checkbox"/> Electricity Generation |
| <input type="checkbox"/> Other Industrial | <input type="checkbox"/> Refineries |
| <input type="checkbox"/> Agriculture | <input type="checkbox"/> Cement |
| <input type="checkbox"/> Sequestration | <input checked="" type="checkbox"/> Other Describe: Ports - Goods Movement |

2020 Baseline Emissions Assumed (MMT CO₂E): unknown

Percent Reduction in 2020: 28+%

Cost-Effectiveness (\$/metric ton CO₂E) in 2020: <\$0

Description: This measure would require implementation of commercially available peak-power reduction retrofit technologies on rubber-tired gantry cranes. These technologies reduce emissions by regenerating otherwise wasted energy, using that energy to reduce peak power needs, directly reducing emissions in RTG cranes. These reductions may be achieved through the use of flywheel technologies, such as VYCON's REGEN system.

The measure would specifically require retrofit of existing RTG cranes within 2.5 years, and require that new cranes be outfitted with these devices. These devices operate independently of other emission control systems, and can be added to a unit with an existing emissions control system.

This measure could begin to be implemented immediately, as an early control measure.

Emission Reduction Calculations and Assumptions: Emission reductions of CO₂ are 28%, based on CE-CERT source testing of RTG crane operating cycles. These tests were

performed under contract to CARB, and for VYCON. Additional greenhouse gas reductions also occur, but have not been included as greenhouse gas equivalent reductions (ex: NOx reductions of 30%).

Cost-Effectiveness Calculation and Assumptions: Cost per unit is \$150,000. Fuel savings per year has been calculated to be 28%, or \$20,000, based on current diesel prices.

Chart outlining savings is attached.

Implementation Barriers and Ways to Overcome Them: Capital cost of units is high. However, the subject of the regulation does not include small businesses. Further, immediate implementation will actually pay for additional compliance measures needed to meet the requirement of CARB's Cargo Handling Equipment (CHE) rule.

High capital costs can also be optionally addressed through low-interest loans or subsidies.

Potential Impact on Criteria and Toxic Pollutants: The measure will also reduce NOx emissions by 30%, VOC emissions by 26%, PM10 by 33%, CO by 27%, and toxic air contaminants by about the same amount as PM10 is reduced.

Name: Mark Abramowitz

Organization: Community Environmental Services

Phone/e-mail: (714) 936-6338 [cell]/ marka@enviropolicy.com